TENDER SPECIFICATION

No. BHE/PW/PUR/HZGG-CLE/645

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 1x350 MW Combined Cycle Power Plant comprising of HRSG, Frame 9 FA Gas Turbine, Steam Turbine and their Auxiliaries, Piping etc.

AT

GUJARAT STATE ENERGY GENERATION LIMITED

NEAR HAZIRA, VILLAGE MORA

POST BHATHA, SURAT HAZIRA ROAD,
DISTT.-SURAT, PIN : 394510
GUJARAT

PART I - TECHNICAL BID

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

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LEGEND:

$: Attached at the end of hard copy of Tender Specifications Part-I. Hosted in BHEL web page (www.bhel.com) as file titled **"NIT+GCC-645".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid-645)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-645"**

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-645"**

BHARAT HEAVY ELECTRICALS LIMITED
(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR - WESTERN REGION
SHREEMOHINI COMPLEX
345, KINGS WAY - NAGPUR 440 001

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

No. BHE/PW/PUR/HZGG-CLE/645

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Handling at Storage Yard/ Stores, Transportation to Site, Calibration, Erection, Testing, Commissioning, Final Painting and Handing Over of Electrical and Control & Instrumentation Works of 1x350 MW Combined Cycle Power Plant comprising of HRSG, Frame 9FA Gas Turbine, Steam Turbine and their Auxiliaries, Piping etc.

AT

GUJARAT STATE ENERGY GENERATION LIMITED

NEAR HAZIRA, VILLAGE MORA

POST BHATHA, SURAT HAZIRA ROAD,
DISTT.-SURAT, PIN : 394510
GUJARAT

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, KINGS WAY - NAGPUR 440 001

PROCEDURE FOR SUBMISSION OF SEALED TENDERS

THE TENDERER 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

EXCEPTING RATE SCHEDULE, ALL OTHER SCHEDULES, DATA SHEETS AND DETAILS CALLED FOR IN THE SPECIFICATION SHALL BE ENCLOSED IN PART-I "TECHNICAL BID" ONLY.

PART-II (PRICE BID) COVER-II

ALL INDICATIONS OF PRICE SHALL BE GIVEN IN THIS PART-II "PRICE BID". **EMD SHALL NOT BE INCLUDED IN THIS COVER.**

THESE TWO SEPARATE COVERS-I AND II (PART-I AND PART-II) SHALL TOGETHER BE ENCLOSED IN A THIRD ENVELOPE (COVER-III) ALONGWITH REQUISITE EMD AS INDICATED EARLIER AND THIS SEALED COVER SHALL BE SUPERSCRIBED AND SUBMITTED TO ADDL. GEN MANAGER (PURCHASE) AT THE ABOVE MENTIONED ADDRESS ON OR BEFORE THE DUE DATE AS INDICATED.

THE QUALIFIED TENDERER WILL BE INTIMATED SEPARATELY ABOUT THE STATUS OF THEIR OFFER.

TENDERER 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.

- TENDERER SHOULD MEET QUALITY REQUIREMENT REGARDING WORKMANSHIP, DEPLOYMENT OF PERSONNEL, ERECTION TOOLS AND NECESSARY INSPECTION, MEASUREMENT & TESTING INSTRUMENTS.

- ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION SHOULD BE FURNISHED IN COMPLETENESS. PLEASE REFER THE CHECKLIST.

- CLARIFICATION ON TENDER IF ANY, SHALL BE OBTAINED BY THE TENDERER 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.

- In case customer approval is required for this package, bidder's offer will be accepted subject to approval of bidder by customer.

PROJECT INFORMATION

Sl.No.	Description	Details
1	Owner	Gujarat State Energy Generation Limited (GSEG)
2	Project Title	1x350 MW Combined Cycle Power Plant
3	Location	Hazira, next to existing GSEG's 156.1 MW CCPP, Near Hazira, Village Mora, Post Bhatha, Surat-Hazira Road, Hazira, Dist.-Surat-394510, Gujarat State, India
4	Power Station site Graded Level Elevation Above Mean Sea Level (MSL)	5.65 Meters above MSL
5	Latitude/ Longitude	72° 38' E/ 21° 08' N
6	Nearest Railway Station	Surat (distance about 30 Km)
7	Nearest Town	Surat (about 20 Km)
8	Nearest Airport	Surat- 20 Km, Mumbai– 300Km, by road
9	Road Approach	From State Highway NH08 running between Ahmedabad and Mumbai. The village –Mora in on NH08 and where the distance of plant is about 5 Km.
10	Site Ambient Conditions	
10.1	Highest ever temp recorded (Dry Bulb)	45.6 Deg C
10.2	Lowest ever temp recorded (Dry Bulb)	4.4 Deg C
10.3	Maximum Daily Average (Dry Bulb)	33.0 Deg C
10.4	Average Mean Dry Bulb Temp	33.0 Deg C
10.5	Average Mean Wet Bulb Temp	28.5Deg C
10.6	Relative Humidity	Max – 89%, Min – 10%, Average-70%
11.7	Basic Wind speed	8.1 Meter / Hr.
11.8	Average Rain fall	1203 mm.
11.9	Seismic Zone	Zone III

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

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 (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 BY BIDDER

I, ... hereby certify that all the information and data furnished by me with regard to the Tender Specification No. BHE/PW/PUR/HZGG-CLE/645 is 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 bidder and a valid power of attorney to this effect is also enclosed**.

Authorized representative's signature with
Name and address

Date:

Bidder's Name and Address

CERTIFICATE OF NO DEVIATION

Tender Specification No. BHE/PW/PUR/HZGG-CLE/645

I/WE, M/s
.....

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

Date:

Signature and Official Seal of Bidder

SECTION – 3
OFFER OF THE CONTRACTOR

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

Dear Sir,

I/we hereby offer to carry out the work detailed in tender specification no. BHE/PW/PUR/HZGG-CLE/645 issued by Bharat Heavy Electricals Limited, Power Sector-Western Region, Nagpur, in accordance with the terms and conditions thereof.

I/we have carefully perused the following documents connected with the above work and agree to abide by the same.

1. Instructions to bidders
2. General conditions of contract
3. Special conditions of contract
4. Other sections, appendices, schedules and drawings.

I/WE HAVE DEPOSITED / FORWARDED HEREWITH THE EARNEST MONEY DEPOSIT FOR A SUM OF RS. 2,00,000/- (RUPEES TWO LAKH ONLY) DETAILS OF EMD PAYMENT ARE FURNISHED IN THE CHECK LIST.

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

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

Place: Signature of Bidder:
Date: Address:

Witnesses with their Address

Signature	Name	Address
1.		
2.		

SECTION – 4

SPECIAL CONDITIONS OF CONTRACT

4.0 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 350 MW Combined Cycle Power Station Having:

- 1 x Frame 9 FA Gas Turbine and its Auxiliaries
- HRSG and It's Auxiliaries
- Steam Turbine and its Auxiliaries
- Piping
- Electrical items
- Instrumentation and Control items

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

4.0.3
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.

4.0.4
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.

4.0.5
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.

4.0.6
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.

4.0.7
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, levelling, 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 and STG 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:

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

Power Cables	**1.5%**
Control & Instrumentation Cables	**2.0%**
Fabrication steel	**2.0%**
Impulse pipe/tubes/GI pipes/copper tube	**1.0%**

If however, the bidder quotes for more wastage than specified above, the excess portion will be considered for adjustment during the tender evaluation at the quoted supply rate of material.

If the actual wastage be more than the specified figure, then equivalent price of the excess portion will be deducted from the contractor's bill.

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, colour 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.moutnted 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 and STG Hall, LT & HT Switchgear room, Unit Control Room etc.

D 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.

E 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.

F 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.

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

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

4.5.2 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, levelling, 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, OFC)**

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/JB.

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 along with 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 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.

Laying, etc of Optical fibre cables on cable trays /cable trench shall necessarily be done using flexible conduit

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 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. 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, Steam Turbine, 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 Transformer / Service Transformer/ Unit Auxiliary transformer

4.6.1 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: -

4.6.2 Transportation of generator transformer tank from store/unloading place to the transformer foundation. 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. Transformer tank shall be made available within 20-meter radial distance from transformer foundation.

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

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

4.6.5 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.

4.6.6 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.

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

4.6.9 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.

4.6.10 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.

4.6.11 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.

4.6.12 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.

4.6.13 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, 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.

4.6.14 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.

4.6.15 Generator Transformer tanks shall be made available to the contractor upto 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, crane etc at his cost for this operation. However accessories shall have to be shifted from stores

4.6.16 Each drum of oil to be tested for BDV and if BDV is less, then each drum should be filtered separately. This treated oil to be filled in the transformers and auxiliaries. Contractor has to arrange storage tank of 10 kilo litre capacity with internally sand blasted and coated with one coat of oil resistance paint. Oil from drums to be transferred in storage tank and filtration to be carried out to achieve the required However, for low capacity of transformer, a separate storage tank for mass filtration may not be required

B 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 & STG

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 CT 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 etc.

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, hardwares, conduit for wiring, marshalling box, CTs and pt 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 circumferantial 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 test 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 circumferance and horizontal plain.

conductor/ enclosure size and welding joint details for gtg & stg bus duct. Refer appendix –vi

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.
Ht 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, 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 during charging / discharging cycle.

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.

A Calibration

- Verification after drawing of material of various types, range of the field devices with respect to instrument schedule, data sheet or system document.
- Codification of instruments as per system tag numbers
- Calibration / adjustment of instrument as per system requirement / set values.
- Providing head correction in case of pressure measurement as per calculated values or actual measured value for the instrument, which are used for interlock protections / monitoring. This is generally applicable for turbine / generator, lube oil systems, lube oil system of fans etc.
- Verification of installation of instruments for range, type, tag number as per physical location of process point as per process, instrumentation diagram.
- Checking and ensuring the proper function of instrument.
- All the recorders shall be made functional with proper chart movement and ink marking.

- 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.

