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

**NO. BHE/PW/PUR/IOCI-TGE/581**

FOR

COLLECTION/ LOADING/ UNLOADING/ TRANSPORATION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER OF Fr-6 GAS TURBINE-GENERATOR SETS & THEIR AUXILIARIES, BALANCE OF PLANT EQUIPMENTS WITH RELATED PIPING, PUMPS, DEAERATORS, TANKS, VESSELS, INTEGRAL PIPING AND EXTERNAL PIPING/CO-GEN PIPING WITH VALVES, SUPPORTS & FITTINGS ETC. FOR 2x30 MW, EPCC PACKAGE-7(GTG & HRSG), RESIDUE UPGRADATION AND MS/HSD QUALITY IMPROVEMENT (IRUP), IOCL, GUJARAT REFINERY, JAWAHAR NAGAR, VADODARA

**AT**

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

PART I - TECHNICAL BID

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

# C O N T E N T S

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NOTE:
FOLLOWING DOCUMENTS HOSTED THROUGH **CORRIGENDUM -01** AS SEPARATE FILES IN BHEL webpage as indicated against each. (HARD COPIES HOWEVER SHALL BE PART OF TENDER SPECIFICATIONS PART-I)

1. STANDARD CONSTRUCTION SPECIFICATION FOR GROUTING WORK. DOCUMENT NO G-304 ( hosted as file titled “Grouting Specifications-581”)
2. STANDARD CONSTRUCTION SPECIFICATION FOR CHEMICAL CLEANING. DOCUMENT NO H-322 ( hosted as file titled “Chemical Cleaning-581”)
3. STANDARD CONSTRUCTION SPECIFICATION FOR PAINTING WORKS. DOCUMENT NO O-301A ( hosted as file titled “Painting Specifications-581”)
4. SAFETY CODE AND REGULATIONS of IOCL to be complied at IOCL Site (hosted as file titled “SAFETY-581”)

**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-581”.**

@: Issued as separate hard copy booklet ‘Tender Specifications Part-II (Price Bid)’. Hosted in BHEL web page (www.bhel.com) as files titled **“PRICE BID-581”**
**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-581”**

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

TENDER SPECIFICATION NO.**BHE/PW/PUR/IOCI-TGE/581**

NAME OF THE WORK : COLLECTION/ LOADING/ UNLOADING/ TRANSPORATION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, APPLICATION OF THERMAL INSULATION, FINAL PAINTING, CO-GENERATION OPERATION AND HANDING OVER OF Fr-6 GAS TURBINE-GENERATOR SETS & THEIR AUXILIARIES, BALANCE OF PLANT EQUIPMENTS WITH RELATED PIPING, PUMPS, DEAERATORS, TANKS, VESSELS, INTEGRAL PIPING AND EXTERNAL PIPING/CO-GEN PIPING WITH VALVES, SUPPORTS & FITTINGS ETC. FOR 2x30 MW, EPCC PACKAGE-7(GTG & HRSG), RESIDUE UPGRADATION AND MS/HSD QUALITY IMPROVEMENT (IRUP), IOCL, GUJARAT REFINERY, JAWAHAR NAGAR, VADODARA AT INDIAN OIL CORPORATION LIMITED GUJARAT REFINERY, JAWAHAR NAGAR, VADODARA (GUJARAT)

EARNEST MONEY DEPOSIT RS.2, 00,000.00 (RS.TWO LAKHS ONLY)

THESE TENDER DOCUMENTS CONTAINING PART**-I** TECHNICAL BID AND PART**- II** PRICE BID, ARE ISSUED TO:

M/s. ……
……

……...

(THESE TENDER DOCUMENTS ARE NOT TRANSFERABLE)

FOR BHARAT HEAVY ELECTRICALS LIMITED

Dy. GEN. MANAGER (PURCHASE)

PLACE: NAGPUR
DATE :

## 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.

**EARNEST MONEY DEPOSIT (EMD)**

EMD shall be included in the Technical Bid. **EMD shall be paid by bidders only in the form of account payee Demand Draft payable at Nagpur in favour of Bharat Heavy Electricals Limited.** No other mode of payment of EMD shall be acceptable.
Bidder may opt to deposit "One Time EMD" of Rs. 2.0 lacs with this office (BHEL:PSWR:Nagpur) which will enable them to participate in all the future tender enquiries in respect of Erection and Commissioning services issued from this office. Interested bidders may clearly send their consent for converting the present EMD into an "One Time EMD" in their offer.
Bidders who have already submitted such "One Time EMD" will be exempted from submission of any EMD for this tender. However bidder shall furnish details of the "One Time EMD" in his offer including the Check List furnished herein.

**Part-II (Price Bid) cover-II:**

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

THESE TWO SEPARATE COVERS-I AND II (PART-I AND PART-II) SHALL TOGETHER BE ENCLOSED IN A THIRD ENVELOPE (COVER-III) ALONGWITH REQUISITE EMD AS INDICATED EARLIER AND THIS SEALED COVER SHALL BE SUPERSCRIBED AND SUBMITTED TO ADDL. GENERAL 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&P 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.

BIDDER SHALL MEET ALL THE QUALIFYING REQUIREMENTS AS MENTIONED IN THE NOTICE INVITING TENDER.

ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION, SHOULD BE FURNISHED. PLEASE REFER THE CHECKLIST. THE DETAILS SO FURNISHED BY TENDERER SHOULD BE COMPLETE IN ALL RESPECTS AND AS PER FORMATS SPECIFIED IN TENDER SPECIFICATION.

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.

**TENDERER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.**

# PROJECT INFORMATION

## 1.0.0 INTRODUCTION, *LOCATION & FEATURES OF SITE*

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

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

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

Site ambient condition informations:
1. Barometric Pressure:

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

2. Site elevation: 37.7meters above the sea level

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

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

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

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

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

CHECK LIST

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

| | | | |
|---|---|---|---|
| 1 | NAME OF THE TENDERER WITH ADDRESS | | |
| 2 | NATURE OF THE FIRM | LIMITED / PARTNERSHIP / PROPRIETARY | |
| 3 | EMD DETAILS (Rs. 2.0 LACS BY DD ONLY OR ONE TIME EMD) | | |
| 4 | VALIDITY OF OFFER (REQUIRED 6 MONTHS FROM DUE DATE) | | |
| 5 | MOBILIZATION TIME (NOT EXCEEDING 30 DAYS 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 APPENDIX-VII ) | 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 (APPENDIX–V) IS FURNISHED | YES | NO |
| 16 | MONTHWISE DEPLOYMENT PLAN FOR MAJOR T&P (APPENDIX-VI) IS FURNISHED | YES | NO |
| 17 | ANALYSIS OF UNIT RATES QUOTED (APPENDIX –VIII) 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 APPENDIX – IX AND SUPPORTING DOUCMENTS FURNISHED. | YES | NO |

| | | | |
|---|---|---|---|
| 20 | ERECTION AND COMMISSIONING PROGRAMME. | 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 |

NOTE : STRIKE OFF YES OR NO, AS APPLICABLE

DATE : SIGNATURE OF TENDERER

## DECLARATION SHEET

I, HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THIS TENDER SPECIFICATION NO.**BHE/PW/PUR/IOCI-TGE/581** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATION, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORISED REPRESENTATIVE OF THE UNDER MENTIONED TENDERER AND A COPY OF VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

SIGNATURE OF TENDERER

DATE:

**CERTIFICATE OF NO DEVIATION**

**TENDER SPECIFICATION : NO.BHE/PW/PUR/IOCI-TGE/581**

**I/WE, M/s ……..**

**HEREBY CERTIFY THAT IN OUR OFFER I/WE HAVE NEITHER SET ANY TERMS AND CONDITIONS NOR THERE ANY DEVIATION TAKEN FROM THE CONDITIONS STIPULATED BY BHEL, EITHER TECHNICAL OR COMMERCIAL AND I/WE AGREE TO ALL THE TERMS AND CONDITIONS STIPULATED BY BHEL IN THE TENDER SPECIFICATION INCLUDING ASSOCIATED AMENDMENTS AND CLARIFICATIONS.**

SIGNATURE OF THE TENDERER

DATE:

## Section-3
## Offer of the Contractor

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/IOCI-TGE/581 for 2x30 MW, EPCC PACKAGE-7(GTG & HRSG), RESIDUE UPGRADATION AND MS/HSD QUALITY IMPROVEMENT (IRUP), IOCL, GUJARAT REFINERY, JAWAHAR NAGAR, VADODARA 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 GENERAL

The work under these specifications broadly comprises of the following:

Collection/ loading/ unloading/ transportation of materials from BHEL/client's stores /storage yards to site of work, erection, testing, commissioning, application of thermal insulation, preservation rapping coating of buried piping, co-generation operation, final painting and handing over of 2x30MW Fr. 6B gas turbine-generator sets and their Auxiliaries, Balance of plant (mechanical) equipments with auxiliaries, Power Cycle Pumps and Fans with motors & related Auxiliaries, Deaerators, Tanks, Vessels, Ducts, Dampers, GT enclosures, Ladders, Approach platforms, Misc. Cranes & Hoists, Integral piping, External piping /Co-gen piping of all related schemes like Fuel/Gas, Steam, Cooling water, Condensate water, Feed water, Drain water, lube oil, instrument air & service air, Chemical dosing, Feed water, Service Water/ Process water, DM water, Buried/under ground piping etc. with valves, fittings, supports including welding, NDT/radiography / pre-heat treatment / post-heat treatment requirements, Chemical cleaning/flushing, Air blowing, Oil flushing, Steam blowing, Hydraulic testing etc. of GTG systems, Co-gen system and related balance of plant equipments.

The work to be carried out under the scope of these specifications is broadly as under:

1) Collection of material from BHEL/ client's stores/storage yard and transportation to site of work/ pre-assembly yard including heavy consignments like Gas Turbines, Gas Turbine Generators and other equipments under the scope of this tender specification.
2) Pre-assembly, Assembly and pre-erection checks as applicable
3) Lifting & Placement, Erection, Fit-up, alignment of Equipments with Aux. systems, of Off base piping, External system / Cogen piping etc. and their welding/bolting/fastening etc. as per scope of these specifications.
4) Erection, Alignment, Fit-up and welding/bolting/fastening, Pre-heat treatment/Post Heat treatment etc. of Equipments with Aux., systems, Field piping & Integral Piping with supports etc. including primer painting of site weld joints with Chlorinated based Zinc Phosphate primer.
5) Non-destructive examination, Radiography, pre-heat treatment & post weld heat treatment as per requirement.
6) Chipping, Preparation of equipments & structures foundations.
7) Secondary grouting of Equipments & Structures with related Aux., Rotating machines etc. including the associated form works like shuttering and related facilities & process for grout mixing.
8) Conductance of Hydraulic test, Oil flushing, Kerosene testing, Chemical cleaning/Flushing, Air blowing/water Flushing, Steam blowing etc.
9) Checking/cleaning & setting of hangers, cold setting and hot setting of hangers & supports.
10) Provisioning, Servicing and setting of valves, actuators, Dampers, Power Cylinders etc.
11) Application of thermal insulation with retainers, fixing components, cladding sheet etc. of Equipments, Aux., Ducts, Piping, Tanks, Vessels, including bypass stacks and other associated equipments as per scope under these specifications.

12) Erection, Laying, Welding, NDE/Radiography of temporary Piping, Valves, Tanks, Supports etc. for Air Blowing, Steam Blowing, Chemical Cleaning/ Flushing etc. and their subsequent dismantling after completion of work
13) Handling and filling of Chemicals, Lubricants/gas/ preservatives during, erection, preservation, chemical cleaning / flushing / blowing, pre-commissioning, Commissioning and subsequent topping up till Trial operation completion.
14) Preservative coating/ rapping of Buried / Under ground piping.
15) Pre-commissioning checks/tests, trial runs/testing and commissioning
16) Trial operation and Co-generation operation.
17) Surface preparation, preservation and Final painting of equipments, related Aux., Systems, Structures, Piping with valves, fittings, supports etc.
18) Completion of facility points (as applicable)

Scope of work is further detailed in various clauses hereafter.

4.1.1 General requirements – common to all packages

4.1.1.1

The intent of specification is to provide 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 execution of this work shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

4.1.1.2

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

4.1.1.3

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 BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

4.1.1.4

The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

4.1.1.5

Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

4.1.1.6

All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory authorities are to be arranged by the contractor at his cost in time to ensure smooth progress of work.

4.1.1.7

The pressure parts and piping will be erected as per relevant provisions of Indian Boiler Regulations & latest amendments/revisions thereof.

4.1.1.8
The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to contractor's fault, the contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

4.1.1.9
The contractor shall perform any services, tests etc. Which may not be specified but nevertheless required for the completion of work within quoted rates.

4.1.1.10
All necessary certificates and licenses, permits etc required for carrying out this work are to be arranged by the contractor expeditiously.

4.1.1.11
The contractor shall execute the work in the most substantial and workmanlike manner.

4.1.1.12
BHEL reserves right to recover from the contractor any loss which arises out of undue delay/discrepancy/ shortage/damage or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.

4.1.1.13
All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, materials, manpower, supervisors/ engineers, consumables etc.(except the T&P indicated in Appendix-III as free by BHEL) required for this scope of work shall be provided by the contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.

4.1.1.14
During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc., may become necessary on account of feed back / revision of drawing. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc., promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc. Shall be maintained by the contractor for such reworks. Claim of contractor if any, for such works will be governed by clauses 13.1 to 13.8.

4.1.1.15
All works such as cleaning, leveling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, gouging, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, 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 within the quoted rates.

4.1.1.16
The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. BHEL will not provide any steel for this.

4.1.1.17
The contractor shall take delivery of the components, equipments, chemicals, lubricants etc from the BHEL stores/ storage area after getting the approval of BHEL engineer on standard indent forms of BHEL. Complete and detailed account of the materials and equipments after usage shall be submitted to the BHEL and reconciled periodically.

4.1.1.18
Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by contractor most expeditiously. No claim for extra payment for such work will be entertained.

4.1.1.19
Plant materials should not be used for any temporary supports / scaffolding / preparing pre-assembly bed etc.

4.1.1.20
The details of equipments to be erected under this contract is generally as per the details of quantity given in Appendix-I. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the erection documents which will be furnished in the course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

4.1.1.21
All welded joints should be painted with anticorrosive paint immediately after completion of radiography and stress relieving works. Necessary paints and other consumables for the above work are in the scope of the contractor.

4.1.1.22
Hangers & suspensions, supports and supporting structures etc for tubes, piping, & ducts etc., will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.

4.1.1.23
Spring suspension/constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of

temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc., have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/ instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

4.1.1.24
Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection. Such changes will be incidental to work hence no separate/ additional payment will be made.

4.1.1.25
Welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow metering & measurement devices, and control valves to be provided on GT & their respective auxiliaries, integral & external pipe/off base/system / co-gen piping covered within the scope of this specification, will also be the responsibility of the contractor and shall be done as per the instructions of BHEL site engineer. The installation of all the above items will be contractor's responsibility even if:

A) Items are not specifically indicated under the respective product groups as given in the technical specifications.
B) Items are supplied by an agency other than BHEL.

NDE/NDT and post weld heat treatment for above shall be done as per the specifications and drawing requirement as part of scope of work.

4.1.1.26
Certain instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal/speed switches of motors, accumulators etc. are received in assembled condition as integral part of equipments. Contractor shall dismount, where instructed so, such instruments for calibration and storage/re-erection. Calibration will be done by C&I erection agency.

4.1.1.27
Fixing and seal welding of thermo wells & plugs before hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo wells after hydro test/steam blowing of lines as part of work.

4.1.1.28
Actuators/drives of valves, dampers, gates, powered vanes etc. May have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

4.1.1.29
All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

4.1.1.30

Contractor will have to collect the materials from BHEL /customer stores/ storage yard, verify the materials, loading of materials including heavy equipments at stores/storage yard by arranging the cranes and all other T&P etc, arrange transpiration to transport to site of work/erection site and unload/handle and preserve them as scope of work.

4.2.1.31
Any discrepancy/shortage/damage found in the consignment after taking clean delivery of materials from the stores/storage yard shall be the responsibility of contractor .

4.2.1.32
Unloading at work site, stacking and restacking if necessity arises including of heavy/sophisticated equipments like heavy motors, heavy bearing pedestals, Dampers, Gas Turbine, Gas Turbine Generator, Duct items and other GT and Balance of Plant Equipments etc. shall be done as per storage and preservation manual of BHEL and/or as per directions of BHEL engineer.

4.2.1.32
If the contractor or his workmen or employees break, deface, injure or destroy any part of a building, road, Krebs, fence, enclosures, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of erected equipments, stored components etc. Within the project premises or outside the contractor shall make the same good at his own expenses.

4.2.1.33
All the materials during pre-assembly, storing shall be stored well above ground level as necessary to avoid water ingress etc, by use of wooden/ concrete blocks/ sleepers. No material shall be stored directly on the ground at any time. Concrete blocks/ Sleepers have to be provided by the contractor.

4.2.1.34 **PRESERVATION OF COMPONENTS**
Contractor shall arrange for preservation of components/ materials issue to him as per BHEL's storage and preservation manual and/or as per instructions of BHEL engineer.

One or more of following methods shall be adopted for preservation:

Coating with preservative paints/lubricant/inhibitors.

Capping/wrapping/covering.

Filling/immersion in oil/chemicals etc.

**HT MOTORS**
For preservation of HT motors, space heaters have to be kept energized to avoid ingress of moisture. Insulation resistance has to be measured and recorded at specified intervals till these are issued for erection. BHEL will provide necessary cables, switches etc. For this however contractor shall install and maintain the same.

BHEL will provide free of cost all preservatives like preservative oil, lubricants, chemicals, inhibitors, caps, paints with primer for preservation and Final/Finish painting.

## 4.2 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENTS

4.2.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the BHEL/customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits and also adjustments of foundation level, dressing and chipping of

foundation surfaces of all equipments contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 25mm for achieving proper levels will be within the scope of work/specification.

4.2.2
All minor foundations and anchor points required for installing erection equipments like winches, anchors etc. are to be cast by the contractor.

4.2.3
The complete work of secondary grouting of equipments is included in the scope of work/specification. Contractor shall arrange all manpower, T&P, form work and shuttering materials, all grouting materials such as ordinary portland cement, sand, stone chips etc & quick-setting-non-shrink-free-flow special grout mix of required specification (like conbextra-gp-2 or equivalent).

4.2.3.1
The quick-setting-non-shrink-free-flow special grout mix shall be purchased only from the following BHEL approved vendors:

1. M/S FOSROC CHEMICALS (INDIA) PVT LTD;
2. M/S SIKA INDIA PVT LTD;
3. M/S PAGEL CONCRETE TECHNOLOGIES PVT LTD;
4. M/S PIDILITE INDUSTRIES LTD.

In order to ensure the quality, the major grouting of equipments using any of above grout mixes shall essentially be done as per the recommendations of supplier with regard to grout preparation and use of machinery etc under the supervision of the respective supplier. BHEL has arrangement with above suppliers for supervision services and the supervision charges for the same will be borne by BHEL. However, the contractor shall ensure readiness of equipment for grouting in all respect before such a service is requisitioned and the duration is not prolonged unduly. Any overstay required due to contractor shall be charged to the contractor with BHEL's departmental charges. Contract shall consult BHEL engineer before deciding upon the vendor for the above.

4.2.3.2
Cleaning of the foundation surfaces, pocket holes, anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods will be within the scope of this work.

4.2.4
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

4.2.5
The contractor shall carry out scrapping and matching of embedded plates, permanent spacers and all the matching parts of turbine, generator, pumps and other equipments wherever required. The support and sole plates matching and concrete surface bedding is also covered in the scope of work. The fine dressing of concrete shall be with Prussian blue-match checks.

4.2.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. Shall also be blue matched and required

percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

4.2.7

**For the purpose of Grouting for any deviation / difference between BHEL specification & Customer specifications/requirements with regard to material requirement, storage & handling, requirements, surface preparation, procedure, mixing, placement, Curing & testing etc., the " Standard Construction Specification for Grouting Work Document No. G-304 of IOCL/TEIL shall be supersede the BHEL Specification and shall be final & binding on contractor.**

## 4.3 WELDING, HEAT-TREATMENT, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING

4.3.1

Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

4.3.2

The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL engineer will have the option of changing the method of welding as per site requirement.

4.3.3

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

4.3.4

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

4.3.5

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.

4.3.6

Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

4.3.7

The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint etc will be in the contractor's scope.

4.3.8

Hp joint fit-ups, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The contractor shall supply consumables like protective paints/tapes etc.

4.3.9

Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with BHEL engineer's instructions. Normally the electric resistance heating method will be adopted. Contractor shall arrange to supply heating equipment with automatic recording devices.

Also the contractor shall have to arrange for labour, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc., required for all heating and stress relieving works.

4.3.10
All the recorded graphs for heat treatment works shall be the property of BHEL and shall be handed over to BHEL engineer when demanded.

4.3.11
The contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL engineer as required. Interpretation of the BHEL engineer regarding acceptability of the welds shall be final.

4.3.12
Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the process. The contractor shall make all arrangements including labour required for the work as per direction of BHEL.

4.3.13
Radiography work of welds connected with this contract shall be arranged by the contractor including provision of services of technician and necessary equipment and consumables like isotope camera, x-ray/gamma ray films, chemicals etc., and necessary labour required such as riggers, helpers, etc., to assist the technician for carrying out the radiography work and making other arrangements such as providing scaffolding, approaches, platform lighting arrangements, etc., at their cost and the work has to be arranged as per the instruction of BHEL. It may please be noted that invariably the radiography work will be carried out after the normal working hours and close of other site activities only.

4.3.14
Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL engineer. The quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL engineer/boiler inspecting authority.

4.3.15
All x-ray / gamma ray films of joints shall be preserved properly and be handed over to BHEL. These shall become the property of BHEL.

4.3.16
The field welded joints shall be subject to dye-penetrant / other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

4.3.17
Where required, surface preparation, like smooth grinding of welded area, prior to radiography shall be done as specified. It may also become necessary to adopt inter-layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The contractor shall take all this into account in his offer.

4.3.18 **SOCKET WELDING** :

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be

furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained at a later date. The socket welding on hp parts/ hp piping shall be done by the IBR qualified welders contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

4.3.19
Welding electrodes have to be stored in enclosures having temperature and humidity control arrangement. This enclosure shall meet BHEL specifications.

4.3.20
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 welding electrodes have to be carried in portable ovens.

## 4.4.0 ERECTION OF GAS TURBINE, GAS TURBINE GENERATOR THEIR AUXILIARIES, COMMON SYSTEM EQUIPMENTS, BALANCE OF PLANT EQUIPMENTS WITH AUXILIARIES AND PIPING

4.4.1
Any fixtures, concrete block supports, steel structures, required for temporary supporting for pre-assembly or checking and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor.

4.4.2
It shall be the responsibility of the contractor to provide temporary ladders on columns, Bypass Stack, Ducting etc in a manner prescribed by BHEL using their own material till such time as permanent stairways are completed.

4.4.3
Pipings, ducts, enclosures and other fabricated/pre-fabricated parts/ components etc. have to be checked for dimensional accuracy, configuration, proper matching and minor rectifications, wherever necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks. Steel, in random sizes, for this purpose will be provided by BHEL from the packing materials / scraps etc., where as necessary concrete blocks shall be arranged by the contractor. Bed shall be fabricated as per requirement. These shall be dismantled & returned to BHEL at appropriate stage. No separate payment for making / dismantling such bed is envisaged.

4.4.4
Normally the high pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor shall prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes and pipes. All fittings like “T” pieces, weld neck flanges, reducers, etc., shall be suitably matched with pipes for welding (this is applicable to piping work also).

4.4.5
Pipes / Tubes wherever deemed convenient, will be sent in random lengths. Tubes / pipes sent in standard/ random length shall be cut and edge prepared to suit the site conditions and the layouts. Bends of tubes upto OD 65 mm will have to be formed at site as incidental to the work. This is applicable to all piping work also.

4.4.6
Welding of all attachments on casing, non-pressure parts, pressure parts/ piping , equipments, tanks, vessels etc. including those required for insulation work is in the scope of work.

4.4.7

The work on piping systems (air, water, fuel,oil/lube oil, steam, gas etc.) will include cutting to required length, laying, edge preparation, fixing & welding of the pipes / elbows / fittings/ valves etc. In the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL engineers instructions and / or as per approved drawings / documents.

**4.4.8**
**Fittings like bends tees, elbows, miter bends, reducers, flanges etc., will be supplied as loose items. However, bends of tube size up to OD 65mm will have to be formed as part of work**.

4.4.9
All drains / vents / relief/ escape / safety valve piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc. From the stubs on the piping and equipments erected by the contractor/ battery limit points as specified in drawings/ instructions of BHEL site in charge is completely covered in the scope of work. The matched flanges including at battery limit points will be provided by BHEL. This is applicable to all piping including Integral Piping also.

4.4.10
Connection (flanged, bolted, welded) of piping to the terminal points/equipments etc. Is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, is also within the scope of work/specification. Terminal points works of various piping schemes with customer lines and other contractor's lines. The terminal points work is inclusive of cutting of existing lines, edge preparation, welding/blanking and hook up work.

4.4.11
It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up alongwith BHEL /customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, are also within the scope of work / specification.

4.4.12
The non-IBR piping will be sent as plain pipes. The attachments for tapping points and / or supports will be sent as loose items. Site work will involve fabrication, drilling, fitting, pre-heating, welding, NDE & PWHT as per applicable BHEL documents. Rate quoted shall take account of all these work as no separate payment is envisaged for such work.

4.4.13
For integral piping all attachments etc will be supplied as loose items and are to be welded to the main pipes at site as per instructions. Necessary drilling of holes on main pipe for welding stub shall also be done at site by the contractor.

4.4.14 **SERVICE & INSTRUMENT AIR PIPES**

4.4.14.1
Laying of S.S. /G.I. Pipes with fittings and supports of instrument air lines/process air shall include air blowing, hacksaw / cutting from running length to the size, threading, welding, installation of isolation valves, headers, root valves, moisture traps, check valves, supports and clamps etc by providing the required consumables shall be carried out by contractor.

4.4.14.2
Line shall be provided with proper slope as per drawing / standards and shall be supported at recommended pitching.

4.4.14.3
Hydraulic / pressure testing of pipelines, wherever called for, shall be conducted as part of work till satisfactory results are obtained.

## 4.5 Other products and systems

4.5.1

Ducts / expansion bellows are normally supplied in loose wall plates / segments and these are to be assembled and welded at site before erection. All joints connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be tested by LPI and made leak proof as per technical instruction / requirement.

4.5.2

Certain structural items like silencer supports, roof cladding structure, platform etc., will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.

4.5.3

The platforms of permanent nature for approaching different equipments like actuators, valves, instruments etc. as per site / BHEL client's requirements, which may not be indicated in drawings, but essential for safe access, shall be made by the contractor from structural steel / materials supplied in random lengths / sizes as per scope of work as per instruction of BHEL Engineer at site.

4.5.4 **INSULATION**

4.5.4.1

Application of wool insulation/mattress, pipe sections etc., sheet metal cladding, welding of hooks/supports to hold insulation of equipments, piping, tanks, vessels, duct with fittings, common system equipments and balance of plant equipments covered under this contract, shall include, but are not limited to, the following :-

A) Where indicated, removable type of insulation to be provided for valves, expansion joints, etc. as per the drawings or as directed by BHEL engineer.

B) Wool insulations are received at site as bonded and unbounded mattresses in standard sizes. These are to be dressed / cut to suit work by the contractor.

C) Application of insulation and refractory works and sheet metal covering as given in various drawings/ specifications of BHEL, supplied to the contractor.

D) Outer sheet cladding by fabrication of aluminum/ GI sheets to the sizes and shapes specified in drawings, beading, swaging, beveling of sheets, crowning the sheets, if necessary, fixing the same to supports, over wool insulation with screws/retainers as specified in BHEL drawings or as instructed by BHEL engineer.