B Erection

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

C Testing, Commissioning & Trial Operation

- Checking/verification of binary/analogue input and output signal from field and panel and upto recording/indicating instrument/MMI monitors.
- Adjustment, testing, calibration of pneumatic drive (control valve, trip valve, power cylinder for gate/dampers), electrical actuator operated valve/gate/dampers of other functional elements.
- Checking the operating electrical/pneumatic drive through functional group panel, remote control desk, MMI, CRT operation and repeatability and smooth operation to be checked.
- Checking the interlock, protection and alarm for various process by simulation of field devices/process changes.

- Functional check of sub-loop control, sub group control and auto loop and fine tuning.
- Adjustment of limit switches/feed back position transmitter checking the actuator for correct Limit switch operation for correct position indication and repeatability shall be ensured.
- Motor IR value measurement, bearing/winding RTD checking, drying out of motor, providing assistance for trial run of motor which includes monitoring temperature rise winding/bearing during trial run.
- Contractor shall prepare calibration/testing report/protocols.
- During trial run of various systems, if the performance of any instrument is found erratic, un-satisfactory and requires re-adjustment, re-calibration etc., the defect shall be attended by contractor.
- Observing and checking the performance of the various devices on load/process variation. Any deficiencies/defect noticed during the variable load conditions, the same should be attended properly.
- Observe the proper functioning of sub-group/sub-loop control.
- Check the operation of various controls in manual/auto mode for smooth functioning.
- Clearing of all bad / invalid signals noticed during commissioning.
- Providing necessary assistance for **Trial Operation** of the unit is in scope of this specification. Trial Operation shall be considered successful on completion of operation of the respective units for a continuous period of 720 hours at maximum available load. Out of this period, 72 hours shall be at full rated load of the unit. Smooth operation and availability of all instrument/controls of the systems installed under the scope herein, shall be ensured by the contractor. Contractor shall provide adequate number of skilled manpower and T&P for this purpose. Interruption in Trial Operation for reasons attributable to the Contractor shall result in re-start of the Trial Operation all over again, consequential extension in Time Schedule / Contract Period shall be to the contractor's account.
- If any small wiring correction or minor modification in control panel wiring is noticed during the commissioning, it shall be carried out as a part of commissioning activity.

D <u>Post-commissioning</u>

- Contractor shall rectify the defect observed/informed by customer during the trial run.
- Contractor shall submit the as- built drawing as per guidelines and instruction of BHEL engineer.
- After trial run/handing over of the equipment, if due to unforeseen reasons, certain works crop up, the contractor shall provide all the assistance.

E. <u>PG Test Assistance</u>

- For PG test assistance, laying of impulse pipes, cables, etc. and installation of instrument tapping points shall be done by the contractor. These activities may be carried out at any point of time before or after Completion of Facilities. Payments will be made as per item rates of comparable similar or identical items in the rate schedule. Such temporary installations shall have to be dismantled and returned to BHEL Stores, after the completion of PG Test for which no separate payment is admissible.

4.13.0 Unit control desk and components

4.13.1

Unit control desk will be supplied in a single shipping section for erection at site.

Console Inserts shall be supplied either mounted on console grid or supplied loose. Also, the items (indicators, pushbuttons, etc.) of the console insert may be supplied mounted in the console insert or may be supplied loose. The lumpsum rates quoted for console inserts should take the above into consideration. No separate payment will be done for the erection of individual components of console inserts. However, for the other items like recorders, indicators, etc., unit rate shall be applicable. Alarm facia on the control desk may be supplied mounted or loose. Mounting these, if required, will not attract any extra payments. The commissioning of these will constitute a part of the panel commissioning from where the alarm is driven.

4.13.2

Wherever control desk / panel is not supplied by BHEL or is in customer scope of supply and installation, loose item supplied by BHEL if any, shall have to be mounted by the contractor.

4.13.3

Console/console tiles shall have plug-in/screwed/soldering/crimp snap-on, connection. Interconnecting cable between console and process control panel shall be either of pre-

fabricated plug-in cable or plugs are required to be made at site with crimp insertion type of pins. BHEL shall provide plugs and any special lugs at free of cost. However, other ordinary lugs required for the work shall be arranged by contractor.

4.13.4

Generally, 0.5 sq.mm multi pair shielded cables are envisaged for console cabling. Cable may have to be terminated at different console tiles, spliced wire of individual cable need to be routed through PVC sleeves upto the plug end of the tiles.

4.14 Battery/battery charger/UPS

4.14.1

HDP Tubular 550/600AH or NiCd (or similar type) or Lead acid Batteries will be supplied loose along with battery interconnection in the series/parallel links/bus bar, lugs, steel/wooden battery stand either assembled or knocked down condition, cables and associated charger and UPS system.

4.14.2

In case of Lead acid battery, the electrolyte shall be supplied in plastic cans. After installation, the electrolyte has to be filled in batteries and charging/discharging shall be carried out to achieve specific gravity of electrolyte and stability of battery/battery bank. If required, discharging of the charging cycle shall be repeated to achieve the desired results. However, BHEL engineer's decision shall be final. Any preparatory arrangement required to be done for charging and discharging of battery, the contractor shall arrange consumables, safety equipments etc., at his own cost.

4.14.3

In case of NiCd (or similar type) batteries are normally supplied in charged condition, due care shall be exercised while handling/installation of the same. If the battery charge is found to be less than the required level, the charging/discharging cycle shall be carried out as per instruction of BHEL engineer.

4.14.4

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

4.14.5

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

4.14.6

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.

4.15 Vibration monitoring system for boiler auxiliaries

System comprises of transducers with integral cables, weldable pads, wall mounted cabinet including monitors. The pads required to be welded on SS block on HT motors end shield and fan bearing housing. In case of pad sizes more than the SS block provided on motor, contractor shall get the pads machined as per the required size and blue matching to be carried out before welding on bearing housing. No extra charges will be applicable.

4.16 Control panels

SG, TG, Station C&I system panels are based on Max DNA distributed digital control philosophy. Max DNA system is having communication through UTP cables amongst themselves. The system consists of computer network with servers and workstations and various peripherals like printers, etc. Optical fibre cables are also used for communication, especially for larger distances. The various components/devices are generally located in control room/computer room/diagnostic and shift in charge room. Some panels (viz. network panels) are also located in outdoor plants and other units.

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 placement of furniture against each device as given in the rate schedule.

4.16.1 Steam and water analyser system

The system consists of the following in general:

Wet system panel consisting of 2 nos. of Primary sample coolers(Approx dim. 2000x1800x600 mm, 2000x600x600 mm), Secondary coolers(appox. Dim. 1800x3040x1340 mm), Wet panel (approx. dim. 4600x2100x600 mm, 600 kgs.), Dry panel (Approx. dim. 5000x2300x750 mm) tubing and fittings for individual stream of steam and water lines and associated devices assembled together and housed in sheet metal enclosure. Process sample line of SS material to be terminated at panel end with bulk head connection. Sample lines will be socket welded type. Ph sensors, conductivity

analyzer , chloride analyzer , sodium analyzers, silica analyzer, multi channel, DO2 analyzer, hydrazine analyzer and sensors for these analyzers will be supplied loose with integral / prefab cables, to be mounted and wired up in relevant panels.

Recorder panel may be supplied separately where the recorders (supplied as loose items) will have to be mounted and wired up.

In wet analyser panel, Phosphate, chlorine, silica, hydrazine, chloride, etc analysers along with accessories will be supplied loose for mounting, wiring and tubing at site.

Chiller Unit, auxiliary cooling water, etc would be supplied as package with accessories like SS/CS pipes, chilled water circulating pump, chilled water storage tanks, valves and fittings.

Commissioning of the analysers is a part of analyser panel commissioning (both wet and dry).No extra payment will be made for installation of the analysers in the panels and wiring of the same.

Commissioning support will be provided by vendor.

4.16.2 Flue gas analysers

4.16.2.1 Oxygen Analysers

The system consists of Zirconia probes, electronic units Panel for mounting electronic unit, purging and calibration gas arrangements, etc. The probes are meant for direct mounting on duct / chimney, etc., at suitable elevation.

Commissioning support will be provided by vendor.

4.16.2.2 NOX, SOX, CO analysers

NOX, SOX, CO analysers system consist of extraction type sampling probes and shall be mounted on the chimney at a considerable height. This will also consist of other accessories like gas extraction sampling pumps, sampling tubing, electrical heat tracer, insulation, test gas cylinders, purge air compressors, etc, etc.

Commissioning support will be provided by vendor.

4.16.2.3 Opacity Monitor

This consists of transmitters, receivers, Local electronic units and housing, air blower and associated hoses / pipes, JBs and cables.

Commissioning support will be provided by vendor.

4.17 Earthing installations

4.17.1

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

4.17.2

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.

4.17.3

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.

4.17.4

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

4.17.5

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

4.17.6

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

4.17.7

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

4.17.8

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.

4.18

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.

4.19 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.

4.20 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 ACCOMMODATION, DRINKING WATER & LOCAL TRANSPORTATION FOR THE LABOUR OTHER EMPLOYEES

BHEL/client is not providing any land / space for labour / workmen colony. Contractor shall make his own arrangements for accommodation of his labour and staff out side the project premise with necessary facilities including drinking water, Sanitation, Transport, Electricity, FIRST AID & Emergency transport facilities with all other Hygienic requirements etc at his own expenditure. BHEL/client shall not provide any facility in this regard.

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 occur 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
All the required welding electrodes, as approved by BHEL shall be arranged by contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement, regarding manufacturer, type of 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 for verification & record before the actual use of the welding consumables.

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 Filler wires, for TIG welding of pressure parts, piping and systems of approved quality as per requirement shall be arranged by Contractor as scope of work at his cost. BHEL shall not provide any filler wires for the works under these specifications.

5.4.3
Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the contractor at his cost.

5.4.4
Nitrogen gas, if required, for preservation of boiler & related system and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from Cylinders.

5.4.5
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.

5.4.6 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 cum stores. Only small open space as per available location will be provided by customer free of charge. **As such there is limitation / shortage of open space in side the project premise and looking to this aspect contractor will plan his small portable type (Porta Cabin) office cum T&P storage arrangement at site.** After the completion of work, contractor shall dismantle his structures/ installations and handover the vacant land to bhel/customer.