E) Welding of hooks/supports on equipment including on pr. Parts and piping to support wool insulation, as per the drawings or as instructed by BHEL engineers.

F) Painting the inner side of aluminum/GI/steel cladding, with anti-corrosive paint as specified. The required paint and thinner is in the contractor's scope. Also all other accessories for painting, cleaning the surfaces etc. shall be arranged by the contractor.

G) The contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL engineer to facilitate inspection by boiler inspector or cut open during commissioning to fix gauges, fittings and instruments. These gaps will have to be finished as per drawings at a later date by the contractor at no extra cost to BHEL.

H) Wastage allowance for the materials issued shall be as under:-

| | | |
|---|---|---|
| i) | Refractory | 2% |
| ii) | Wool Insulation | 2% |
| iii) | Cladding sheets | 2% |

4.5.5 Erection of GT with aux, diverted dampers, guillotine dampers, Bypass stack, Common System Equipments and Balance of plant Equipments with other related equipments & auxiliaries.

4.5.5.1
For the skid mounted equipment, the checking and realignment required at site is in the scope of work.
4.5.5.2
Components like generator auxiliary compartment, load gear and enclosures etc received loose are to be erected in position by contractor.

4.5.5.3
Air filter, inlet ducting, exhaust ducting will be supplied in individual assembled sections with inside insulation. Site job involves complete assembly and erection.

4.5.5.4
Water wash skid shall involve welding of stainless steel pipe from skid to the GT. The piping shall be site routed. The contractor shall complete the job within quoted rate.

4.5.5.5
Overhauling, cleaning, revisioning, servicing of pumps, governing system, equipments, valves etc. During erection and commissioning stages, are in the scope of work. Gaskets/packing for replacement will be provided by BHEL free of cost. All equipments shall be preserved and protected periodically before and after erection as per the advice of BHEL engineer at no extra cost. All HT motors should be, if necessary, serviced and reassembled before erection as per the advice of BHEL engineer.

4.5.5.6
Certain instrumentation like pressure switches, air sets, filter regulators, pressure gauges, and junction boxes, power Cylinders, dial thermometers, flow meters, valve actuators, flow indicators etc. are received in assembled condition as integral part of equipments. Contractor shall dismount such instruments for calibration and hand over the same to c & i erection agency of BHEL. Mounting of such instruments will be done by the C&I erection agency.

4.5.5.7
Contractor shall provide the following for GTG, Common System Equipments and Balance of plant equipments and other related equipments with auxiliaries' erection:

1) Temporary bolts of required size for honing of generator coupling
2) Spanner & torque wrench/bolt stretching device for Tightening of load and accessories coupling bolts.

4.5.5.8
Rain hood protection shall be provided for the equipments e.g. Fuel/HSD, Naphtha forwarding skid and other skids etc. located outside/ in open space as per drawings & instructions .

4.6.0 Testing, pre-commissioning, commissioning and post commissioning
4.6.1

Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing, trial runs of various equipments erected and systems installed; flushing of the lines by air, water, oil/lube oil, gas, steam as the case may be; chemical cleaning of various systems & piping; steam blowing of the pipe lines; floating of safety valves, cranking of GT, FSNL run, Synchronization, Trial operation, open cycle operation, Co-gen operation and reliability run etc., are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

4.6.2
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 authority.

4.6.3
Contractor shall lay / install necessary temporary piping, tanks, pumps, valves, blanks, gauges, cables, switches etc., for conduct of hydraulic / pressure test, chemical cleaning, steam / air blowing etc. This may involve cutting of some portion of existing piping / valves, placing of rubber wedges / blanks in the valves and other openings. Where required, bends have to be fabricated / formed at site from random length / size of pipes / structural steel. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work.
4.6.4
For the installation of temporary system as above BHEL will provide only the piping, structural items for supports and access platforms, tanks/ plates for fabrication of tank, valves, gauges and their fittings, and thermal insulation only. These will be supplied in random sizes / lengths. However, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the contractor. All above works shall be carried out by contractor. The payment for temporary piping of Chemical Cleaning / Alkali Boil out & Steam Blowing shall only be paid as per applicable carbon steel piping rate of rate schedule (refer Sl. No. C(a) of rate schedule). The works of all other temporary piping for remaining applicable tests shall be carried by contractor as scope of work. All pumps of adequate capacities and specifications to meet the requirement, suitable motors and their starters, foundation/ frames, cables, switches etc shall be arranged by the contractor (other than which are to be provided by BHEL free of hire charges on returnable basis).
4.6.5
Fabrication, fit-up, pre-heating, welding, and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test / leakage test is part of work. Similarly, removal of blanks, restoration and normalization of the concerned system / line is to be done as part of scope of work. BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.
4.6.6
Cleaning, servicing of tanks, valves, pumps, equipments, Turning gear, governing system during various stages of erection and commissioning are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.
4.6.7
For various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL/ customer’s stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the contractor.
4.6.8
During trials/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipments like pumps, removal and cleaning / replacing of filters etc is within the scope of work.
4.6.9

In case any defect is noticed during tests, trial runs of all equipments and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the same shall be done as per BHEL engineer's instructions. Claim, if any, for these works from the contractor shall be governed by clauses 13.1 to 13.8.

4.6.10

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

Similarly, during the course of erection, if certain portion of equipments 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 contractors / 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.

4.6.11

During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc., till such time the unit is taken over.

4.6.12

Commissioning activities will continue till the completion of trial operation. During this period contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff along with necessary tools and plants, consumables etc as part of work.

4.6.13

It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.

4.6.14

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.

4.6.15

After chemical cleaning/pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Cleaning of oil tank of lubricating oil system of GTG set, rotating machinery and other system as per scope of tender specification before and after oil flushing is in the scope of work.

4.6.16

Transportation of oil drums from customer's/BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly, for various pre-commissioning/ commissioning activities/ processes mentioned in various clauses,

transport of chemicals from BHEL/customer's stores, charging of chemicals into the system and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

4.6.17
No any EOT crane or any other BHEL's crane willbe available under this tender specification for erection of Gas Turbine, Gas Turbine Generator, Bypass Stack, Feed Storage Tanks or any other equipments. Contractor shall take specific note of this aspect and shall arrange all necessary T&P and lifting/handling/transportation arrangements for placement on required foundation/elevation, erection of equipment including the heavier consignments/equipment like gas turbine, gas turbo-generator, GT inlet ducts, GT off base enclosure, Filter unit of GT, Feed Storage Tanks & Heater of Deaerator etc.. Gas Turbines and Gas Turbine Generators weighing respectively about 64 MT & 81 MT shall be required to be lifted by Suitable capacity Crane/ jacks & support structure etc. to take minimum possible time in lifting and placement then on respective foundations. The contractor shall specific note of same and shall arrange required arrangements as per site requirement.

4.6.18
The Height of assembled Bypass Stack is about 32 meters and Internal Dia. Is 3.56 meters. These Bypass Stacks will be supplied in loose ducts / sections and have to assembled / erection at site involving welding, bolting, tack welding work and erection of Aviation Light and lightening arrestor. The Bypass Stack have to insulated upto full height followed by cladding/sheeting work. All these works are covered under the scope of work of contractor under these specifications.

4.6.19
Piping weight indicated in Appendix-II under Item 5 Off base pipings with valves/fittings, supports and all other piping schemes like fuel, gas, naphtha, HSD, HP feed water, feed water, LP & HP steam, instrument air & service air, cooling water, service water piping, portable water piping, DM water piping, condensate piping, underground / buried piping, process air/n2 piping etc. (excluding GTG sets integral piping) for GTG, HRSGs, Common system equipments and balance of plant equipments / systems & related auxiliaries. Contractor shall carry out the erection and complete the piping works of respective system as per sequence, schedule and programme decided by BHEL engineer/customer at site in order to achieve the commissioning schedule of respective equipments/ systems and over all commissioning schedule of project as whole.

4.6.20
About 100meter pipe of dia 6" is under ground / buried piping and shall involve rapping & coating protective coating as per drawing requirement. Erection, laying, welding, Rapping & Coating of this pipe shall be carried out and payment for all such work shall be paid as applicable carbon steel piping erection & commissioning pipe rate of rate schedule (refer item No. C (a) of rate schedule).

4.6.21
**For any deviation / difference between BHEL specification & Customer specifications/requirements with regard to Chemical cleaning operation of systems, piping etc under these tender specification, the " Standard Construction Operation for Chemical Cleaning Document No.:H-322" of IOCL/TEIL for Procedure, Preparation, Sequence of Operation, control & monitoring, Neutralization etc. shall supersede the BHEL specifications and shall be final & binding on contractor.**

## 4.7 SECURITY, HOUSE KEEPING & OTHER RESPONSIBILITIES OF THE CONTRACTOR

4.7.1
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

4.7.2 Preservation & Protection of components

At all stages of work, equipments/materials in the custody of contractor, including those erected, will have to be preserved as per the instructions of BHEL. Necessary preservation agents, excepting the primer & paint, for the above work shall be provided by BHEL.

4.7.3
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.

4.7.4
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

4.7.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.

4.7.6
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.

## 4.8 **FINAL PAINTING**

4.8.1
BHEL will provide the primer, thinner & paints for final painting. All other consumables like brush, cleaning agents etc. All T&P, manpower, supervision is contractor's scope.

4.8.2
All exposed metal parts of the equipment including piping, supports, structures, railing, tanks/vessels, GT sets, Common System Equipments, Balance of Plant Equipments with associated auxiliaries etc. as covered under these tender specifications, as applicable shall be painted after thoroughly cleaning the surface from dust, rust, greases, oils, scales, etc, by wire brush, scrapping etc; as specified in relevant erection documents.

The above parts shall then be painted with specified no. Of coats of specified 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 primer coat applied.

Similarly, certain components may be supplied without any primer/paint coat from shop. The surface of such items shall be cleaned as per specifications, coated with suitable primer and then coated with final paint coats. The dry film thickness after final coat should be as per specification.

4.8.3
In addition, color banding, legend and identification marking, direction of flow/rotation marking etc. Is part of work.

**4.8.4**
**The surface preparation/cleaning, treatment, Identification marking Colour Codes and Final/Finish painting works shall be carried out by contractor as per TEIL/IOCL Specification "PAINTING WORKS -DOC. No.: O-301-A" with Addendums (the Specifications O-301-A is attached separately). For any non-confirmation/dispute between BHEL & TEIL/IOCL specification, the procedure/instructions as laid down in customer & their consultant's specification shall supercede BHEL specification and shall be binding on contractor.**

**4.9.0 OTHER POINTS:**

4.9.1
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL to Customer & suit the site requirement.

4.9.2
The work shall be executed under highly restricted, Space Constraints & Safety Concerned /constrained conditions affecting major Refinery projects in an existing power plant and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of customer's, Consultant's, contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole without compromising the Safety aspects/laws/Rules/Regulations.

4.9.3
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineer's decision regarding correctness of the work and method of working shall be final and binding on the contractor.

4.9.4
The contractor shall perform all required services which may not be specified herein but nevertheless required for the completion of work within quoted rates.

4.9.5
All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously from Respective Statutory Authorities/ Customer/Consultant/ Factory Inspector/ Labour & Welfare Officers/ Labour Commissioner/ Electrical Inspectorate etc. as required.

4.9.6

All cranes, transport equipments, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors/engineers, consumables (excluding those indicated as BHEL scope), etc required for this scope of work shall be provided by the contractor and shall conform to Safety Requirements/ Load Testing etc. as per IOCL/TEIL rules & Regulations at site.

4.9.7
All expenditure including taxes and incidentals in this connection will have to be borne by the contractor unless otherwise specified in the relevant clauses elsewhere here. The contractor's quoted rates shall include of all such contingencies. In this connection refer relevant clause of general conditions of contract.

4.9.8
If the contractor or his workmen or employees break, deface, injure or destroy any part of a building, road, Kerbs, fence, enclosures, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of erected equipments, stored components etc. Within the project premises or outside the contractor shall make the same good at his own expenses.

4.9.9
The contractor shall take due precaution during Materials Handling and Erection, testing & commissioning of equipments/works under these specifications to avoid deface, injure, damages, destruction by contractor or his workmen or servants to any pipelines, railway lines, roads, canals, cables, culverts, drains, sewer, telephone &telegraph lines, water mains, dykes, poles, pillars, fences, wires, supports and embedments and other under ground or over ground works, Structural or constructions whatsoever and shall at his own cost and initiative forthwith restore and repair any damage thereto the entire satisfaction of customer/BHEL at his own expense or in default, the customer/ BHEL site engineer may cause the same to be made good by other agency or by other means and deduct the expense with BHEL overhead (of which the site engineer's decision is final) from any sums that may be then or at any time thereafter become due to the contractor or from his security deposit or any other money due.

4.9.10
As such, the marine cover and erection all risk cover insurance for the project for permanent incorporation of materials and services at site lies with customer. The contractor shall have to take necessary all risk insurance policy (motor vehicles act, worker's compensation act, fatal accidents act, personal injuries insurance act, emergency risk insurance act and/or other industrial legislation from time to time India with insurance company(ies) approved by owner) **for his manpower and his employees deployed at site under work compensation act including but not limited to third party insurance at IOCL, Gujarat refinery project along with his T&Ps before starting of the work and shall submit the necessary document/policy in support of above to BHEL/customer at site. This will be also essential for taking the gate pass/entry pass etc. From customer & their related departments/TEIL/CISF at site. The insurance policy taken shall be kept in-force till completion of contract.**

**The workmen's compensation insurance and third party insurance liability limits shall be as customer specification. Contractor shall indemnify the customer (IOCL)/ BHEL harmless against such losses, which are on account of contractor.**

4.9.11
Recoveries will be made from contractor's bills for any liability accrued to BHEL/IOCL/TEIL for the accidents and refund of the same shall be considered later, after the claim is fully settled by insurance authorities.