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

5.6.1
Contractor shall arrange adequate floodlights, hand lamps and area lighting. Contractor shall use his own materials like cables, fuses, switch-boards etc. BHEL/client will not provide anything in this regard.

5.7 Construction Power & Water

5.7.1

Construction power (three phase, 415v / 440v) will be provided at one point near the site approximately 300 meters from erection site free of charge. However the contractor shall provide energy meter (calibrated) for measuring the consumption of power in their works. all cables, fuses, distribution boards, switches, switchboards, bus bars, earthing arrangements, protection devices e.g. ELCB if any and any other installation as specified by statutory authority/client in this regard for drawl of construction power and further distribution shall be arranged by the contractor. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to these being put to use or as may be specified, shall be the responsibility of the contractor.

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

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. The installation and maintenance of this shall be done by licensed and experienced electrician.

5.7.3
The customer will provide water for construction purpose at a single point free of charge, however any taxes, duties, levies, charges shall be borne by the contractor. All arrangements for further distribution with necessary meter and metering arrangement has to be made by the contractor.

5.7.4
Contrcator shall make his own arrangement of drinking water.

5.7.5
Contractor shall be well equipped with back-up power supply arrangement like DG set and diesel operated welding machine etc. to tackle situations arising due to failure of customer supplied power, so as to ensure continuity and completion of critical processes that are underway at the time of power failure or important activities planned in immediate future.

5.7.6
BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage or frequency or interruptions in power supply.

5.7.7
The meters to be used for metering of construction power as well as construction water shall have necessary test certificate from relevant approving authority and these meters shall be used only on clearance from client/BHEL.

5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

Refer clause 2.8 of general conditions of contract also in this regard.

5.8.1
Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.2

BHEL / customer may insist for 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.

5.8.3

It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc for entering the project premises. 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 permits for working beyond normal working hours.

5.8.4.
Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangement including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

5.8.5
If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability/shortfall in provision of resources from the contractor's side, BHEL will make suitable alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads thereon shall be recovered from the contractor.

5.7.6
The contractor in the event of engaging 10 or more workmen will obtain Independent licence under the contract labour (regulation and abolition) act 1970 from the concerned authorities based on the certificate (form-V) issued by the principal employer/customer. In order to issue the certificate (form-V) by customer, contractor shall fulfill all statutory requirements like Insurance Policy, PF code/PF account number etc. as per requirement of Customer.

5.8.7
Contractor will deduct the necessary amount from his employees towards provident fund and contribute the equal amount as per government of india labour laws. This amount will be deposited regularly to the provident fund commissioner and get the account code. Contractor shall submit the above account code duly certified by pf commissioner to bhel project incharge.

5.8.8
It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc. Necessary coordination with Coustomer/BHEL officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by Coustomer/BHEL for making gate passes.

5.8.9
BHEL/Coustomer may insist upon witnessing the regular payment to the labour. They may also like to verify the relevent records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL/Coustomer.

5.8.10
Contractor shall also comply with the provisions of ESI act in vogue and submit evidence thereof to BHEL site incharge. Also all other 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.

5.8.11
Contractor shall also comply with the requirements of local authorities / project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.12
Where permitted, by Costomer/BHEL, to work beyond normal working hours, the contractor shall arrange necessary gate passes.

5.9.0 TAXES, DUTIES, LEVIES

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

5.9.1

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

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

5.9.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on output Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Output Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and deposit the same with the concerned tax authorities, such applicable amount will be paid by BHEL.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract.. **Contractor has to mention in their RA Bill service tax registration number and remittance record of such tax immediately after depositing the tax with concerned authorities.** Contractor shall obtain prior written consent from BHEL before billing the amount towards such taxes.

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

5.9.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where

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

5.9.4 Modalities of Tax Incidence on BHEL

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

5.9.5 New Taxes/Levies

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

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

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

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) Daily and Monthly Progress reports

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 should have valid Electrical Contractor-ship License to carry out the Erection, Testing & Commissioning work on High / Low Voltage electrical equipments from the appropriate statutory authority of concern state or Central Electricity Authority, as the case may be.

5.12.2
Contractor shall arrange inspection of concerned Statutory Authority for the installation, testing & commissioning of High / Low voltage equipment covered under 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 Statutaory Authority towards the certification of installation / works. BHEL shall reimburse Statutory Fees as per actual on submission of original receipt, however all incidental expenses shall be borne by Contractor. BHEL/ BHEL's Customer shall be providing technical assistance, drawing & document for submission to Statutory Authority.

5.12.4
The installation of all electrical equipments shall be carried out only by persons holding valid certificates of Competency for the voltage classes as defined in this tender specification, issued by appropriate state or central Statutory Authority. Contractor shall submit the particulars of Licenses held by him.

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 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.

6.7 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 another contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations shall be borne by the contractor.

6.8 WATCH AND WARD

Contractor shall arrange and provide watch & ward round the clock for the materials/equipments issued to him.

6.9
Contractor shall implement local labour laws and Safety & Insuranace requirements, maintain necessary records and co-ordinate with the local labour authorities on all matters of labour and industrial relations.

6.10

The contractor shall comply with the applicable law, rules and regulation etc; with regard to employment of labour. He shall obtain labour license.

The scope includes getting the licenses and approvals from the statutory authorities, arranging for inspection of electrical inspector periodically as per BHEL engineer's instructions, submitting documents etc. and following up the matter with them as and when necessary for the work involved in this scope. All expenses, fees, levies etc have to be borne by the contractor.

6.11 Industrial Relations and Labour Laws

6.11.1
An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition act) and also coordinate with the local labour authorities. Contractor has to ensure minimum wages payment to their labours as per the rule of the state and they have to produce documentary evidence to that effect to bhel.

6.11.2
Contractor shall provide the names and details of engineer/ supervisors at the time of mobilization to bhel as per the proposed organization chart.

6.11.3
In case at any time the contractor is not in a position to deploy the required engineers/supervisors due to any reason, BHEL shall have the option to deploy their engineers/supervisors. The expenditure incurred with overheads on this account will be recovered from the contractor's bills.

6.11.4
The contractor's supervisory staff shall execute the work in the most substantial and workmanlike manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/ instructions given by bhel engineer from time to time.

6.11.5
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 and in general, 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.

6.11.6

Contractor will deduct the necessary amount from his employees towards provident fund and contribute the equal amount as per government of India rules. This amount will be deposited regularly to the provident fund commissioner and an account code obtained. Contractor shall submit the above account code duly certified by pf commissioner to bhel project in-charge. Also all other employees' benefits are to be borne by the contractor as per statutory laws.

6.11.7
The contractor shall obtain independent labour license under the contract labour (regulation and abolition) act from the concerned authorities based on the certificate (form-v) issued by the principal employer/customer.

6.11.8
The contractor shall pay for all taxes, fees, license charges, local body clearance, duties, tools, royalty, commissions and other charges, gate passes which may be leviable on account of his operation in executing the contract. In case bhel is forced to make any such payments, bhel shall have the right to recover the same from contractor's bills.

6.12 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.

6.13 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.

Contractor to provide necessary engineers and supervisors for the work and they shall have adequate experience in similar type of work. Adequate staffing shall be provided by contractor in the following areas:-

- Overall co-ordination planning & execution

- Boiler & aux. C&I erection / commissioning
- Turbogenerator and aux. C&I erection / commissioning
- Station C&I & Mark VI
- Instrument calibration
- Quality control
- Safety
- Planning, review, monitoring & reporting
- Industrial relations
- Material management, material identification, transport, storage & supervision.

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

7.2 SPACE 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 relevant **Appendix** 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

Refer Section-5 in this regard.

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.

7.9.1 **CRANES TO BE PROVIDED BY BHEL**

7.9.1.1
BHEL will make available EOT (as per relevant appendix) free of hire charges to the contractor on sharing basis subject to availability and accessibility. Allocation of this crane has to be shared with other agencies / contractors of BHEL, which will be binding on the contractor. Contractor shall make all arrangements of all other arrangements, T & P, cranes and other suitable arrangements as required for satisfactory completion of work as scope of work of this tender specification.

7.9.1.2

Any boom reduction, extension for their use and restoration to pervious state / condition or as directed by BHEL after the use shall be the contractor's responsibility. Contractor shall arrange at his cost suitable capacity of assist crane for boom extension & reduction, handling of plates, boom inserts and suitable trailers for shifting of the plates boom inserts from bhel store's to site and return back to stores after completion of work

7.9.1.3
BHEL shall not provide any other crane and any other T&P or transportation arrangement for this work.

7.9.1.4
The day-to-day upkeep and running maintenance like filling / topping up of lubricants, etc, of BHEL T & P shall be the responsibility of the contractor. Spares if any, required in normal course will be provided by BHEL. Major breakdowns will be attended to by BHEL.

7.9.1.5
All arrangements, including providing & laying of sleeper beds, backfilling of approaches wherever necessary for safe movement of the cranes as directed by BHEL shall be the responsibility of the contractor. Sleepers for this purpose shall be provided by the contractor.

SECTION-8 (Rev 01, 24/01/2009)
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.

The protocols between contractor and customer/ BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/ BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

8.3 A daily log book should be maintained by every supervisor/engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/clearance / centering / leveling readings and inspection details of various equipments etc.

High pressure welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc. will be documented in welding log as per BHEL Engineer's instructions.

Record of radiography containing details like serial number of weld joints, date of radiography, repairs, if any, re-shots etc shall also be maintained as per BHEL Engineer's instructions.

Record of heat treatments performed shall be maintained as prescribed by BHEL.

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 furnished for scrutiny of BHEL's Engineer. 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/Customer/Consultant. Only welders duly authorized by BHEL/customer/consultant shall be engaged on the work.

8.6 Contractor shall provide all the measuring monitoring devices (MMDs) required for completion of the work satisfactorily. These MMDs shall be of brand, quality and accuracy specified by BHEL Engineer and should have necessary calibration and other certificates as per the requirement of BHEL Engineer. Decision of BHEL Engineer regarding acceptance or otherwise of the measuring instruments/gauges/tools for the work under this specification, is final and binding on the contractor. The indicative list of MMDs 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 wherever required.

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

8.8

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

8.9 BHEL, Power Sector – Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect which needs special mention is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMDs (Instrument Measuring and Test Equipment). The MMDS shall have test / calibration certificates from authorised / Government approved / Accredited agencies traceable to National / International Standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMDs so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMDs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall ie repeat the readings taken by that instrument, failing which BHEL may deploy MMD and retake the readings at Contractor's cost.

8.10 Re-work necessitated on account of use of invalid MMDs 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.

8.11 In the courses of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. BHEL may counter/ finally check the measurements with their own MMDs. Contractor shall render all assistance in conduct of such counter/final measurements.

8.12 Vibration indicators / vibration recorders / vibration analysers will be provided by BHEL for checking and analysing vibration levels of rotating equipments with necessary operators. Contractor shall provide necessary labour for carrying out such tests.

8.13 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 the services of Quality Assurance Engineer.

8.14 Stage Inspection By FES/QA Engineers

Apart from day-to-day inspection by BHEL Engineers stationed at Site and Customer's Engineers, stage inspection of equipments under erection and commissioning at various stages shall also be conducted by teams of Engineers from Field Engineering Services of BHEL's Manufacturing Units, Quality Assurance teams from field Quality Assurance, Unit/Factory Quality Assurance and Commissioning Engineers from Technical Services etc. Contractor shall arrange all labour, tools and tackles etc for such stage inspections free of cost.

8.15 Any modifications suggested by BHEL FES and QA Engineers' team shall be carried out. Claims of contractor, if any, shall be dealt as per Section 13, and provided such modifications have not arisen for reasons attributable to the contractor.

Statutory Inspection of Work

8.16 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.

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

1) Inspectorate of steam boilers and smoke nuisance
2) Factory Inspector, Labour Commissioner, Electrical Inspector PF Commissioner and other authoritiy connected to this project work

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority periodically as per BHELl Engineer's instructions, arranging materials for ground inspection, taking rub outs for the pressure parts to be offered for inspection, submitting co-related inspection reports, documents, radiographs etc and following up the matter

with them. Contractor shall also make all arrangements for offering the Products / Systems for inspection at location, as applicable, to the concerned authority.

8.17 Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state concerned. contractor also should be aware of the latest IBR regulations and Electricity Act, including the amendments thereof.

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

8.19 Other fees like fees for periodic visits, hydraulic test fees, light up inspection fees etc. shall be borne by the contractor.

8.20 Payment of Registration fees for Boiler is excluded from the scope.

8.21 BHEL shall pay the ground inspection fees of Boiler Inspectorate. All other arrangements for site visits periodically by Boiler Inspector to site, for obtaining Inspection certificate etc, will have to be made by contractor.

8.22 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

8.23 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

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

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

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

9.1 The Contractor shall:

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

9.1.2
Hold BHEL harmless and indemnified from and against all claims, cost and charges under Workmen's Compensation Act 1923 and 1933 and any amendment thereof and the contractor shall be solely responsible for the same.

9.1.3
Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorized 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 signboard giving the following information and display it near work site:

i) Name of Contractor
ii) Name of Contractor Site-in-charge & Telephone number

iii) Job Description in short
iv) Date of start of job
v) Date of expected completion
vi) 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 authorized 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.

9.2.1.2
The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's authorized person to prevent loss of human lives, injuries to men engaged and damage to property and environment.

9.2.1.3
The contractor shall provide to his work force and also ensure the use of Personnel Protection Equipment (PPE) as found necessary and/or as directed and advised by BHEL officials without which permission is liable to be denied.

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

9.2.1.4
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 authorized BHEL official who shall have the right to ban the use of any item found to be unsafe.

9.2.1.5
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.

9.2.1.6
The contractor shall not use any hand lamp energized 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.

9.2.1.7
The contractor shall adopt all fire safety measures as per relevant Indian Standards

9.2.1.8
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 authorized BHEL official at the site.

9.2.1.9
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.

9.2.1.10
Temporary arrangements made at Site for lifting , platforms, approach access etc should be properly designed and approved before being put to use.

9.2.1.11
All excavations and openings must be securely and adequately fenced/barricaded and warning signs erected when considered necessary as per relevant code of practice.

9.2.1.12
No persons shall remove guardrails, covers or protective devices unless authorized by a responsible supervisor and alternative precautions have been taken

9.2.1.13
Access ways, means of escape and fire exits shall be clearly marked, kept clear and unobstructed at all times

9.2.1.14
Only authorized persons holding relevant license will drive and operate site plant and equipments e.g. cranes, dumpers, excavators, transport vehicles etc

9.2.1.15
Only authorized personnel are allowed to repair, commission electrical equipments.

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas Cylinders Rules and relevant safe working practices

9.2.1.17

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.

9.2.1.18
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.

9.2.1.19
The contractor shall train adequate number of workers/supervisors for administering "FIRST AID". List of competent first aid administers should be prominently displayed.

9.2.1.20
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

9.2.1.21
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.

9.2.1.22
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.

9.2.1.23
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.

9.2.1.24
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.

9.2.1.25
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 authorized 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.

9.2.1.26 **Emergency Response**

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

- Safeguard of life
- Protect assets under construction or neighbouring
- Protect environment
- Resumption of normal operations as soon as the emergency condition is called off

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

9.2.1.27
At least 5% Contractors supervisors and workmen shall undergo training in administering 'First Aid'. The trained persons should represent for all categories of work and for all areas of work. Adequate number of trained persons should be available for each shift. These first aides shall be included in the emergency response team. Contractor employees and workmen are encouraged to participate in first aid training programmes whenever organized 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 PPE are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health
- Ensure that the personnel deployed are physically fit for the operation/work concerned
- Provide hygienic and sanitary working conditions

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

9.2.1.2.4
All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

9.3 **SUPERVISION**

9.3.1

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

9.3.2

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

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

9.3.3

Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared

and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

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

9.4.0 **TRAINING & AWARENESS**

9.4.1

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

9.4.2
All Supervisors & Workmen of the Contractor shall undergo Fire safety training/ demonstration whenever arranged by BHEL with the help of either Customer's Fire and Safety department or outside faculty so as to acquire knowledge of fire prevention and also to be able to make use of appropriate fire extinguishers.

9.4.3
Contractor must familiarize himself from BHEL Engineer in Charge about all known potential fire, explosion or toxic release hazards related to the contract. He in turn will ensure that same information has been passed to the supervisors and workmen

9.4.4
Contractor must ensure that all his supervisors are properly trained and each employee has received and understood from his supervisor necessary training and briefing about the safety requirement. Necessary document as a means to verify that employees have understood the training is to be maintained.

9.4.5
The contractor supervisors shall also give a small safety briefing to all the workmen under his charge before undertaking any new work and specially understand the safety requirements that are mandatory

9.5.0 **REPORTING**

9.5.1
The contractor shall submit report of all accidents, fires and property damage, dangerous occurrences to the authorized BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

9.5.2
Any injury sustained by any of the contractor's employees within the Project premises must be reported to BHEL supervisor and FIRST AID should be immediately administered. The Contractor shall be responsible for keeping and maintaining proper records of Accidents to his personnel.

9.5.3
Contractor must arrange to immediately investigate, properly document and report any injury, accident or near miss involving any of his employees and take appropriate follow up action. He

must furnish within 12 hours of the incident a written report to BHEL Engineer in charge and the Safety Section.

9.5.4
According to the Factory Act and the Employees state Insurance Act & regulation, any person sustaining any injury within the project premises and absenting himself from work for more than 46 hours, his accident report has to be sent to the respective Government Authorities. Therefore contractor shall inform the owner's representative such matter immediately for their needful action.

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

9.5.6
Before commencing the work, the contractor shall appoint/nominate a responsible officer to supervise implementation of all safety measures and liaison with his counterpart of BHEL.

9.6 **AUDIT REVIEW AND INSPECTION**

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

9.6.2
Inspections shall be carried out regularly by the contractors and by BHEL Engineers on activities, facilities, equipment, 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 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

Sl no	**Equipment**	**Scope of inspection**	**Inspection by**	**Schedule**
1	Hand tools	To identify unsafe/defective tool	User	Daily

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

9.7 **NON COMPLIANCE**:-

9.7.1
NONCONFORMITY OF SAFETY RULES AND SAFETY APPLIANCES WILL BE VIEWED SERIOUSLY AND THE BHEL HAS RIGHT TO IMPOSE FINES ON THE CONTRACTOR AS UNDER **for every instance of violation noticed**:

Sl. No	Instance of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
	Major Accident or Accidents causing partial loss of earning to the victim	50,000/- per victim
14	Fatal Accident or Accidents causing permanent loss of earning to the victim	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 recognize 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 authorized representative of M/s----------

Name :

Place & Date:

9.10

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

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING

IS No	YEAR	Amd upto	DESCRIPTION
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 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 No	YEAR	Amd upto	DESCRIPTION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)

IS No	YEAR	Amd upto	DESCRIPTION
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 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 tenderness, general conditions of contract contained in sections 1 & 2 respectively and special conditions of contract contained in sections 4 to 15 and appendices, provisions contained in special conditions of con t in sections 4 to 15 and appendices shall prevail.

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

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

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	Feb 2010
2)	COMMISSIONING OF HRSGS	Mar 2010
2)	SAFETY VALVE FLOATING AND STEAM BLOWING	Mar 2010
3)	SYNCHRONIZATION OF STG	Mar 2010
4)	STABILISATION & RELIABILITY RUN IN COMBINED CYCLE MODE	Apr 2010

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 12 (twelve) months from the date of start of erection. Erection, Testing, Calibration and Commissioning of permanent equipments required for completion of system shall be completed within the time schedule given above. Grace Period as specified later here will be allowed at BHEL's discretion.