4.9.12
Customer has taken the marine cover and erection all risk cover insurance for the project for permanent incorporation of materials and services at site. However contractor shall take all due precautions, arrange & follow the safety & security requirements/regulations for materials issued to him & works under his execution and shall be responsible for safety & security of these materials & works for any loss or damages. For any damage / loss to the material during inland transportation, storage, erection, final testing, commissioning stage etc., contractor shall intimate promptly to BHEL/customer and shall prepare & submit the necessary detailed report / documents / information, facilitating inspection / discussions by the officials / surveyors deputed by insurer with all expenditure on contractor's account. Contractor shall take care for timely information for conducting survey, submission of monetary estimate & furnish the requisite documents to surveyors/insurer, taking necessary precautions so that the loss/damage is not aggravated further, protecting damaged goods etc. As part of scope of work.

**Contractor shall promptly make repair / rectify/replace and make good any damage or loss to customer/BHEL materials and works on above account as per instructions of BHEL engineer incharge at site without any delay & waiting for settlement of insurance claim from insurer. Contractor's claim (if any) for such works will be settled as per applicable item rate of contract after settlement of claim from insurer / customer & after ascertaining / establishing that contractor is not responsible for such loss or damages. The contractor's claim for such repair / replacement shall not be more than the payment settled by insurer / customer and in such case the contractor's payment will be limited to seventy percent of settled amount by insurer/customer against claim amount.**

4.9.13
The contractor shall submit survey report/performance report of the tools and plants deployed by him and being utilized on the work under the scope. These survey reports/performance reports are to be obtained by contractor from the customer of BHEL/insurance authorities and submitted to BHEL at no extra cost.

**4.9.14**
In case, any additional expenditure is to be incurred in work during execution arising out of the faulty execution of such work by the contractor, the same shall be borne by the contractor.
4.9.15

Contractor shall deploy & maintain, the separate exclusive workforce / manpower arrangements and T&Ps resources including the Cranes & heavy lift equipments /arrangements for Material Handling and Erection & Commissioning scope of works.

4.9.16
All the Material Handling and Erection & Commissioning scope T&Ps and tools & tackles, Measuring equipments/devices/ Tools, Safety devices, Transport Vehicles, Welding Generators/diesel Generators etc. shall have due calibration, Test & Load Test certificates from approved agencies / statutory authority as per requirement of IOCL/TEIL. All vehicles/ electrical motors, devices shall have to be provision of fire extinguisher/muffler facilities etc.

4.9.17
Contractor shall abide by all Safety Rules, Laws & regulations and statutory requirements as per requirement of TEIL/IOCL/CISF at project premise and same shall be binding on contractor.

4.9.18
Contractor shall provide FIRST AID / emergency medical facilities & Emergency Vehicle facilities at project premise/work site to meet any exigency / emergency requirement and shall maintain these facilities through out the contract period & extension period (if any) as scope of work.

4.9.19
The equipments/systems/piping/components under these specification shall require to connect / hookup with other systems / equipments / piping / components / terminal points etc. of Customer / other erection vendors. Contractor shall carry out the termination of these systems / equipments / piping with customer/other vendor's terminal points and shall involve welding, bolting/flange joints, cutting, edge preparation, radiography, NDE etc. of terminal point systems (which may not be included in these specifications and may have been erected by other vendor) shall be carried out by contractor as per instruction of BHEL engineer at site including welding / bolting of counter/matching flange joints as scope of work. Decision of BHEL engineer shall be final and binding on contractor.

4.9.20
As such the external barricading of project plot area will be carried out by civil agency as scope of civil works. Contractor under these specification shall carry out his internal barricading/ cordoning off (as applicable) of area of HIS operations, providing safety nets, safety tapes, passenger trolley for high height working etc. as per safety requirements/safety concern and regulations enforced by IOCL/TEIL at site before under taking the day-to-day works. All such works/arrangements shall be carried out by contractor as scope of work.

4.9.21
For structures, supports, stairways, platforms, galleries, hand rails, grills, etc. the structural materials may be supplied in random length which may have to be cut to required profile in order to suit the requirement a incidental to the work. Also it may sometimes be necessary to remove some of the erected members to

facilitate erection of bigger / pre-assembled equipments. In such cases, the removal and re-erection of such works as agreed by BHEL Engineer will have to be done by contractor as incidental to work.

4.9.22
All the handrails and toe guards shall be provided as per drawing and safety requirements. After cutting the floor grills to suit the site condition, the cut edges shall be painted with two coats of cold galvanizing paints conforming to Indian Standard.

4.10 **EXCLUSIONS**
The following works are specific exclusions from the scope of work / specification: -

I) Some sub-delivery items and electrical components such as push buttons, junction boxes etc.

II) E&C work of cable trays, cables and earthing except specifically mentioned.

III) Erection of control panels, MCC etc., Calibration of instruments.

IV) All electrical and control & instrumentation items except those specifically included in these tender specifications.

V) Civil works except to the extent specifically indicated elsewhere in this tender.

VI) Pneumatic copper tubing and fittings thereof.

VII) Design, procurement, supply, and application of spray insulation.

## 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, MEASURING AND MONITORING DEVICES:

5.2.1

The contractor shall provide all (excepting those indicated in BHEL scope) required tools and plants, monitoring and measuring devices (MMD) and handling & transportation equipments for the scope of work covered under these specifications. Contractor has to provide suitable cranes / Jacks & sleepers / other suitable arrangements and all T&Ps required for erection, commissioning and testing of equipments/components/items for satisfactory completion of work. BHEL's crane / any arrangement shall not be available for this purpose. Please refer relevant Appendix-III for the list of T&P being provided by BHEL free of hire charges on sharing basis. Contractor shall take the specific note this aspect and shall arrange all necessary required T&Ps and lifting/handling/transportation arrangements for placement on required foundation/elevation, erection of equipments including for heavier consignments like gas turbine generator, GT inlet ducts, GT Load Gear Box, GT off base enclosure, Filter unit of GT, Feed Storage Tank & Heater of Deaerators, Bypass Stack items, Accessory base, Diverter Damper, Guillotine Dampers and all other equipments etc.

5.2.2

All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification. Indicative list of major T&P to be arranged by the contractor has been furnished in relevant appendix. Contractor shall also mobilize all other T&P necessary for timely and satisfactory completion of the work in scope.

5.2.3

As regards the hydraulic test pumps, water fill pumps and chemical cleaning pumps etc which have to be used in temporary installations for the respective purpose have to be arranged by the contractor. **BHEL will not provide any Pumps/arrangements. BHEL will provide only Chemical Circulation Pumps for Alkali Boil out / Chemical cleaning of Major / Bigger size of Piping.**

5.2.4

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.

5.2.5

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 alternative arrangements expeditiously so that the progress of work is not hampered.

5.2.6

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 alternative arrangement at the risk and cost of the contractor.

5.2.7
The T&Ps to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. The movements of cranes and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility. The necessary test certificates as per requirement of IOCL/TEIL Rules, Laws, Regulations, Safety Requirement at site shall be required to be submitted at site.

5.2.8
Use of welding generators/ rectifiers for welding only shall be permitted. Use of welding transformers will be subject to specific approval of BHEL engineer.

5.2.9
The contractor at his cost shall carry out periodical testing of his construction equipments and calibration of measuring & monitoring devices (MMD). Test/ calibration certificates shall be furnished to BHEL. MMD shall be calibrated only at accredited laboratory as per the list available with BHEL or any other laboratory approved by BHEL.

5.2.10
Contractor shall transport BHEL's T&P to & fro between BHEL stores and site. Additional loose components / sub-assemblies / attachments as and when necessary, will be issued by BHEL, to & fro between BHEL stores and site of such items shall also be done by the contractor. Assembly of such additional loose components/sub-assemblies/ attachments is in contractor's scope. Contractor shall provide all enabling services with tools and tackles for assembly/dismantling as above.

5.3 **CONSUMABLES**

5.3.1
The contractor shall provide all consumables including GT set and TG set special consumables like Molykote, Hylomar, Bricosit, Stag-B etc. required for carrying out the work covered under these specifications excepting those specifically indicated as BHEL scope.

5.3.2
All consumables to be used for the work shall have prior approval of TEIL/IOCL & BHEL engineer with regard to brand and quality specifications. Test reports / certificates in respect of these consumables, wherever applicable, shall be submitted to BHEL engineer.

5.3.3 **PRIMERS & PAINTS**
All preservation primers with paints for entire works is in the contractor's scope. BHEL will provide preservation paints & Finish Paints with primer for preservation of BHEL supplied equipments / materials and Final / Finish Painting of BHEL equipments under these specifications.

5.3.4 Consumables for BHEL supplied equipments (cranes, T&P etc.)

Refer relevant clause of section-7 special conditions of contract in this regard.

**5.4 Welding electrodes, filler wires for 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.

## 5.5 FIELD OFFICE

5.5.1
**The contractor shall make his own arrangements for field office and stores for accommodating necessary equipments, tools room for execution of the work. Only open space will be provided by BHEL / customer, free of charges as per the availability of space. The contractor shall make his own arrangements for Construction of field office, store shed/stores. IOCL Gujarat Refinery project having space constraints and Safety as prime Concern & lots of work permit procedures/formalities for excavation, Fabrication, grinding, welding works etc., contractor may decide his portable Type office/stores etc. arrangements. Contractor may have to arrange his own arrangement outside the project premise for accommodation of his T&P and cranes etc. and shall be arranegd by contractor at his own expenditure**

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:**

Construction power (3ph., 415v/440v) will be provided at available single point in project premise by customer (IOCL). The construction power for construction purpose will be free of charges, however any taxes, duties, levy etc. As charged by customer, shall be paid by contractor. The contractor shall provide all necessary cables, glands, fuses, switches, switchboards, ELCB, energy meters etc. And any other installation as specified by statutory authority in this regard for further drawl of power. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to their being put to use or as may be specified, shall be the responsibility of the contractor.

5.7.2

It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety laws & regulations and requirements at site as per specifications of iocl/teil. 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 contractor shall install necessary capacitor bank etc. with appropriate control mechanism to maintain the power factor as per the guidelines in vogue from time to time in this regard. Any levy imposed by the customer / authority for any deviation in power factor shall be passed on to the contractor.

5.7.4

Contractor shall be equipped with back-up power supply arrangement like Diesel Generator 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 process that are underway at the time of power failure or important activities planned in immediate future.

5.7.5

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.

5.7.6 **Construction Water:**

Water for construction purpose will be provided by customer free of charges at available single point inside the plant area. Contractor has to arrange his own distribution system/pumping arrangements etc. for further distribution of construction water. The necessary taxes, duties and levies as imposed by m/s iocl have to be borne by contractor and the coated rates deemed to have included all this things.

5.7.7

Contrcator shall make his own arrangement of drinking water.

5.7.8

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.

5.8.6
**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 IOCL/TEIL.**
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 IOCL/TEIL /bhel officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by IOCL/TEIL /BHEL for making gate passes.

5.8.9
BHEL/IOCL/TEIL 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/IOCL/TEIL

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 IOCL/TEIL /BHEL, to work beyond normal working hours, the contractor shall arrange necessary gate passes.

## 5.9 TAXES, DUTIES, LEVIES

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

### 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 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.

**5.9.4Modalities 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.

## 5.10.0 SUBMISSION OF PERIODICAL REPORTS

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

- Consumption of welding electrodes and gases
- Consumption of construction power
- Availability and utilization of BHEL's cranes
- Manpower reports
- Progress reports - periodically
- Field calibration reports

BHEL at site will inform formats for these reports.

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.

## SPECIAL CONDITIONS OF CONTRACT

### 6.0 CONTRACTOR'S OBLIGATION IN REGARD TO EMPLOYMENT OF SUPERVISORY STAFF AND WORKMEN

### 6.1 SUPERVISORS AND LABOUR

Contractor shall deploy in adequate strength Labour, Technicians, Supervisors and Engineers for these works.

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-vi. 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 and Workmen for this job. They shall have professional approach in executing the work having adequate knowledge / experience in over all knowledge of G T Equipments/ systems/components, Quality Assurance procedures, Planning, Safety etc. and conversant / exposure to such refinery atmosphere / environment that are required to be undertaken for the type of work as per these specifications.

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.

6.7

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.

6.8

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.

**6.9 WATCH AND WARD**

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

6.10

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.

6.11

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.

**6.12 SITE ORGANIZATION**

The contractor shall provide adequate staffing in the following areas in addition to the staffing requirements of execution as instructed/informed by BHEL from time to time:

6.12.1 Overall planning, monitoring & control

6.12.2 Quality control and quality assurance

6.12.3 Materials management

6.12.4 Safety, Fire & security

6.12.5 Industrial relations and fulfillment of labour laws and other statutory obligations.

## SECTION-7

## SPECIAL CONDITIONS OF CONTRACT

7.0 **OBLIGATIONS OF BHEL**

7.1 Facilities to be provided by BHEL

7.1.1 Space for site office / stores

Refer section-5 in this regard.

7.1.2 **CONSTRUCTION POWER & WATER**

Refer section-5 in this regard.

7.1.3 **OTHER MATERIALS AND CONSUMABLES**:

BHEL shall not provide any material / consumables except those specifically mentioned in this tender specification.

7.1.4 **WELDER'S TEST MATERIALS (ONLY TUBES & PIPES)**

BHEL will only provide the tube & pipe pieces in random sizes free of charges for preparation of test coupons for conducting the site qualification test of hp/ IBR welders. Contractor shall arrange on his own arrange other materials such as plates, tubes, pipes etc for qualification of other welders. Contractor shall prepare the required test coupons.

7.2 **FILLER WIRE FOR TIG WELDING**

Refer section-5 in this regard.

7.3 **EQUIPMENTS – TOOLS & PLANTS**

BHEL will make available T&P listed vide **Appendix-III** free of hire charge on returnable basis. Contractor shall ensure these are maintained in working condition during their deployment for the work and while retuning the same. BHEL reserves the right to take penal action as deemed fit in the event of damages to these on account of contractor. Further details are as under:

7.3.1 **CRANES TO BE PROVIDED BY BHEL**

7.3.1.1

BHEL shall not provide any crane or transportation arrangement for this work. **Contractor shall make all arrangements for the crane and other suitable arrangements as indicated in relevant appendix and required for completion of work in contractor's scope including the handling, lifting, placement, erection of heavy equipments like Gas Turbines, Gas Turbine Generators, Feed Storage Tank and Heater of Deaerators, Bypass Stack items, Accessory Base, Diverter Dampers, Guillotine Dampers etc..**

**As an additional information, the tentative Elevation of operating Centre line of Feed Storage Tank (FST) and Header of Deaerator is 17.195 Meter & 20.51 meters respectively.**

7.3.1.2

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.

7.4 **OTHER T&P**

7.4.1
Special tools which are supplied by BHEL as part of maintenance tools to be handed over to customer under regular DU / DESS numbers in various product groups 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.

7.4.2
Lubricants like hydraulic oil, gear oil and grease for BHEL's T&P will be provided by BHEL free of charge. All other consumables like cotton waste etc shall be in the contractor's scope.

7.4.3
The contractor must not use these equipments for any purpose other than what they are intended for.

7.4.4
If the above items issued to contractor are found not utilized / not maintained to the satisfaction of BHEL engineer or misused, these will be withdrawn and no replacement will be done for such items.

7.4.5
Required temporary structural steel, pipes & fittings, valves for conductance of hydraulic test, chemical cleaning / steam blowing / oil flushing / acid cleaning etc. shall be provided by BHEL.

## 7.5 CHEMICALS, GASES AND LUBRICANTS FOR PRE-COMMISSIONING AND COMMISSIONING

7.5.1
All lubricants and chemicals required for testing, preservation, chemical cleaning / acid cleaning, oil flushing, and the lubricants for flushing/initial filling/subsequent topping, trial runs/ trial operation of the equipments will be supplied by BHEL as free issue. BHEL will provide paints with primer & thinner for Final/Finish painting.

## INSPECTION / QUALITY ASSURANCE / STATUTORY INSPECTION

8.1
Various inspection / quality assurance procedures / methods at various stages of erection and commissioning will be as per BHEL / customer quality plans / codes / IBR 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 and post weld heat treatment records, testing & calibration records and other quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification. These records shall be submitted to BHEL/customer for approval from time to time.

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

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

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

8.6
Contractor shall provide all the measuring and monitoring devices (MMD) required for completion of the work satisfactorily. These MMD shall conform to job requirement in respect of measurement range, accuracy level & any other specification.

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

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

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

8.10
Vibration indicators/vibration recorders/vibration analyzers will be provided by BHEL for checking and analyzing vibration levels of rotating equipments with qualified operatoRs.

Contractor shall provide necessary manpower for carrying out such tests. Similarly, BHEL will provide the oscilloscope for any specific requirement.

8.11
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 should engage well-qualified and experienced engineer for quality assurance and NDE services.

8.12 Stage inspection by FES / QA engineers

8.12.1
Apart from day-to-day inspection by BHEL engineers stationed at site and also by customer's engineers, stage inspection of equipments under erection and commissioning at various stages of erection and commissioning by teams of engineers from field engineering services of BHEL's manufacturing units and quality assurance teams from field quality assurance, factory quality assurance and commissioning engineers from technical services of BHEL / consultant will also be conducted. Contractor shall arrange all labour, tools and tackles etc for such stage inspections as part of work.

**STATUTORY INSPECTION OF WORK**

8.13.1
The work to be executed under these specifications has to be offered for inspection, at appropriate stages of work to statutory authorities to comply with applicable regulations.

8.13.2
The work related statutory inspections, though not limited to, are as under:
Inspectorate of steam boilers and smoke nuisance
Factory inspector, labour commissioner, electrical inspector pf commissioner and other authority connected to this project work

The scope includes getting the approvals from the statutory authorities, which includes arranging for inspection visits of statutory authority like boiler inspector, electrical inspector etc. Periodically as per BHEL 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.

8.13.3
The contractors shall pay all fees connected with testing of his welders / workers and testing, inspection & calibration of his MMD and T&P.

8.13.4
It shall be contractor's responsibility to obtain approval of statutory authorities, whenever applicable, for the conducting of any work which comes under the purview of these authorities. Any cost arising from this shall be contractor's account.

8.13.5
Contractor shall pay fees for visits, inspection fees etc of IBR authorities in addition to all other expenses in this regard.

8.13.6

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.

8.14.0
The quality management system of BHEL, power sector – western region (PSWR) has already been certified and accredited under ISO 9001: 2000 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.

**8.15**
**Contractor to note that in addition to above BHEL requirements of inspection /quality assurance / quality control / statutory inspection, contractor shall follow & abide the requirements of iocl/teil and in the event of any deviation/ dispute, the requirements of IOCL/TEIL in above regard shall supersede the BHEL requirements.**

**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 endeavor of BHEL and all its subcontractors to meet and implement the requirements by following the guidelines issued under Environmental, Occupational Health and Safety Management (EHS) manual a copy of which will be available with the BHEL Site-in-charge.

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

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

**9.1 The Contractor Shall**

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

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

9.1.3
Abide by the Procedure governing entry/exit of the contractor's personnel within the Customer/Client premises. All the contractors employees shall be permitted to enter only on displaying of authorized Photo passes or any other documents as authorised by the Customer/Client

9.1.4
Be fully responsible for the identity, conduct and integrity of the personnel/workers engaged by them for carrying out the contract work and ensure that none of them are ever engaged in any anti national activity

9.1.5
Prepare a 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 authorised BHEL official. The safety plan shall indicate in detail the measures that would be taken by the contractor to ensure safety to men, equipment, material and environment during execution of the work. The plan shall take care to satisfy all requirements specified hereunder.

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

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

9.2.1.3
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 authorised 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 energised by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

9.2.1.7
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 authorised 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, access etc should be properly designed and approved put to use. Approach Before being

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 guard rails, covers or protective devices unless authorised 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 authorised persons holding relevant license will drive and operate site plant and equipments eg cranes, dumpers, excavators, transport vehicles etc

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

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas CyliNDEr 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 authorised BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **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 mobilisation of personnel and equipment, and defining the responsibilities of the personnel indicated, in order to prepare for any emergency that may arise in order to ensure the priorities of

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

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

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

9.2.2 **OCCUPATIONAL HEALTH**

9.2.2.1
Specific occupational health hazards will be identified through the hazard evaluation processes in consultation with BHEL engineers and the necessary prevention/reduction/elimination methods implemented.

9.2.2.2
All personnel working in an activity with a potential risk to health shall be made aware of all those risks and the actions they must take to reduce/control/eliminate the risk

9.2.2.3
Safety coordinator shall conduct periodic checks to ensure that every group of workers engaged in similar activities are aware of potential risks to health and the actions required to be taken to mitigate the risk

9.2.2.4

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

- Issue of approved Personnel Protective Equipment
- Verification that the PPEs are adequate/maintained and worn by all staff involved in operations that are potentially hazardous to their health
- Ensure that the personnel deployed are physically fit for the operation/work concerned
- Provide hygienic and sanitary working conditions

9.2.2.5
Contractor workers employees engaged in noise risk areas shall be issued with hearing protection aids and the use of the same will be enforced. Further, these workers will be educated on the hazards of noise

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

9.2.2.7
Workers engaged in exposure to bright light/rays as in welding or radiation shall be issued with eye protection devices and the use of the same shall be enforced

9.2.2.8
Adequate arrangements shall be made to provide safe drinking water

9.2.2.9
Health monitoring records on at least sample basis for contractor employees & workmen shall be maintained for persons engaged in specified categories of work. These shall include

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

9.2.3.0 **HYGIENE and HOUSEKEEPING**

9.2.3.1
Good house keeping and proper hygiene is one of the key requirements of Occupational Health Safety and Environment management. Towards this the contractor shall encourage his workers and supervisors to maintain cleanliness in their area of work.

9.2.3.2
The Contractor shall arrange to place waste bins/chutes at convenient locations for the collection of scrap and other wastes. The bins shall be clearly marked and segregated for metal, non-metal, hazardous and non hazardous wastes.

9.2.3.3
BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail 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

**9.2.4.3.1**
The objective of waste management is to ensure the safe and responsible disposal of waste, ensuring that it is correctly disposed of and being able to audit the process to ensure compliance.

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

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

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

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

**9.2.4.3.6**
All necessary measures shall be taken to ensure safe collection and disposal of waste oils. In particular to ensure the prevention of their discharge into surface waters, ground waters, coastal waters or drainages

## 9.3 **SUPERVISION**

**9.3.1**
Contractor must provide at least one full time on site safety coordinator when the manpower engaged is in excess of 50 for the contract activities in the premises. If the manpower is less than 50, the on site safety coordination responsibilities shall be assumed by any one of the contractor's other supervisory staff; however in both the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

**9.3.2**
Contractor's safety coordinator or his supervisor responsible for safety as the case may be shall conduct at his work site, and document formal safety inspection and

audits at least once in a week. Such documents are to be submitted to BHEL Engineer in Charge for his review and record

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

**9.3.3**
Before starting work under any contract, the contractor must ensure that a job specific safety procedures/field practices as required over and above the safety permit conditions are prepared and followed .He should also ensure that all supervisors and workers involved understand and follow this procedures /field practices.

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

9.4.0 **TRAINING & AWARENESS**

9.4.1
Contractor shall deploy experienced supervisors and other manpower 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 authorised BHEL official immediately after such occurrence but in any case not later than twelve hours of the occurrence. Such report shall be furnished in the manner prescribed by BHEL and also to meet statutory requirement.

**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.

**9.6.0 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.

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

- Compliance with procedures and systems
- Availability, condition and use of PPEs
- Condition of maintenance tools, equipments, facilities
- Availability of fire fighting equipments and its condition
- Use of fire fighting equipments and first aid kit
- Awareness of occupational health hazard

- Awareness of safe working practices
- Presence of quality supervision
- Housekeeping

The Safety 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<br>Every month |
| 4 | Lifting equipment/tacles | To check for defects and efficacy of brakes | User<br>Third party | Daily<br>Every Year |
| 5 | PPE | To check for defects | User | Daily |

9.7.0 **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** | **Safety** | **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 | 500/- |

| | | |
|---|---|---|
| | Dangerously | |
| 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.

9.8.0
**CITATION:**-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate certificate to recognise the safety performance of the contractor may be considered by BHEL after completion of the job

9.9. **Memorandum of Understanding**

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

**Memorandum of Understanding**

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

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

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

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

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

Name :

Place & Date:

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

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

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

| IS No | YEAR | Amd upto | DESCRIPTION |
|---|---|---|---|
| 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 |

| IS No | YEAR | Amd upto | DESCRIPTION |
|---|---|---|---|
| | | | STRUCTURES SUBJECTED TO UNDERGROUND BLASTS |
| IS 6994 | 1973 | | SPECIFICATION FOR SAFETY GLOVES |
| IS 7155 | 1986 | | CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8) |
| IS 7205 | 1974 | | SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK |
| IS 7293 | 1974 | | SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY |
| IS 7323 | 1994 | | GUIDELINES FOR OPERATIONS OF RESERVOIRS |
| IS 7812 | 1975 | | CODE OF SAFETY FOR MERCURY |
| IS 7969 | 1975 | | SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS |
| IS 8089 | 1976 | | CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT |
| IS 8091 | 1976 | | CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT |
| IS 8095 | 1976 | | ACCIDENTS PREVENTION TAGS |
| IS 818 | 1968 | 1997 | CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS |
| IS 8448 | 1989 | | AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER) |
| IS 8519 | 1977 | | GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION |
| IS 8520 | 1977 | | GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION |
| IS 875 | 1987 | | STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5 |
| IS 8807 | 1978 | | GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS |
| IS 8978 | 1985 | | INSTANTANEOUS WATER HEATERS |
| IS 8989 | 1978 | | SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES |
| IS 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 No | YEAR | Amd upto | DESCRIPTION |
|---|---|---|---|
| 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 |

**9.11**

CONTRACTOR TO NOTE THAT IN ADDITION TO ABOVE BHEL REQUIREMENTS OF SAFETY, OCCUPATIONAL HEALTH AND ENVIRONMENTAL MANAGEMENT, CONTRACTOR SHALL STRICTLY FOLLOW & ABIDE THE SAFETY LAWS/RULES & REGULATION REQUIREMENTS OF IOCL/TEIL AT SITE AND IN THE EVENT OF ANY DEVIATION/ DISPUTE, THE REQUIREMENTS OF IOCL/TEIL IN ABOVE REGARD SHALL SUPERSEDE THE BHEL REQUIREMENTS (**THE SPECIFICATION OF REQUIREMENT OF IOCL/TEIL " *SAFETY CODE AND REGULATIONS" TOTAL 61 PAGES"* ARE ATTACHED SEPARATELY**). CONTRACTOR SHALL ARRANGE THE REQUIRED SAFETY FACILITIES SUCH AS FIRST AID, EMERGENCY TRANSPORT, FIRE PROTECTION/FIRE EXTINGUISHERS/SAND BUCKETS/WATER BUCKETS, BARRICADING OF AREA, DISPLAY OF SAFETY RULES/POSTER/ DANGER MARKS, PUTTING OF DANGER BOARDS/ CORDONING OF UNSAFE AREAS, PUTTING THE SAFETY TAPS/ SAFETY FENCING SAFETY TAG ETC. AS PART OF SCOPE OF WORK AS PER REQUIREMENT OF IOCL/BHEL.

FOR NON-COMPLIANACE/VIOLATION OF SAFETY RULES AND FINE/PANELY IMPOSED BY IOCL/TEIL AS THEIR RULES & REGULATIONS SHALL BE TO THE ACCOUNT OF CONTRACTOR & SAME SHALL BE PAID BY CONTRACTOR. IN EVEN OF ANY RECOVERY FROM BHEL BILLS BY CUSTOMER ON ACCOUNT OF CONTRACTOR AGAINST SUCH FINE/PANELTY, BHEL SHALL RECOVER SUCH AMOUNT/PAYMENT IN ADDITION TO 30% DEPARTMENTAL OVERHEADS FROM ANY AVIALBLE BILLS/PAYMENTS OF CONTRACTOR WHICH IS DUE FOR PAYMENT FROM BHEL.