ERECTION/PLACEMENT ON IT'S DESIGNATED FOUNDATION/LOCATION, OF THE FIRST MAJOR PERMANENT EQUIPMENT/COMPONENT/COLUMN COVERED IN THE SCOPE OF THESE SPECIFICATIONS OR CALIBRATION OF FIELD EQUIPMENT/INSTRUMENT IN CALIBRATION LAB OF THE SUBCONTRACTOR SET UP AT SITE SHALL BE RECOGNIZED AS "START OF CONTRACT PERIOD". SMALLER ITEMS LIKE PACKER PLATES, SHIMS, ANCHORS, INSERTS ETC. WILL NOT BE CONSIDERED AS START OF CONTRACT PERIOD.

BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule by upto 15%. This will result in advancement of various milestones. Contractor shall plan his activities and mobilise additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.

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.

11.2.6 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. 50,000/- (Rupees Fifty 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

IN ORDER TO TAKE CARE OF VARIATION IN COST OF EXECUTION OF WORK ON EITHER SIDE, DUE TO VARIATION IN THE INDEX OF LABOUR, DIESEL AND ELECTRODE, PRICE VARIATION FORMULA AS DESCRIBED HEREIN SHALL BE APPLICABLE

11.3.1

85% COMPONENT OF CONTRACT VALUE SHALL BE PERMITTED TO BE ADJUSTED FOR VARIATION IN VARIOUS RELEVANT INDICES DURING EXECUTION OF WORK. THE REMAINING 15% SHALL BE TREATED AS FIXED COMPONENT.

11.3.2

THE BASIS FOR CALCULATION OF PRICE VARIATION IN EACH CATEGORY, THEIR COMPONENT, BASE INDEX, BASE DATE OF ACCOUNTING SHALL BE AS UNDER:

.SL NO.	CATEGORY	COMPONENT ('K')	BASE INDEX	BASE DATE
A)	LABOUR (ALL CATEGORIES)	40%	CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS (GENERAL), APPLICABLE TO 'ALL INDIA' AS PUBLISHED BY LABOUR BUREAU, SHIMLA	Base date shall be calendar month of last date of submission of Tender (including extended date of submission if any)
B)	H.S. DIESEL OIL	5%	WHOLE SALE PRICE INDEX (FOR COMMODITY :HIGH SPEED DIESEL) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (www.eaindustry.nic.in)	...DO...
C)	WELDING ELECTRODE	40%	WHOLE SALE PRICE INDEX (FOR COMMODITY: ELECTRODES) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (www.eaindustry.nic.in)	...DO...

11.3.3

Payment/recovery due to variation in index shall be determined on the basis of the following notional formula without any initial absorption, in respect of the identified components viz LABOUR, HS DIESEL and ELECTRODE

$$A = K \times R \times \frac{(X_N - Xo)}{Xo}$$

Where

A = Amount to be paid/recovered due to variation in the Index for Labour, Electrode and HS Diesel

K = Percentage component applicable for Labour, Electrode and HS Diesel

R = Value of work done for the billing month

XN = Revised Index No for Labour, Electrode and HS Diesel for the billing month under consideration

Xo = Index no for Labour, Electrode and HS Diesel as on the Base date. Base date for each of the category is defined in the table above

11.3.4

THE ABOVE PRICE VARIATION FORMULA IS APPLICABLE FOR THE ENTIRE CONTRACT PERIOD, GRACE PERIOD, AND THE EXTENDED CONTRACT PERIOD IF ANY. HOWEVER FOR THE PERIOD EXTENDED ON ACCOUNT OF REASONS ATTRIBUTABLE TO THE CONTRACTOR AND/OR FORCE MAJEURE CONDITIONS, THE PRICE VARIATION WILL BE APPLIED BASED ON THE RESPECTIVE INDICES/PRICES FROZEN AT THE CALENDAR MONTH PRECEEDING THE START OF SUCH EXTENDED PERIOD.

11.3.5

THE PRICE VARIATION IS NOT APPLICABLE TO OVER RUN CHARGES, MANDAY RATES FOR EXTRA WORKS ETC.

SIMILARLY PRICE VARIATION SHALL NOT BE APPLICABLE FOR THE RESPECTIVE % ASSIGNED TO MILESTONE ACTIVITIES VIZ OIL FLUSHING, BARRING GEAR, COMMISSIONING OF CONDENSATE SYSTEM, COMMISSIONING OF FEED WATER SYSTEM AND SYNCHRONISATION

11.3.6

THE CONTRACTOR SHALL FURNISH NECESSARY MONTHLY BULLETINS FOR WHOLE SALE PRICE INDEX (FOR COMMODITY :ELECTRODES AND HS DIESEL) PUBLISHED BY MINISTRY OF COMMERCE AND INDUSTRY (WWW.EAINDUSTRY.NIC.IN) AND CONSUMER PRICE INDEX FOR INDUSTRIAL WORKERS (GENERAL), APPLICABLE TO 'ALL INDIA' AS PUBLISHED BY LABOUR BUREAU, SHIMLA.

11.3.7

THE CONTRACTOR WILL BE REQUIRED TO RAISE THE BILLS FOR PRICE VARIATION PAYMENTS ON A MONTHLY BASIS ALONG WITH THE RUNNING BILLS IRRESPECTIVE OF THE FACT WHETHER ANY INCREASE/DECREASE IN THE CONSUMER PRICE INDEX FOR LABOUR, HS DIESEL AND ELECTRODE HAS TAKEN PLACE OR NOT. IN CASE THERE IS DELAY IN PUBLICATION OF BULLETINS (FINAL FIGURE), THE PROVISIONAL VALUES AS PUBLISHED CAN BE CONSIDERED FOR PAYMENTS AND ARREARS SHALL BE PAID/RECOVERED ON GETTING THE FINAL VALUES.

11.3.8

THE TOTAL QUANTUM OF PRICE VARIATION SHALL NOT EXCEED FIFTEEN PERCENTAGE (15%) OF EXECUTED CONTRACT VALUE. EXECUTED CONTRACT VALUE FOR THIS 15% CAP SHALL NOT INCLUDE OVERRUN CHARGES, EXTRA WORKS.

11.3.9

WITH THE ABOVE PROVISION, THE CLAUSE NO. 2.15 OF GENERAL CONDITIONS OF CONTRACT SECTION-2 IS NOT APPLICABLE.

11.4 Foreclosing of Contract

11.4.1

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

11.4.2

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

11.4.3

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

11.5

Clause 2.12 of GCC regarding force majeure shall, inter-alia, include stoppage of work due to 'local bandhs' arising out of external factors.

11.6 Contract Variations

11.6.1 Variation in Weight/Quantities

The quantities shown in rate schedule are only estimated and the payment will be made on the actual quantity executed on unit rate basis. Variation in quantities upto ± 40% in case of the cable quantities and about ± 25% for other items to be considered while quoting.

Agreed rates shall remain firm for any upward and downward variation in quantities upto ± 40% in case of the cable quantities and about ± 25% for other items. Applicable rates for variation beyond these limits shall be mutually discussed & decided.

11.6.2 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.

11.7 INTREST 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).

11.8 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.

11.9

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. However, first RA Bill shall be released only after signing of Contract Agreement.

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

12.2 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

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

SL NO	TYPE OF PAYMENT (Refer Rate Schedule)	CALIBRATION	ERECTION	TESTING AND COMMISSIONING	FINAL PAINTING	CABLE DRESSING /TAGGING
1	A1.1, A2.1-A2.4, A3.1-A3.20, B1-B3, S1.1-S1.5, S2.1-S2.10, S4.1-S4.3, S6.1-S6.4	NA	55%	40%	5%	NA
2	M1.1, M2.1-M2.15, M3.1-M3.11, M4.1-M4.17, M5.1-M5.7, M6.1-M6.10, N1.1-N1.2, S10.1-S10.2, S17.1-17.2	NA	55%	40%	NA	5%
3	B4-B13, L1-L4	NA	60%	40%	NA	NA
4	B14-B44	45%	55%	NA	NA	NA
5	A3.21-A3.22, D1-D19,S5.1-S5.3, S9.1-S9.4	NA	95%	NA	5%	NA
6	S3.1-S3.33, S7.1-S7.2,S8.1, S11.1-S11.3, S15.1, S16.1-S16.2	NA	100%	NA	NA	NA

12.2.2 TRANSFORMERS, 273 MVA (GT), 153 MVA (STATION), 20 MVA (UAT), 1600 KVA/ 2000 KVA/ 1000 KVA SERVICE TRANSFORMER (Item No E 1 to E 6)

S N	DESCRIPTION OF ACTIVITY	PERCEN-TAGE
01	COLLECTION OF MATERIALS AND TRANSPORTATION FROM BHEL STORES TO SITE EXCEPT THE TRANSFORMER TANK	10%
02	POSITIONING AND ALIGNMENT TRANSFORMER TANK AS PER LAY OUT DRAWING	5%
03	INTERNAL INSPECTION OF CORE AND WINDING TAPS SWITCH OFF-LOAD/ON-LOAD, H.V./L.V. BUSHING TURRET ASSEMBLY, VACUUM PULLING, OIL FILTERATION AND FITTING OF OIL UPTO CORE AND WINDING LEVEL	15%

S N	DESCRIPTION OF ACTIVITY	PERCEN-TAGE
04	ASSEMBLY OF ALL ACCESSORIES, PIPES AND FITTINGS, CONSERVATOR TANK, COOLER BANK/RADIATOR BANK, BUSHINGS, MARSHALLING BOX, CABLING FROM MARSHALLING BOX TO FIELD DEVICES, FANS AND PUMPS ETC.	17%
05	OIL FILLING IN COMPLETE ASSEMBLED TRANSFORMERS, COMPLETION OF DRY OUT AND FILTERATION OF OIL OF COOLING BANK, ACCEPTANCE OF DRY OUT.	20%
06	PRE-COMMISSIONING CHECKS, ELECTRICAL TESTS, CALIBRATION AND PROTECTION AND INTER LOCK CHECKS	13%
07	**INTEGRATED ELECTRICAL TESTING/ COMMISSIONING WITH ASSOCIATED CONNECTED EQUIPMENT,** BACK CHARGING/FORWARD CHARGING	13%
08	TRIAL RUN AND FULL LOADING	2%
09.	FINAL PAINTING	5%