## 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 contract in sections 4 to 15 and appendices shall prevail.

10.7 In case of discrepancy between quoted item rate and corresponding amount in the rate schedule, the **quoted item rates shall be reckoned as correct and amount recalculated**. Quoted item rates shall also prevail for arriving at the total price quoted for offer evaluation.

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 case.

## SECTION-11

## SPECIAL CONDITIONS

### 11.0 TIME SCHEDULE, MOBILISATION, PROGRESS MONITORING, COMPLETION, OVERRUN, PRICE VARIATION ETC.

### 11.1 TIME SCHEDULE AND MOBILIZATION

11.1.1
The contractor shall mobilize at site to start the contractual work within **TWO Weeks** from issue of fax letter of intent by BHEL. Contractor shall mobilize the resources and shall augment & increase additional resources further in such a manner that the entire work s envisaged under the tender specification is completed to achieve the following schedule from date of start of work at site:

| SN | MILESTONE | COMPLETION SCHEDULE |
|---|---|---|
| 1. | SYNCHRONISATION OF GT UNIT-1 IN OPEN CYCLE | 24.02.2009 |
| 2. | FULL LOAD OPERATION OF GT UNIT-1 | 24.03.2009 |
| 3. | CO-GEN COMMISSIONING OPERATION | 05.05.2009 |
| 4. | COMPLETION OF ALL FACILITIES INLUDING FINAL PAINTING | 05.06.2009 |

**NOTE: Schedule of Unit-2 shall be with a phase difference of ONE Month.**

**Erection work is tentative expected to start by First Week of September 2008 (with +/- of one month). However the Start of contract period shall be reckoned from the actual date of start of erection work at site and which shall from erection/placement of first major equipment / major assembly / major sub-assembly on its designated foundation/location by the contractor and so certified by BHEL engineer**. Placement of packers, inserts, foundation bolts and shims, or chipping of foundations for packers etc. will not be considered for this purpose.

11.1.2
In order to meet above schedule in general, and any other intermediate targets set, to meet customer requirements, contractor shall arrange all necessary resources in consultation with BHEL.

11.1.4 **CONTRACT PERIOD**
The total contract period shall be **10 (TEN) months** from the start of erection work as defined in clause 11.1.1 herein earlier.

11.1.5 **GRACE PERIOD**
Grace period of **3 (Three) months** beyond contract period will be applicable.

11.2 Progress monitoring, contract extension and overrun

11.2.1 Progress monitoring

11.2.1.1
Progress will be reviewed periodically (daily / weekly / monthly) 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.

11.2.1.2 Ascertaining and establishing the reasons for shortfall

The onus-probandi that the causes leading to extension of the contract period is not due to any reasons attributable to the contractor is on him (the contractor). Review of the performance as stated vide Cl.11.2.1 above will be made considering the availability of components to be erected and other inputs / constraints over which the contractor has no control. The programme will be reviewed area-wise and the following facts will be recorded in case of shortfall at the end of every month:

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

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

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

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

11.2.2 **CONTRACT EXTENSION**

12.2.2.1
If the completion of work as detailed in these specifications gets delayed beyond the end of contract period and grace period contractor shall request for an extension of the contract. Depending on the balance work left out then, BHEL at its discretion may extend the contract.

11.2.2.2
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. 11.2.1.2 shall be done during the extended period. The overrun charges will be paid in proportion to the achievement of the respective month vis-à-vis the plan for the month (for assessing the performance, the agreed plan shall be reduced by shortfall attributable to the BHEL). BHEL may disallow contractor's claim for over run charges if the monthly programme as mentioned here not made by him.

11.2.2.3

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

### 11.2.3 OVERRUN COMPENSATION

If the contract is extended beyond the contract (including grace) period for any reason other than those attributable to the contractor or force majeure conditions, the contractor will be compensated by payment of over run charges at the rate of **Rs.50,000/-** per month (**Rupees Fifty Thousand only**). Over run compensation will be paid for the extension attributable to BHEL only. No over run compensation will be payable for the extension on account of reasons attributable to contractor and / or force majeure conditions. Pro-rata payment will be made for part of a month considering daily ORC=Monthly ORC rate divided by 30.

## 11.3 PRICE VARIATION

Rates offered shall remain firm through out the contract period and grace period as also during extended period, if any. No rate revision, price variation is applicable under this contract. Accordingly, the clause no. 2.15 of general conditions of contract is also not applicable.

## 11.4 CONTRACT VARIATIONS

### 11.4.1 VARIATION IN QUANTITIES

Weight of various equipments, quantities of various items of work, etc. Covered under these specifications, & indicated in relevant appendices are likely to vary. For any upward or downward variation in the quantities the rates accepted shall be applicable without any variation, wherever unit rate is applicable. Payment will be made by BHEL for the actual executed quantities in such cases. However for lump sum rate of equipments/auxiliaries of rate schedule, no additional payment/ recovery shall be made towards any variation in weights and quantities.

## 11.5 INTEREST BEARING ADVANCE

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

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

## 11.6 DEFINITION OF WORK COMPLETION

The contractor's scope of work under these specifications will deem 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.

## SECTION-12

SPECIAL CONDITIONS OF CONTRACT

### 12.0 TERMS OF PAYMENT

12.0.1
The contractor shall submit his monthly on account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas from the 25th of previous calendar month to 24th of the current month.

12.0.2
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:

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number

6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

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

## 12.1 STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

### 12.1.1 STAGE BREAK UP FOR PAYMENT OF GAS TURBINE-GENERATOR SETS WITH AUX., INTEGRAL PIPING AND BALANCE OF PLANT (MECHANICAL) AND OTHER RELATED EQUIPNMENTS & AUXILIARIES PER UNIT (REFER SL. NO. A OF RATE SCHEDULE) shall be as per following on progressive prorate basis:

Terms of payment for GTG & aux. with Balance of Plant Equipments, Integral Piping (Refer item under Sl. No. A of rate schedule) and Common system equipments / items/systems (Refer item under Sl. No. B of rate schedule), immediate payments shall be made as follows on the basis of percentage/billing breakup of rate schedule on completion of the work. The following break up is only for the purpose of payment and should not be constructed as price for individual item and also it does not constitute total scope of the work. The total scope of work is as detailed in this tender document and shall be completed by contractor without making any reference to the following break up.

| **1.0** | **GAS TURBINE, DUCTING, AUXILIARIES AND INTEGRAL PIPING (50 %)** | **%** |
|---|---|---|
| 1.1 | Preparation and chipping of fdn., leveling and centering of gas turbine | 2.0 |
| 1.2 | Placement, leveling & centering of Gas Turbine with accessories on foundation | 6.0 |
| 1.3 | Erection of load gear box | 1.0 |
| 1.4 | Alignment of GT with Load Gear Box | 1.0 |
| 1.5 | Grouting of foundation | 2.0 |
| 1.6 | Erection of GT off base enclosure | 3.0 |
| 1.7 | Erection of lube oil & gas fuel modules/Skids, Air Processing Skid, L.O. centrifuge, lube oil drain pump, water injection skid | 3.0 |
| 1.8 | Erection of GT vent Fans with enclosure & exhaust blowers with frame, Lube oil mist eliminator etc. | 4.0 |
| 1.9 | Erection of GT $co_2$ fire protection systems | 2.0 |
| 1.10 | Erection of Main Filter House with inlet filter, GT air filter system | 4.0 |
| 1.11 | Erection of GT inlet ducting with silencers, expansion joints, Supports structure etc. | 3.0 |
| 1.12 | Erection of Exhaust ducting with silences, Bypass Stack with Support structure, Aviation lamp & Lightening arrestors etc. | 7.0 |
| 1.13 | Erection of dampers/diverter dampers with seal air fans with accessories & Aux. | 4.0 |

| | | |
|---|---|---|
| 1.14 | Erection of Integral Piping | 5.0 |
| 1.15 | Erection of miscellaneous works on GT | 1.0 |
| | **SUB TOTAL OF 1.0** | **48.0** |
| **2.0** | **GAS TURBINE GENERATOR & AUX (17%)** | % |
| 2.1 | Preparation of foundation and leveling of base plates & packers etc. | 1.0 |
| 2.2 | Placement of generator on foundation, centering & leveling | 6.0 |
| 2.3 | Alignment of Generator with load gear box | 2.0 |
| 2.4 | Erection of exciter and alignment | 1.0 |
| 2.5 | Grouting of foundation | 2.0 |
| 2.6 | Erection of air filter, Air cooler duct with air cooling elements etc. | 2.0 |
| 2.7 | Erection of staircase, walkway & enclosure | 2.0 |
| 2.8 | Miscellaneous items | 1.0 |
| | **Sub total of 2.0** | **17.0** |
| 3.0 | **BALANCE OF PLANT (MECHANICAL) AND OTHER RELATED EQUIPMENTS & AUX. (15%)** | % |
| 3.1 | Erection of Naphtha Filter Skids with aux | 1.0 |
| 3.2 | Erection of HSD Filter Skid with Aux. and HSD Centrifuge | 1.0 |
| 3.3 | Erection of Hitech Additive Skid and Naphtha Fuel forwarding Skid, Naphtha Calescent Skid with Aux. | 2.0 |
| 3.4 | Erection HSD Fuel forwarding Skid and Drain tank | 1.5 |
| 3.5 | Erection of Water to Water Heat Exchanger | 0.5 |
| 3.6 | Erection of DM water circulating Pumps skids and DM water Pump GT Atomising Cooler | 2.0 |
| 3.7 | Erection of Deaerator with Heater, fittings and Platform structure | 4.0 |
| 3.8 | Erection of LP Dosing Skids | 2.0 |
| | Erection of Miscellaneous items | 1.0 |
| | **Sub total of 3.0** | **15.0** |
| **4.0** | **FINAL PAINTING (5%)** | **%** |
| 4.1 | Progressive final painting of equipments under scope | 5.0 |
| **5.0** | **Commissioning 15%** | % |
| 5.1 | Oil flushing completion of GT system | 2.0 |
| 5.2 | Cranking of GT | 2.0 |
| 5.3 | Full speed no load sum of GT | 1.0 |
| 5.4 | Synchronisation of GT set | 2.0 |
| 5.5 | Trail operation of GT set | 1.0 |
| 5.6 | Commissioning of feed water system | 2.0 |
| **5.7** | Commissioning Export BFPs | 2.0 |
| **5.8** | Combined Trial operation of GT in co-gen operation | 1.0 |
| **5.9** | Completion of all facilities of GT systems | 2.0 |
| | **SUB TOTAL OF 5.0** | **15.0** |
| | **GRAND TOTAL OF 1.0,2.0,3.0,4.0, AND 5.0** | **100.0** |

**12.1.2 STAGE BREAK UP FOR PAYMENT OF COMMON SYSTEM EQUIPMENTS / ITEMS / SYSTEMS WITH RELATED EQUIPNMENTS & AUXILIARIES PER UNIT (REFER SL. NO. B OF RATE SCHEDULE):**

**The progressive payment of contract value of (item under Sl. No. B of Rate Schedule) shall be as per following progressive payment on prorate basis as percentage of accepted contract value:**

| | | |
|---|---|---|
| **1.** | **Erection of BFPs with Aux.** | **20.0%** |
| 2. | Erection of Export BFPs with Aux. | 10.0% |
| 3. | Foundation Grouting of BFPs | 5.0% |
| 4. | Foundation Grouting of Export BFPs | 2.0% |
| 5. | Erection of Compressor Water wash Skid | 10.0% |
| 6. | Grouting of foundations of other related equipments | 5.0% |
| 7. | Erection of Electrical Hoists of BFPs and Export BFPs | 5.0% |
| 8. | Erection of Gas Condensate Drain Tanks | 3.0% |
| 9. | Erection of Gas Conditioning of system | 10.0% |
| 10. | Load testing of Electrical Hoists of BFPs & Export BFPs | 7.0% |
| 11. | Final Painting of Equipments | 10.0% |
| 12. | Erection of Miscellaneous items | 3.0% |
| 13. | Cranking of GT | 2.0% |
| 14. | Synchronisation of GT set | 2.0% |
| 15. | Trail operation of GT set | 2.0% |
| 16. | Combined Trial operation of GT in co-gen operation | 2.0% |
| 17. | Completion of all facilities of GT systems | 2.0% |
| | **GRAND TOTAL** | **100.0%** |

**12.1.3 PROGRESSIVE PAYMENT FOR PIPINGS (C.S. A.S. AND S.S.) ( REFER SL. NO. C OF RATE SCHEDULE) SHALL BE AS PER FOLLOWING PROGRESSIVE PAYMENT ON PRORATE BASIS OF** PERCENTAGE OF ACCEPTED ITEM RATES**:**

(a) 20% on prorata basis after placement is completed.

(b) 25% on prorata basis after alignment & joint fit-up is completed.

(c) 25% on prorata basis after completion of welding

(d) 10% on prorata basis after completion of NDE & post weld heat treatment, if any.

(e) 5% on prorata basis after completion of hydraulic test

(f) 5% on prorate basis after completion of Air blowing/Flushing/ Chemical cleaning/Alkali Boil out etc.

(g) 4% on prorata basis after satisfactory completion of Final Painting, legending, etc.,

(h) 3% on prorata basis after floating of line on permanent supports and removal of temporary support

(i) 1% on prorata basis after final adjustment of supports for cold and hot values.

(j) 1% on prorata basis after Combined Trial operation of GT in co-gen operation.

(k) 1% on prorata basis after completion of all facilities of GT for Combined Trial operation in co-gen operation.

**12.1.4 INSULATION & CLADDING (SL. NO. D OF RATE SCHEDULE): THE PAYMENT FOR INSULATION FOR INSULATION & CLADDING OF PIPING WITH VALVES & FITTINGS, EQUIPEMNTS, TANKS, VESSELS SHALL BE AS PER FOLLOWING PROGRESSIVE PAYMENT ON PRORATE BASIS OF PERCENTAGE OF ACCEPTED ITEM RATE:**

| Sl. No. | Part of activity completed | Percentage of accepted item rate |
|---|---|---|
| (a) | Transport to work site & erection / placement in position | 80% |
| (b) | Chemical cleaning of pipeline | 5% |
| (c) | Steam blowing of pipeline | 5% |
| (d) | Synchronization of GT | 2% |
| (e) | Trial operation completion of GT in co-gen operation | 2% |
| (f) | Marking of legend, direction of flow etc. | 5% |
| (g) | Completion of all facilities of GT for co-gen operation | 1% |
| | Total | 100% |

12.1.5

For payment of temporary system for chemical cleaning and steam blowing of boiler and piping the measurement for the piping, fitting, valves etc and equipments like tanks, structures provided by BHEL & not figuring in shipping list will be based on jointly measured quantity and corresponding standard weights. Payment will be made at the rate applicable of carbon steel piping item of rate schedule. No payment will be made for the equipments brought by the contractor such as pumps etc and foundations made by the contractor for temporary systems. Similarly, no payment will be made for temporary system installed for conducting hydraulic test,

oil flushing of various piping systems, GT, GT generator and Balance of Plant Equipments .

## 12.2 GENERAL

12.2.1
Weight of packers and shims which become permanent part of equipment, both figuring in shipping list and those fabricated at site will be paid for on shipping list based actual weight.

12.2.2
Certain optimized assemblies / or modules may be made, assembling products from two or more different product group main assembly and dispatched. Payment for erection of these optimized assemblies / or modules will be regulated as per the weight of individual product group main assemblies contributing to the total weight of the module or optimized assembly at the quoted rate for the respective product group main assemblies, in the rate schedule.

12.2.3
For the purpose of release of progressive payments, month-wise break up for each of the above services will be jointly worked out by BHEL and the contractor at site at the time of start of work. This will be dynamically and regularly reviewed every month or mutually agreed periodicity and shall be re-set based on expected requirement or various services keeping in view relevant aspects. On all the issues as above, BHEL engineer's decision shall be final & binding.

12.2.4
To start with contract value will be considered as the award value. Contract value will be periodically reviewed depending on the quantity of Erection & Commissioning of materials (Excluding the lumpsum quoted work) by contractor for completion of the contractual work in totality. Finally, the contract value shall be arrived at by multiplying the agreed item rates of the rate schedule applied on actually executed final quantity of materials involved for Erection & Commissioning activities envisaged in clause 12.1.3 & 12.1.4 and the agreed lumpsum value of items envisaged in clause 12.1.1 & 12.1.2. This will be dynamically and regularly reviewed every month or mutually agreed periodicity

## 12.3 MEASUREMENT OF THE WORK COMPLETED

A) Where payment is to be made on the basis of weight, the weight per unit given in the BHEL document only shall be taken in to consideration. In case such an information is not available in BHEL documents, then the latest relevant Indian standards in this regard may be applied.

B) Spares, surplus quantity, erection contingency materials will not be paid for unless the same has been consumed in place of regular item of measurable work as per the rate schedule.

C) Where the payment is made on the basis of item rate, actual executed quantity measured jointly shall only be paid for.

D) It is clarified that as far as weight constituted by welding consumables and other consumables supplied by BHEL as well as by the contractor, shall be ignored for the purpose payment.

E) BHEL engineer's decision regarding stage of payment corresponding to progress of work, calculation of weight etc. Will be final and binding on the contractor.

F) Wastage allowance provided elsewhere on application of refractory & insulation will be applied on the net issued quantity. The net issued quantity is gross issue less the quantity returned. The wastage allowance will be applied at the final reconciliation stage. The payable amount will then be restricted to the net quantity after wastage allowance.
No separate payment shall be made for grouting of equipments, structures etc specified elsewhere in these specifications.

13.1

If extra works (requiring up to 100 manhours) for modification, rework, revamping, in brief, any work done to change the state existing to a stage desired and also fabrication, all or any, needed due to any change in or deviation from the drawings and design of equipment, operation / maintenance requirements, mismatching, transit damages and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, are done, no extra charges will be paid. The tenderers are requested to take this aspect into account and the quoted rate should include all such contingencies.

13.2

However, BHEL may consider for payment as extra on manday basis, for such of those activities detailed in clause 13.1 which require more than 100 manhours and such payment will be regulated by the terms, conditions and stipulations contained in the clauses contained hereinafter. It may be specifically noted that the decision of BHEL as to whether such payment is due shall be final and binding on the contractor.

13.3

Extra works should be done by a separately identifiable gang, without affecting routine activities. Daily log sheets in the proforma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered / entertained in the absence of the said supporting documents i.e. Daily man-hour log sheets. It may, however, be noted that signing of log sheets by BHEL engineer does not mean the acceptance of such works as payable extra works.

13.4

Such extra works arising out of transit, storage and erection damages, payment, if found due, will be regulated as per section-14.

13.5

BHEL retains the right to award or not to award any of the major repair / rework / modification / rectification / fabrication works as defined above to the contractor, at their discretion without assigning any reason for the same.

13.6

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

13.7

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.

**Manday rate for eligible extra works**

Single average manday rate for 8 working hours, including overtime if any, and other site expenses and incidentals, including suprevision, consumables, tools and tackles, will be **Rs. 320/-** (Rupees three hundred twenty only).

No payment will be made if an item of work lasts less than 100 manhouRs.

## SECTION-14

## SPECIAL CONDITIONS OF CONTRACT

### 14.0 INSURANCE

### 14.1 MARINE, STORAGE CUM ERECTION (MCE) INSURANCE AND REPAIRING DAMAGES

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

### 14.2 REPORTING DAMAGES AND CARRYING OUT REPAIRS

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

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

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

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

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

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

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

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

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

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

14.2.11 In case of theft / damage / loss of materials due to negligence or failure attributable to the Contractor, the expenses incurred on account of repair/ replacement of such components including BHEL's overhead expenses as applicable (presently @ 30%) in excess of the amount realized from the underwriters shall be recovered from the contractor. Recovery will be limited to Normal Deductible Franchise (DF) / Excess as per applicable Insurance (TAC) tariff guidelines. However, in case such insurance claim is summarily rejected by the underwriters due to willful damage/loss on the part of the contractor, the total cost of repair/ replacement shall be recovered from the contractor.

**14.3 INSURANCE BY THE CONTRACTOR AND INDEMNIFICATION OF BHEL**

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

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

**NOTE:**
**CONTRACTOR SHALL TAKE THE REFERENCE OF CLAUSE 4.9.10 AND INDEMNIFY BHEL AND CUSTOMER (IOCL) ACCORDINGLY.**

## SECTION-15

## Special Condition of Contract

### 15.0 EARNEST MONEY DEPOSIT & SECURITY DEPOSIT

**15.1 EARNEST MONEY DEPOSIT**:

EMD for this tender is Rs. 2,00,000/- (Rupees two lakhs only). Bidders who have already deposited One Time EMD of Rs. 2.00 lakh will be exempted from submission of any EMD now for this tender.

EMD is to be paid in **cash** (as permissible under Income Tax Act), Pay order or **Demand Draft** only in favour of Bharat Heavy Electricals Limited and payable at Nagpur. **No other form of EMD is acceptable**.

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

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

ii) The tendered 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 tendered. 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 based on award value shall be furnished before start of the work by the Contractor. Amount of Security Deposit shall be aligned with the actual executed value at appropriate stages of the contract period if there is variation from the award value.

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

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

ii) Pay Order, Demand Draft in favour of BHEL.

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

iv) Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor furnishing the security and duly pledged in favour of BHEL and discharged on the back).

v) Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act subject to a maximum of 50% of the total security deposit value. The balance 50% has to be remitted either by cash or in the other form of security. The Bank Guarantee format should have the approval of BHEL.

vi) Fixed Deposit Receipt issued by Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The FDR should be in the name of the contractor, A/C BHEL, duly discharged on the back.

vii) Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be furnished in the form of BG or DD by the Contractor before start of the work and the balance 50% may be recovered from the running bills.

viii) EMD of the successful tendered shall be converted as Security Deposit, excepting those bidders who have 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.

15.2.2.1 Security Deposit shall not be refunded to the Contractor except in accordance with the terms of the contract.

## APPENDIX-I

**TENTATIVE SCOPE OF EQUIPMENTS/SYSTEMS COVERED PER UNIT OF 2X30MW UNDER THIS TENDER SPECIFICATION .**

**Gas Turbine with Generator & Aux., Heat Exchanger and Balance of Plant Equipments with Integral Piping etc.**

**(A) Fr6B Gas Turbines and their Auxiliaries:**

1. **Fr6B Gas Turbines : Base mounted, Single Shaft Frame-6B Split base, Gas Turbines and accessory compartment consisting of:**

**Accessory compartment consisting of:**

- Diesel Engine starting system.
- Hydraulically operated, solenoid-valve controlled jaw clutch with automatic disengagement at turbine self-sustained speed.
- Hydraulic torque converter.
- Heavy duty, multi-shaft accessory gear box.
- Diaphragm type accessory coupling.
- DC motor driven hydraulic ratchet rotor turning device.
- **Fuel system consisting of:-**
- **Natural Gas system consisting of:**
- Stop / speed ratio valve & Control valve located in Gas Module(mounted off base)
- Piping, Valves, Filters, supports & necessary fittings, Instrument etc.
- Gas Strainer (mounted Off-base)
- **Liquid Fuel System consisting of (Suitable Naphtha & HSD Fuel firing system):**
- Shaft driven fuel pump with stop and bypass valves and accessories.
- Main atomizing air compressor (Shaft driven)
- Starting belt driven air compressor.
- Atomizing air pre-cooler.
- Flow divider.
- Piping, Valves, Filters and associated accessories and instruments.
- **Closed, forced fed lubricating oil system including:**
- Shaft driven main oil pump
- Full flow AC motor driven emergency oil pump
- Dual Lube Oil Coolers (Oil to Water)
- Dual filters with transfer valve for Lube oil & Hydraulic Oil systems.
- Dual filters with transfer valve for Trip oil system.
- Full flow AC motor driven auxiliaries Hydraulic Pump.
- Necessary piping, with valves, fittings & supports and instruments.
- Off-base Enclosure thermal & acoustic for accessory compartment lining.
- Negative ventilation system.
- Fire detection & monitoring system with Co2 protection.
- Necessary on-base piping with valves, supports & fittings.
- Associated lighting.
- **Turbine compartment consisting of:**

- Seven stage, axial flow, corrosion protected compressor.
- Ten-chamber, reverse flow type with standard diffusion type combustor system suitable to Naphtha & HSD and Natural gas fuel firing, with water injection system
- 3-stage turbine with Plasma Guard coated first stage buckets.
- Ignition system.
- Vibration sensors, Non-contact type displacement probes, Thermocouples,
- Boroscope openings.
- Inlet and Exhaust plenums.
- On-base enclosure thermal & acoustic for accessory compartment lining .
- Negative ventilation system.
- Fire & Gas detection cum & monitoring system with co2 protection
- Necessary on –base piping with valves, fittings, supports etc.
- Associated lighting.

2. **Inlet Air Systems consisting of** :
   - Filter compartment with:
   - Self cleaning filter cartridges.
   - Associated Lighting
   - Air Processing Unit
   - Inlet ducting with Silencer.
   - Transition pieces from inlet ducting to inlet plenum.
   - Necessary structural supports.

3. **Internally insulated Exhaust Gas system (side Exhaust) consisting of:**
   - Exhaust ducting
   - Electrically operated Diverter dampers with 2x100% seal air fans.
   - Electrically operated Guillotine Dampers with 2x100% sear air fans.
   - 32 Meters Bypass stack (height from machine base-line) including Transition piece & silencer.
   - Necessary structural supports.

4. Walkways
5. Foundation hardware & parts.
6. Water injection skid with 1x100% pumps.
7. Off-base compressor cleaning and washing skid for off-line cleaning.
8. Boroscope kit.
9. Mobile (Portable ) Oil centrifuge
10. Lube oil drain pumps
11. Diaphragm type load coupling.
12. Load gear box between GT & Generator

**(B) Gas Turbine Generator and Auxiliaries:**

**(i) Closed circuit air cooled Generator consisting of:**

- Stator with output leads.
- Rotor with overhang Brushless Exciter
- Bearing, Base frame, Built in RTDs, space heaters
- Side mount type Air to water Coolers,

- Liquid leakage detector.
- Enclosure.
- Walkways
- Overhang Brushless Exciter and PMG along with portable stroboscope
- Co2 fire extinguishing equipment.