12.2.3 ISOLATED PHASE BUS DUCT FOR GENERATOR TRANSFORMER (Item Sl. No. F 1)

SL. NO	DESCRIPTION OF ACTIVITY	PERCE NT-AGE
01	COLLECTION OF MATERIAL, TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	ERECTION AND ALIGNMENT OF SUPPORTING STRUCTURE	10%
03	PLACEMENT OF BUS DUCT, SUB-ASSEMBLIES, LAVT CUBICLE, NG TRANSFORMER AND RESISTANCE CUBICLE, AIR PRESSURIZATION UNIT AND ITS PIPING AND ACCESSORIES, EXCITATION TRANSFORMER AND ITS TRUNKING CUBICLE, WALL FRAME ASSEMBLY, SEAL AIR BUSHINGS	20%
04	ALIGNMENT OF BUS DUCT ASSEMBLIES, WELDING OF CONDUCTORS, MAKEUP PIECES, SHUNTS, FLEXIBLES, CURRENT TRANSFORMERS AND VOLTAGE TRANSFORMER, SURGE PROTECTOR ETC. INSTALLATION, LINE, NEUTRAL TEE OFF DUCT CTs, WIRING UPTO MARSHALLING BOX, DPD TEST ON CONDUCTOR WELD JOINTS ETC.	25%
05	PRE-COMMISSIONING TESTS, HIGH VOLTAGE TEST	10%
06	COMPLETION OF AIR LEAKAGE TEST	3%
07	FINAL BOX-UP AND END TERMINATION AND MAKING READY FOR ENERGIZATION	5%
08	COMPLETION OF SHORT CIRCUIT/OPEN CIRCUIT TEST WHICH INCLUDES FIXING AND REMOVING OF CERTAIN LINK AND NORMALISATION AND SYNCHRONIZATION OF THE UNIT, **INTEGRATED ELECTRICAL TESTING/ COMMISSIONING WITH ASSOCIATED**	10%

SL. NO	DESCRIPTION OF ACTIVITY	PERCE NT-AGE
	CONNECTED EQUIPMENT	
09	TRIAL RUN AND FULL LOADING	2%
10.	FINAL PAINTING	5%

12.2.4 NON-SEGREGATED PHASE BUS DUCT 11 & 6.6 kV (Item Sl No G1 to G2)

SL. NO	DESCRIPTION OF ACTIVITY	PERCEN T-AGE
01	COLLECTION OF MATERIAL, TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	ERECTION, ALIGNMENT, GROUTING SUPPORTING STRUCTURE	15%
03	PLACEMENT, ALIGNMENT, BOLTING OF CONDUCTOR, ENCLOSURES, COPPER FLEXIBLES, WALL FRAME ASSEMBLIES, SEAL OFF BUSHINGS, CONDUIT AND WIRING FOR ANTI-CONTENTATION HEATERS, EARTHING INTER CONNECTING BRIDGING BUS DUCT BETWEEN THE SWITCH BOARD ETC.	40%
04	PRE-COMMISSIONING AND COMPLETION OF AIR LEAK	10%
05	COMPLETION OF AIR PRESSURIZATION TEST	5%
06	ENERGIZATION OF INDIVIDUAL BUS DUCT AND SWITCH BOARD, **INTEGRATED ELECTRICAL TESTING/ COMMISSIONING WITH ASSOCIATED CONNECTED EQUIPMENT**	13%
08	TRIAL RUN AND FULL LOADING	2%
09.	FINAL PAINTING	5%

12.2.5 GENERATOR STARTING FREQUENCY CONVERTER (Item Sl. No A4)

SL. NO	DESCRIPTION OF ACTIVITY	PERCEN T-AGE
01	COLLECTION OF MATERIAL, TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	PLACEMENT, ALIGNMENT, GROUTING OF LOAD CONVERTOR/INVERTOR PANELS, COMMON CONTROL PANELS, FIXING OF HOT AIR EXHAUST DUCT ETC.	13%
03	VACUUM BREAKER PLACEMENT, ALIGNMENT, SUB-ASSEMBLIES, GROUTING ETC.	15%
04	PLACEMENT, ALIGNMENT OF POWER TRANSFORMERS, ASSEMBLIES OF	15%

	LOOSE ACCESSORIES AND OIL FILLING	
05	DRYING OUT OF TRANSFORMERS	10%
06	PLACEMENT, ALIGNMENT OF D.C. LINK REACTOR	10%
07	PRE-COMMISSIONING TESTS ON LCI, COMMON CONTROL PANEL, BREAKERS, TRANSFORMERS, REACTOR ETC.	20%
08	NO LOAD TRIAL RUN OF MOTORS	5%
09	FULL LOADING AND TRIAL RUN OF UNIT	2%

12.2.6 GTG & STG EXCITATION SYSTEMS & ACCESSORIES (Item Sl. No A5 & A6)

SN	DESCRIPTION OF ACTIVITY	PERCEN T-AGE
01	COLLECTION OF MATERIAL, TRANSPORTATION FROM BHEL STORE TO SITE	10%
02	PLACEMENT, ALIGNMENT, GROUTING, INTER CONNECTION OF BUS BAR AND WIRING, FIXING OF LOOSE COMPONENTS AND AIR EXHAUST OUTLET DUCT FOR REGULATION, FIELD FLUSHING AND THYRISTOR PANELS	60%
04	PRE-COMMISSIONING TESTS	15%
05	UNIT SYNCHRONIZATION AND STABILIZATION, **INTEGRATED ELECTRICAL TESTING/ COMMISSIONING WITH ASSOCIATED CONNECTED EQUIPMENT**	13%
06	TRIAL RUN AND FULL LOADING	2%

12.2.7 11 KV / 3.3KV / 415V / DCDB SWITCHGEAR BOARDS, GENERATOR/ ST/UAT /CONTROL & PROTECTION PANEL & ACCESSORIES (Item Sl No A7.1 to A7.2, J1, K1 to K16)

SL. NO	DESCRIPTION OF ACTIVITY	PERCENT-AGE
01	COLLECTION OF MATERIAL AND TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	PLACEMENT ON FOUNDATION, ASSEMBLIES ETC.	20%
03	ADJUSTMENT, ALIGNMENT, GROUTING, ELECTRICAL INTER-CONNECTIONS,INTER PANEL WIRING AND BUS BAR, INSTALLATION OF LOOSE ACCESSORIES ETC.	35%
04	PRE-COMMISSIONING AND ELECTRICAL TEST, MECHANICAL/ELECTRICAL CHECKS INCLUDING PROTECTION, INTERLOCK TESTING AND MAKING THE SYSTEM READY BY ENERGIZATION	15%
05	**INTEGRATED ELECTRICAL TESTING/ COMMISSIONING WITH ASSOCIATED CONNECTED EQUIPMENT**	8%

05	ENERGIZATION OF SWITCH BOARD AND TRIAL OF INDIVIDUAL FEEDERS ON LOAD	10%
06	COMPLETION OF TRIAL RUN OF MAIN TG SET/FULL LOADING	2%

12.2.8 ABOVE GROUND EARTHING, CABLE TRAY & SUPPORTING STRUCTURE, GI LATTICE & PIPE STUCTURE (Item Sl No. O 1-O 10, P1.1-P1.4, P2.1-P2.2, P3.1-P3.2, P4.1, P5.1, P6.1-P6.2, P7.1-P7.4, P8.1-P8.8, R1-R5, S12.1-S12.6,S13.1,S14.1)

SN	DESCRIPTION OF ACTIVITY	PERCEN-TAGE
01	COLLECTION OF MATERIALS AND TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	ERECTION, ASSEMBLY, ALIGNMENT, EARTHING ETC AS PER DRG, FIXING OF LEBALS, DANGER BOARD, MARKING OF TOWER & GANTRY STRUCTURE, PREPARATION / SUBMMISSION OF FQA LOG SHEET / ERTECTION PROTOCOL ETC.	85%
03	ENERGISATION OF SYSTEM FROM 400 / 220 KV SIDE SYSTEM, PREPARATION / SUBMMISSION OF COMMISSIONING PROTOCOL ETC.	5%

12.2.9 MARSHALLING BOX, JUNCTION BOX, STRUCTURAL STEEL FABRICATION & INSTALLATION (Item Sl. No. CC, Q1-Q2)

SN	DESCRIPTION OF ACTIVITY	%TAGE
01	COLLECTION OF MATERIALS AND TRANSPORTATION FROM BHEL STORES TO SITE	10%
02	COMPETION OF ERECTION, PREPARATION / SUBMMISSION OF FQA LOG SHEET / ERTECTION PROTOCOL ETC	85%
03	FINAL PAINTING	5%

12.2.10 Testing of Commissioning of Equipment erected by other agencies: Item nos. T1 to T11 of Rate Schedule

1. 80% of the agreed unit rates on completion of testing and off-load commissioning.
2. 10% after on-load commissioning of each item.
3. 5% after completion of trial operation of unit.
4. 5% on completion of facilities and handing over.

12.2.11

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.

12.2.12

i) BHEL site at its discretion may further split up the percentage break up shown above and effect payment to suit the site condition, cash flow requirements according to the progress of the work.

ii) However for any items missed out in terms of payment specified herein, but required for total completion of work, payment of such items shall be regulated on the basis of percentage break up arrived at by any one of the following methods so as to effect payment to suit the site condition, cash flow requirements according to the progress of the work

1. Based on percentage break up mentioned for identical/similar items.

2. Based on the percentage break up arrived from nearby items.

3. In case 1 or 2 above do not exist, then BHEL site may derive percentage break up to suit the type of work.

iii) Before release of payment for (i) and (ii) above, BHEL site shall obtain requisite approvals from the competent authority.

12.3 MEASUREMENT OF THE WORK COMPLETED

12.3.1
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.

12.3.2
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.

12.3.4
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.

12.3.5
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 lengths 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.

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.

12.4 PAYMENT FOR THE WORK COMPLETED

12.4.1

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.

12.4.2 MEASUREMENT FOR PAYMENT

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.

12.4.3

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.

12.4.4

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

12.4.5

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".

12.4.6

ANY ITEM RETURNED TO STORES SHALL BE CLEARLY IDENTIFIED AND TAGGED FOR ITS SERVICEABILITY OR ANY DEFECTS IN THE RETURNED ITEMS.

12.4.7

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.

Sometimes recalibration of equipments may become necessary due to reasons not attributable to the contractor, e.g. Lapse of Time after first calibration, Need for change in range/parameter, etc. If re-calibration is required due to no fault of the contractor, the rates payable for re-calibration shall be as under:

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

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

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

13.6
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.

13.7
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

13.8
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 and Forty only)**

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

SECTION-14 (rev:01 dated 02/02/2009)

SPECIAL CONDITIONS OF CONTRACT

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 by way of a transit and storage cum erection policy covering liability against damages/ losses etc.

14.2

The contractor has to arrange on his own, insurance cover for all the T&P and other construction equipments deployed at site. Such assets are not covered in insurance policy taken by BHEL.

14.3

It shall also be the responsibility of the contractor to arrange for accident risk policy/workmen compensation policy for the staff and workmen.

14.4

The contractor has to provide assistance in lodging and realizing the insurance claims covered by the MCE insurance policy that is taken by BHEL. Scope shall include receipt inspection (shortage/damage/loss reporting) immediately on arrival of consignment, recording such damage/loss/shortage intimation on the LR/RR/LWB duly countersigned by the driver/transporter's representative while acknowledging receipt of consignment to the concerned transporter, intimating the loss/damage/shortage to BHEL, providing assistance for inspection of the reported consignment at the time of insurance survey, liasioning with the transporter and insurance company etc.

14.5

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

14.6

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

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).

15.3.1 Guidelines for acceptance of Bank Guarantees are as follows :

- Vendors are advised to obtain BG from any of the following BHEL consortium banks

State Bank of India Ltd.	The Hongkong and Shanghai banking Corporation
ICICI Bank Ltd	ABN Amro Bank N.V
Bank of Baroda	IDBI Ltd
Canara Bank	Punjab National Bank
Citi bank N.A	Standard Chartered Bank
Corporation Bank	State Bank of Travancore
Detshe Bank	State Bank of Hydrabad
HDFC Bank Ltd	Syndicate Bank

- The Bank Guarantees of all Public sector banks shall be accepted (Other than consortium banks also).
- The Bank Guarantees of Co-operative banks shall not be accepted.
- Bank Guarantees of other banks (banks other than consortium bank, public sector bank, & Co-operative banks) can be accepted subject to an overall exposure limit (at BHEL, PSWR, Nagpur) of RS. 10 crores for banks with net worth of more than Rs. 500 crores as on last balance sheet date and Rs 5 crores for banks with net worth between Rs. 350 to Rs 500 crores (A certificate and copy of latest Balance Sheet to be given at the time of submission of bank guarantees .
- In case Bank Guarantees given by non consortium banks (Private sector or Public sector), the bank Guarantees shall be enforceable at Nagpur, Maharastra.

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 A 2.1 to A 2.4: Control panels
  - These are microprocessor based sophisticated electronic control panels in majority. Weights range from 400 to 1600 Kgs from A1 to A4 respectively.

- Sl No A3.1: Network panels
  - These panels are used basically for housing Ethernet switches which are to be wired up with various other max stations. System interface network panels also house computer CPUs, monitors, etc
- Sl No A3.15: HART Management system
  - Consists of panel (1200 x 800 x 2415) approx weight 500 Kgs. Also consists of PC, printer, Hart communicators for field use, etc. Erection supervision and commissioning is in the scope of the supplier. The Contractor to provide erection and commissioning support only.

- Sl No A3.19: P A system

Public Address system consists of erection, testing and commissioning of following works:

Item No.	DESCRIPTION	QUANTITY	Unit
1	Central exchange with integrated MDF: Microprocessor controlled, digital, programmable central control unit (CCU) with PCM/TDM technology suitable for 96 stations and equiped for 75 stations and ability to interconnect 10 more zones for future expansion	1	No.
2	Master Control Station (MCS) Mosaic grid compatible, with Built-in mic & speaker, LCD display, handset, 4 LED indicators & 18 nos. key board switches	2	Nos.
3	Flush Mounted Station (FMS) Built-in mic & speaker, LCD display, handset, 4 LED indicators & 18 nos. key board switches	1	Nos.
4	Desktop Station Built-in mic & speaker, LCD display, handset, 4 LED indicators & 18 nos. key board switches	1	Nos.
5	Extension amplifier for MCS, FMS and desktop station	4	Nos.
6	Wall/column mounted, weatherproof field call station with handset and built-in power amplifier with 15W (RMS)	29	
7	Wall/column mounted, weatherproof field call station with handset and built-in power amplifier with 15W (RMS) in pilfer proof encloser	17	Nos.
8	Sub-distribution frame (SDF) 24 pairs	10	Nos.
9	Portable handset station with multi-pin plug and 25 meter wire	2	Nos.
10	Socket box for Portable handset station	10	Nos.
11	Wall/ column mounted 4W Cone type loudspeaker	33	Nos.
12	Wall/ column mounted 15W Horn type loudspeaker	17	Nos.
13	Flame proof handset station with cone type speaker (suitable for group-IIA)	1	No.
14	Power junction box	51	Nos.
15	Signal junction box	4	Nos.
16	Weather protecting canopy for field call station	17	Nos.
17	Sound protecting floor mounted Acoustic hood	8	Nos.
18	Power distribution box	1	Nos.
19	Special tools & tackles, if any	1	Lot
20	Additional item, required for the completeness of system	1	Lot

- ❖ Sl No A3.20: Lab Equipments
  - Package consists of various standard laboratory instruments, which are to be installed in Customer's lab. Tentative list is as follows:

Electrical Lab equipments:

ITEM No.	ITEM DESCRIPTION	QUANTITY	UOM
1	High potential test set AC / DC (0 – 50 kV)	1	No.
2	Automated oil BDV test set (0 – 75 kV)	1	No.
3	Rheostats of following ratings (650 V)		
i	25 Ohms,10A	2	No.
ii	50 Ohms,5A	2	No.
iii	100 Ohms,2.5A	2	No.
iv	250 Ohms,2.5A	2	No.
v	500 Ohms,0.5A	2	No.
4	Portable secondary injection test set 500VA, 1AMP/ 5AMPs Normal; 20AMPS / 100AMPS for 30 secs	1	No.
5	Digital Earth resistance tester with resistivity test facility (0.01 Ohms,500 Ohms in three ranges)	1	No.
6	Digital Insulation resistance tester (transistorised) 0-100, 000 Mega Ohms, 500-1000- 2500-5000 Volts	2	No.
7	Cable fault locator (HV cable)	0	No.
8	Cable fault locator (LV Cable)	1	No.
9	Relay tool kit	2	No.
10	Hot stick with indication & audible alarm (Upto 11 kV)	1	No.
11	Hot stick with indication & audible alarm (Upto 220 kV)	1	No.
12	Temperature controlled soldering iron (50W)	2	No.
13	Thermovision equipment (INFRA RED CAMERA)	1	No.
14	Primary Injection kit (5000 A, 7.5 kVA)	1	No.
15	Milli volt drop test set (600A DC continuous /variable)	1	No.
16	Illuminometer (0 to 50,000 Lux)	2	No.
17	Circuit breaker analyser (1 ms to 999 secs)	1	No.
18	Turn ratio meter with vector group testing facility (1 to 99000 ratio)	1	No.
19	Capacitance and tan delta measurement kit	1	No.

20	Online DC circuit fault locator	1	No.
21	Vibrometer	1	No.
22	Partial discharge measurement kit	0	No.
23	Earth loop tester	0	No.
24	Battery capacity test kit	0	No.
25	Battery impedance measurement kit	0	No.
26	Motor checker	0	No.
27	Capacitor measurement kit	0	No.
28	Live line detector 33kv	0	No.
29	Three Phase sequence testing meter (100 – 600 V)	3	No.
30	Clip on Ammeters AC / DC		No.
i	0-2000-2500-3000A	1	No.
ii	0-250-500A	1	No.
iii	0-100-150-200A	1	No.
iv	0-5A	2	No.
v	0-1A	2	No.
31	Auto-transformers – 3 Phase (0-500 Volts, 7KVA)	1	No.
32	Auto-transformers – 3 Phase (0-270 Volts, 2-16KVA)	3	No.
33	Digital micro-ohm meter (0.1 micro-ohm-1999Ohm, 100A)	1	No.
34	Portable power analyser meter Accuracy=0.2 (Amp-1A/5A, Volt 600 V, for measurement of KW, KVA, KVAr, KWh, PF, Amp, Volt, in 1 ph & 3 ph ,3 wire & 3ph,4 wire system)	1	No.
35	LCD type portable scope meter (Wave form analysis with Harmonic measurement facility)	1	No.
36	Analog voltmeter AC/DC (0-5-10-25-50-100-500 V)	1	No.
37	Analog ammeter AC/DC (0-5-10 A)	1	No.
	Electronic instruments		No.
38	Universal microprocessor based relay testing kit to test :1) Current relay 2) Voltage relay 3) Frequency relay 4) Differential relay 5) Distance relay 6) Synch. Relay 7) Timer relays	1	No.
39	Regulated DC power supply equipment Voltage 0-+300V DC, 2 Amps, 0 -+ 30V, DC, 2 Amps, 0-+5V 10 Amps, Current 0 – 2 AMPS DC, 100 VA	2	No.
40	Digital tachometer (non-contact type) (0,1500,3000,5000, 10000 rpm)	2	No.
41	Digital multimeter (Class 0.5)	3	No.
42	Hydrogen leak detectors	0	No.

43	Fuel gas leak detectors	0	No.
44	All the necessary accessories shall also be supplied with the instruments. These shall include but not be limited to :	1	No.
	(a) Two meter length power supply cord with plug.	1	No.
	(b) All necessary accessories like jacks, probes, connectors, adapters, clips, rain jackets, protective covers, shields, carrying / transporting.	1	No.
	Composite universal microprocessor based test kit with 0.02 accuracy for testing following: Distance relays, Differential relays, Over current relays, F/V/I relays, Ground fault relays, Synchronising devices, Transient playback, Harmonics generation, Transducers, Energy meters testing /calibration. Requsite software and Laptop shall be included as a part of test kit.	1	No.

C&I LAB INSTRUMENTS

S. No.	Description of Equipment	Total Quantity	Common
1.0	High precision regulators for pressure and vacuum	2	
2.0	Test gauges	6	
3.0	Master pressure Gauges		
	Ranges – 1 to 0 – 160, 0 – 250, 0 – 600 kg/sq cm	10	
4.0	Test RTD	2	
5.0	Test Thermocouple	2	
6.0	Digital Portable Multimeter	3	
7.0	Digital Tachometer	1	
8.0	Digital Stop Clock	2	
9.0	Tool Kit	1	
10.0	Soldering Kit	2	
11.0	Furniture – Trolley	2	
12.0	Furniture – Chair-Revolving type	4	
13.0	RTD Simulator cum Temperature Calibrator	2	
14.0	Thermocouple Simulator cum Temperature Calibrator	2	
15.0	4-20 mA, mV source simulator / calibrator	2	
16.0	220 VDC regulator power supply	1	
17.0	Industrial type vacuum Cleaner	1	
18.0	Dead Weight Tester	1	
19.0	Temperature Oil Bath	1	
20.0	Integrated calibration Electronic and Pneumatic Instrument	1	
	(i) DP transmitters draft Gauge, DP indicators		
	(ii) –Do-, Pressure Transmitter, P/I & I/P converters		

	(iii) Pressure gauges, Switches, Transmitters (iv) I/P & P/I converters DP/ Pressure Transmitters	
21.0	Manometer: Ranges 0-10 mbar to 0-365 (vertical) mbar	1 set
22.0	Manometer (Inclined tube)	1
23.0	High Precision Regulators for Pressure and Vacuum	2
24.0	Precision Thermometers (Mercury in Glass) Ranges: -38 to 2^0 C, -8 to 32^0 C, 25 to 55^0 C, 50 to 80^0 C, 75 to 105^0 C, 95 to 155^0 C, 145 to 205^0 C, 195 to 305^0 C, 295 to 405^0 C.	1 set
25.0	Digital Infrared Pyrometer	1
26.0	DC regulated Power Supply	1
27.0	Adjustable AC Power Supply	1
28.0	Digital Tong tester	1
29.0	Portable T/C Calibration	1
30.0	Digital Portable Vibration Meter	2
31.0	DC Battery Chargers	2
32.0	Vacuum Pumps / Compressors	1
33.0	Barometers	1
34.0	Laboratory Furnace	1
35.0	Handheld configurator for smart field devices	3
36.0	Portable Liquid and gas leak detectors	3
37.0	Function generator	1

- Sl No A3.21: Plant Control Desk
  - To be erected in the PCR (Plant Control Room).
  - This consists of seven computer tables (app dim 1200x1400x1000), integrated into a single curved Operator control desk. Relevant CPUs will be housed inside.

  Lumpsum rate to be quoted.
- Sl No A3.22 : Computer furniture
  - Computer table 7 nos, printer tables 7 nos, chairs 15 nos approx.
  - The furniture will be delivered in knocked down condition and will have to be assembled at site by contractor.

  Lumpsum rate to be quoted.

- Sl No B1: Master and slave clock system
  - This equipment consists of one control panel (900 x600 x 2415) housing power supplies, clock modules etc. GPS antenna is also to be suitably located and cabled up under this scope. About 4 nos slave clocks will have to be installed at

various locations throughout the plant. Commissioning supervision will be provided by the supplier of Master clock system.

- Sl No B2 and B3: LIRs and LIEs
  - Local instrument racks are open type housing for field instruments. These have to be located in suitable places, impulse piping and cabling to be done. Number of instruments in each LIR will vary.
  - Local instrument enclosures are closed type housing for field instruments. These have to be located in suitable places, impulse piping and cabling to be done. Number of instruments in each LIE will vary.

- Sl No B6: LVS
  - Other than the LVS (67" diagonal) mentioned in the rate schedule, accessories like video switches, associated cabling (prefab and otherwise) etc are also included.
  - LVS erection and commissioning supervision in scope of other agency (supplier)

- Sl No B12 & B13: SWAS system

The scope of work includes all equipments including recorders etc, which may be fitted in any of the panels. Ph, sensors (9 nos.) conductivity analyzer (21 nos.), chloride analyzer (2 nos.), sodium analyzers(3 nos.), silica analyzer, multi channel(3 nos.), DO2 analyzer (2 nos.), hydrazine analyzer (2 nos.) and sensors for these analyzers will be supplied loose with integral / prefab cables, to be mounted and wired up in relevant panels.

- Sl No B43: Electronic water level indicator (EWLI)

2 nos Electronic Water Level Indicator EWLI comprises of the following:

- 1 No. 16 Port pressure vessel & 1 No. 8 port pressure vessel with loose supplied electrodes (24 nos)
- 2 Nos. of Ascertor Units (Local) with Display, each of dimension: 600 x 350 x 600 mm; Weight: 25 kg each
- 2 Nos. of Remote Display Unit (100 x 90 x 234 mm)
- Interconnecting cables between local panel and 24 electrodes (included in cabling BOM)
- Display units (2 nos) to be mounted in backup desk

Pressure vessel shall be erected by mechanical agency.

Lumpsum rate per set is to be quoted.

❖ Sl No G1 : LT Busduct

Each set consist of :

1) 15 METRE STRAIGHT RUN

2) 90 DEG BEND – 4NOS

3) FLEXIBLE (Cu) AT TRANSFORMER END GAP AND SWGR END – 1SET

4) ADAPTER – 1NO.

5) EXPANSION JOINT – 1NO.

6) WALL FRAME ASSEMBLY – 1NO.

7) PHASE CROSSOVER – 1NO.

8) SET OF HARDWARE AT TRF. & SWGR END

9) SUPPORT STRUCTURE – 200KG OF GI

❖ Sl No T6: ERV Controller

The controller box to be erected near the ERV and impulse piping to be done. It has 220V DC rated pressure switches inside which are to be calibrated. Dimension: 350 x 290 x 180 mm; weight: 5 kg each. Remote console is to be mounted at control room backup desk. Lumpsum rate per set is to be quoted.

APPENDIX–II

T&P TO BE PROVIDED BY BHEL FREE OF CHARGE (ON SHARING BASIS, BASED ON AVAILABILITY)

i. EOT crane in TG floor will be made available on sharing basis for handling panels when required

While all efforts will be made for amicable sharing of the above, non-availability of the above due to any reason shall not absolve the contractor of performing his responsibilities in time. The contractor shall undertake sufficient pre-planning and arrange his own handling/transport equipment as deemed necessary.

Appendix III

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	Secondary current injection kit upto 300 amp	1 no.
45	Dead weight tester rated 400 Kg/cm2 and with weights and test gauge facility. Make ‘Budenberg or ‘Ravika’	1 no.
46	Oil temperature bath suitable to calibrate the instruments range 0 – 200 deg. C with standard temperature gauges and thermostatic control	2 nos.

47	Muffle furnace – 800 deg. C with standard temperature gauges	1 no.
48	Standard gauges 12” dial size make “Budenberg” or ”H Guru” or “Odin”	
	A) – 1-0 kg/cm2 pressure gauge(vacuum gauge) 1 no. B) 0 – 5 or 6 kg/cm2 pressure gauge 1 no. C) 0 – 10 kg/cm2 – do – 1 no. D) 0 – 25 kg/cm2 – do – 1 no. E) 0 – 60 kg/cm2 – do – 1 no. F) 0 – 100 kg/cm2 –do – 1 no. G) 0 – 250 kg/cm2 – do – 1 no. H) 0 – 600 kg/cm2 – do – 1 no. I) 0.2 to 1 kg -- do -- 1 no.	
49	Manometers (+/-) 1000 mm water column With hand bulb for lab and small manometers for field purpose.	2 nos.
50	Manometer (+/-) 500mm mercury column with hand bulb for lab and small manometer for field purpose.	1 no.
51	Inclined manometer (+/-) 300 mm water column	1 no.
52	Glass thermometer 0-120 deg. C, 0-200 deg.c and 0-600 deg.c	1 no. Each
53	RTD/Pt 100 source	1 nos.
54	Decade resistance box	1 sets.
55	Function generator	1 no.
56	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–IVA

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-IVB

Consumables/items to be provided by BHEL free of charge

01 Metallic Cable glands

02 Steel for support frame of permanent equipment.

03 Lugs beyond 4 sqmm size

APPENDIX–V

FORMAT FOR MONTHWISE MANPOWER DEPLOYMENT PLAN

(CATEGORYWISE NUMBERS TO BE INDICATED FOR EACH MONTH)

* USE ADDITIONAL SHEETS TO COVER THE TOTAL CONTRACT PERIOD

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–VI

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

* USE ADDITIONAL SHEETS TO COVER THE TOTAL CONTRACT PERIOD

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-VII

CONCURRENT COMMITMENTS

SL. NO.	FULL POSTAL ADRESS OF CLIENT AND NAME OF OFFICER IN-CHARGE	DESCRIPTION OF THE WORK	VALUE OF THE CONTRACT	COMMENC-EMENT DATE	SCHED U-LED COMPL E-TION	% COM PL-TD. AS ON DATE	ANTICI PA-TED COMPL N. DATE

DATE:

SIGNATURE OF THE BIDDER

APPENDIX VIII

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-IX

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

APPENDIX-X

DRGS FOR TENDERING PURPOSE ONLY

1. Layout of Isolated Phase Bus Duct GTG - Drg No: 0 661 0220 602 – Rev 00.