**(C) BALANCE OF PLANT EQUIPMEMTS / SYSTEMS FOR BOTH THE UNITS:**

1. **NAPHTHA SYSTEM:- Consisting of:**
   - **Naphtha Forwarding pumps with motor drive**
   - **25 micron duplex type filter skid**
   - **6 micron duplex type filter skid**
   - **Coalescent filters (Simplex type)**
   - **Hi-tech additive skid**
   - **AccumulatorS**
   - **Drain tank with 2x100% pumps**

2. **HSD SYSTEM:- Consisting of:**
   - **HSD Forwarding pumps skid with motor drives (each skid contains2x100% pumps)**
   - **Forwarding pumps with motor drives for HRSGs**
   - **Centrifuge skids**
   - **25 micron duplex type filter separator skid.**
   - **6 micron duplex type filter separator skid**
   - **Accumulators**
   - **Drain tank with pumps**

3. **FUEL GAS SYSTEM:- Consisting of:**
   - **Knock out drum common for two GTs**
   - **Filter Separator skid common for two GTs**
   - **Fine filter skids-one for each GT**
   - **Knock out drum common for two HRSGs**
   - **Condensate drain tanks of 2Cu.m with drain pumps common for GTGs & HRSGs**
   - **Dew point heater**

4. **FEED WATER SYSTEM (Common For Two Units):- Consisting of:**
   - **Deaerators with header and associated approach plat form, connected piping, fittings and accessories.**
   - **Boiler Feed pumps with motor drive (Barrel type) with associated auxiliaries, fittings, foundation parts**
   - **Export Boiler Feed pumps with motor drive (Barrel type) with associated auxiliaries, fittings, foundation parts for (i.e. future extension plan/Customer use)**

5. **CHEMICAL DOSING SYSTEM FOR TWO UNITS: Consisting of:**
   - **LP dosing skid (Hydrazine)**
   - **LP Dosing skid (Morpholine)**

6. **DM WATER SYSTEM:- Consisting of:**

- **DM water tank of capacity-60Cu.M**
- **DM Water pumps**

7. **FIRE FIGHTING SYSTEM:- consisting of:**
   - **Extension of fire hydrant network for the plant under execution**
   - **MV spray system for cable cellar**
   - **HV water spray system for Generator Transformer**
   - **Foam system for liquid fuel tankage area**
   - **Co2 fire extinguishers for control room**
   - **Clean agent system for control room**
   - **Fire detection and alarm system**
   - **Gas detection system**
   - **Smoke detectors for cable cellar**

8. **MAINTENANCE EQUIPMENTS: Consisting of:**
   - **Electrical Hoist of 5 tons capacity for BFPs**
   - **Electrical Hoist of 3 tons capacity for Export BFPs**

9. **EXTERNAL PIPING/ COGEN PIPING, VALVES, SUPPORTSAND FITTINGS FOR TWO UNITS:-Consisting of:**

**9.1 NAPHTHA SYSTEM:**
- **Carbon Steel piping with valves, supports and fittings from plant battery limit to 6 Micron filter Separators**
- **Stainless steel piping with valves, supports and fittings from outlet of 6 Micron filters to GT**

**9.2 HSD SYSTEM:**
- **Carbon Steel piping with valves, supports and fittings from plant battery limit to coalescent filters**
- **Stainless steel piping with valves, supports and fittings from outlet of coalescent filters to GTs**

**9.3 FUEL GAS SYSTEM:**
- **Carbon Steel piping with valves, supports and fittings from plant battery limit to Inlet of GCS**
- **Stainless steel piping with valves, supports and fittings from outlet of GCS to Inlet of GGTs**
- **Carbon Steel piping with valves, supports and fittings from plant battery limit to Inlet of HRSGs**

**9.4 MAKE-UP WATER/DM WATER SYSTEM:**
- **Piping with valves, supports and fittings from Battery Limit to Deaerators**
- **Piping with valves, supports and fittings for Initial fill-up to Deaerators**
- **Piping with valves, supports and fittings for make-up water/DM water system**

**9.5 FEED WATER SYSTEM:**

- **Feed water Piping with valves, supports and fittings from Deaerators to HRSGs**
- **Feed water Piping with valves, supports and fittings for re-circulation piping**
- **Feed water Piping with valves, supports and fittings for PRDS**
- **Feed water Piping with valves, supports and fittings for feed water system**

**STEAM SYSTEM:**

- **Main Steam Piping with valves, supports and fittings from HRSGs outlet to Battery Limit**
- **Auxiliary LP Steam Piping with valves, supports and fittings from Plant battery limit to Deaerators**

**COOLING WATER SYSTEM:**

- **Closed Circuit Cooling water Piping with valves, supports and fittings from terminal points to equipments & heat exchangers**
- **Cooling water Piping with valves, supports and fittings from sample coolers etc.**

**9.8 MISCELLANEOUS PIPING :**

- **Instrument air piping with valves, supports and fittings as per applicable drawings/schemes**
- **Service air piping with valves, supports and fittings as per applicable drawings/schemes**
- **Nitrogen piping with valves, supports and fittings as per applicable drawings/schemes**
- **Service water piping with valves, supports and fittings as per applicable drawings/ schemes**
- **Portable water piping with valves, supports and fittings as per applicable drawings/schemes**
- **Respective equipments drains & Vents piping with valves, supports and fittings as per applicable drawings/schemes**
- **Under ground piping/buried piping with supports, fittings as per applicable drawings/schemes**
- **Temporary piping with valves, supports, fittings etc. for chemical cleaning, flushing, steam blowing, Hydraulic test, air blowing etc. as per requirement.**

**10. APPLICATION OF THERMAL INSULATION AND CLADDING ALONG WITH WELDING OF HOOKS, RETAINERS ETC. FOR EQUIPMENTS, TANKS, VESSELS AND PIPINGS, VALVES & FITTINGS AS APPLICABLE UNDER THESE TENDER SPECIFICATION FOR TWO UNITS INCLUDING COMMON EQUIPEMNTS AS APPLICABLE .**

**APPENDIX – II**

**DETAILS OF QUANTITIES**

TENTATIVE WEIGHT SCHEDULE AND DIMENSIONS OF VARIOUS EQUIPMENTS/ITEMS OF GAS TURBINES WITH AUX., GAS TURBINES GENERATORS WITH AUX., BALANCE OF PLANT (MECHANICAL) AND OTHER RELATED EQUIPMENTS & AUX., EXTERNAL PIPING / CO-GEN PIPINGS WITH VALVES/ FITTINGS/ SUPPORTS, AND INSULATION FOR ERECTION & COMMNG. PER UNIT OF 2X30MW IOCL, GUJARAT REFINERY, VADODARA, GUJARAT PROJECT.

## (1) GAS TURBINE, DUCTING, AUXILIARIES AND INTEGRAL PIPING ETC.(PER UNIT):

| DESCRIPTION | LENGTH (M) | WIDTH (M) | HEIGHT (M) | WT/GT (MT) |
|---|---|---|---|---|
| GAS TURBINE PACKAGE (FLANGE TO FLANGE) | 7.38 | 3.6 | 3.93 | 64 |
| LOAD COUPLING | 2.1 | 0.6 | 0.75 | 0.3 |
| LOAD COUPLING GUARD | 2.2 | 1.5 | 1.0 | 0.22 |
| ACCESSORY COUPLING | 1.5 | 0.5 | 0.5 | 0.1 |
| ACCESSORY COUPLING GUARD | 1.5 | 0.6 | 0.6 | 0.05 |
| ACCESSORY BASE | 6.0 | 3.0 | 5.0 | 30.0 |
| GAS VALVE MODULE | 6.0 | 3.6 | 5.0 | 8.0 |
| EXHAUST FRAME BLOWERS (2 Nos.) | 3.0 | 3.0 | 1.5 | 2X2.0 |
| GT WALKWAY+LADDERS (WALKWAY IS SPLIT INTO PIECES) | 3.0 | 1.0 | 1.5 | 1.5 |
| DIESEL ENGINE MUFFLER | 4.0 | 3.0 | 3.0 | 1.5 |
| CO2 BOTTLE RACKS-1 | 2.0 | 1.0 | 1.0 | 1.0 |
| CO2 BOTTLE RACKS-2 | 2.0 | 1.0 | 1.0 | 1.0 |
| MAIN FILTER HOUSE (SHIPPED IN LOOSE) | 9.3 | 10.6 | 9.0 | 34 |
| TURBINE VENT FANS (8NOS.) | 2.5 | 2.5 | 2.0 | 8X2.0 |
| GT VENT DUCTING | 2.5 | 2.5 | 1.0 | 5.0 |
| AIR PROCESSING SKID | 3.0 | 1.3 | 2.5 | 4.0 |
| L.O. CENTRIFUGE | 3.00 | 1.50 | 1.80 | 2.5 |
| FIELD INTERCONNECTION PIPING | 6.0 | 3.5 | 3.0 | 10.0 |

| DESCRIPTION | LENGTH (M) | WIDTH (M) | HEIGHT (M) | WT/GT (MT) |
|---|---|---|---|---|
| FOUNDATION BOLTS & MISC. HARDWARE | - | - | - | 5.0 |
| GT-OFF BASE ENCLOSURES | 7.0 | 3.0 | 3.0 | 30.0 |
| SPECIAL TOOLS | - | - | - | 3.00 |
| LOAD GEAR BOX | 2.0 | 1.5 | 2.0 | 12.0 |
| **INLET DUCTING:** | | | | |
| • Inlet Duct Transition pieces | 4.0 | 4.0 | 3.0 | 25.0 |
| • Inlet Duct Transition pieces | 4.0 | 0.5 | 4.0 | |
| • Inlet Duct Elbow No.1 | 4.0 | 4.0 | 4.0 | |
| • Inlet Duct Elbow No.2 | 4.0 | 4.0 | 4.0 | |
| • Silencer | 4.0 | 2.0 | 3.0 | |
| • Straight Duct No.1 | 4.0 | 3.0 | 3.0 | |
| • Straight Duct No.2 | 4.0 | 3.0 | 3.0 | |
| • Support Structure | 6.0 | 3.0 | 3.0 | |
| **EXHAUST DUCTING:** | | | | |
| • Horizontal Duct Assy. Fr6B-H1 | - | - | - | 3.858 |
| • Horizontal Duct Assy.Fr6-D5 | - | - | - | 2.010 |
| • Horizontal Duct Assy. Fr6-D6 | - | - | - | 2.542 |
| • Trans. Duct Assy. Fr6B-D2 | - | - | - | 5.319 |
| • Silencer Assy. Fr6-SL1 | - | - | - | 10.362 |
| • Trans. Duct Assy. Fr6-D3 | - | - | - | 4.274 |
| • Vertical Duct Assy. Fr6-D8L | - | - | - | 4.66 |
| • **Platforms on Sup. Structure:** comprising of Platform items, beams, Hand Rails, Pipes, Ladders, Plates and other structural material & fasteners etc. | - | - | - | 4.57 |
| • Vertical Duct Assy. Fr6-D8M | - | - | - | 4.66 |
| • Vertical Duct Assy. Fr6-D8U | - | - | - | 4.66 |
| • Duct Ground Supports SG-2 | - | - | - | 0.202 |

| DESCRIPTION | LENGTH (M) | WIDTH (M) | HEIGHT (M) | WT/GT (MT) |
|---|---|---|---|---|
| • Duct Ground Supports SG-3 | - | - | - | 0.29 |
| • Expansion Joint EJ6-2A | - | - | - | 1.2 |
| • Vertical Duct Assy. Fr6-D9 | - | - | - | 5.0 |
| • Silencer Assy.Fr6-SL2 | - | - | - | 5.3 |
| • Stopper, plate items | - | - | - | 0.047 |
| • Connecting retainers SLCR-1,2,3 & 4 etc. | - | - | - | 0.079 |
| • Expansion Joints-EJ6B-1. 2 with guide buckets, plates, taper washers etc. | - | - | - | 3.90 |
| • Support Structure Assy. items: consisting of Columns, Beams, Slice Plate, Fasteners, springs, etc. | - | - | - | 258.95 |
| • Ladders Assy. LD-1,2,3, Duct platform PF-1,2, Platform support, Expansion joint EJ6-2C etc. | - | - | - | 4.063 |
| • Aviation lamp & Lightening arrestors items etc. | - | - | - | 0.1355 |
| • Fasteners, connecting retainers etc. | - | - | - | 0.90 |
| • Silencer Panel-1 & 2 | - | - | - | 9.5 |
| • Ceramic Insulation 25thk, 120 SQM | - | - | - | 0.384 |
| • Hor. Duct Assy. Fr6B-D1 | - | - | - | 9.199 |
| • Duct Ground support SG1 | - | - | - | 0.137 |
| • Vertical Duct Assy. Fr6-D81 | - | - | - | 4.66 |
| • Other loose items like hand rail, sockets toe guard, Grab Hook, Hook Hood, ISMB, Chain etc | - | - | - | 0.52 |
| • Plenum Top Cover Assy. Fr6B-PTC | - | - | - | 2.31 |
| • GT side Extn. Assy. | - | - | - | 1.275 |
| • Foundation Studs, Plate, Packer Plate etc. | - | - | - | 2.3 |
| • Diverter Damper | 4.0 | 4.0 | 4.4 | 18.0 |
| • Guillotine Dampers | 6.0 | 0.4 | 4.0 | 11.0 |
| • Seal Air fan assembly for Diverter | 1.8 | 1.0 | - | 0.5 |

| DESCRIPTION | LENGTH (M) | WIDTH (M) | HEIGHT (M) | WT/GT (MT) |
|---|---|---|---|---|
| damper | | | | |
| • Seal Air fan assembly for Guillotine damper | 1.8 | 1.0 | - | 0.5 |
| STACK SUPPORT STRUCTURE (Columns, Beams, Angles) | - | - | - | 35.0 |
| MISCELLANEOUS ITEMS (LADDERS, PLATFORMS, BOLTS AND OTHER ITEMS) | - | - | - | 4.0 |
| LUBE OIL MIST ELIMINATOR | 1.5 | 1.5 | 1.0 | 1.0 |
| PORTABLE L.O. DRAIN PUMP | 1.0 | 1.0 | 0.8 | 0.2 |
| OFF BASE L.O. SKID FOR FUEL PUMP | 0.92 | 1.22 | 1.675 | 0.8 |
| WATER INJECTION SKID WITH PUMP | 6.0 | 3.0 | 5.0 | 10.0 |
| **SUB TOTAL WEIGHT PER UNIT** | | | | **695.43 SAY 695.0** |
| **SUB TOTAL WEIGHT FOR TWO UNITS** | | | | **1390 MT** |

**(2) GAS TURBINE GENERATOR & AUX PER UNIT:**

| SL. NO. | DESCRIPTION OF THE EQUIPMENT | APPROX. EQUIPMENT DIMENSION L X B X H (IN MM) | APPROX. WEIGHT (MT) |
|---|---|---|---|
| (a) | GENERATOR PACKAGE COMPRISING OF STATOR, ROTOR, BRGS (2 Nos.), EXCITER (OH) | 7400x3150x2850 | 81.0 |
| | AIR COOLER DUCT | 6000X1700X2400 | 5.0 |
| (b) | AIR COOLER ELEMENTS (6 NOS.) | 3000X670X630 | 6X1.5=9.0 |
| (c) | GENERATOR ENCLOSURE | AS PANELS | 7.0 |
| (d) | FOUNDATION ITEMS | LOOSE ITEMS | 6.0 |
| (e) | STAIRCASE | 1000 X 1125 X 600– 4 Nos. | 4.0 |
| (f) | EXCITER | 1845 X 1500 X 1160 | 2.0 |
| **SUB TOTAL WEIGHT PER UNIT** | | | **114** |
| **SUB TOTAL WEIGHT FOR TWO UNITS** | | | **228 MT** |

## (3) BALANCE OF PLANT (MECHANICAL) AND OTHER RELATED EQUIPMENTS & AUX PER UNIT:

| SL. NO. | DESCRIPTION OF EQUIPMENT | APPROX. DIMENSIONS (L X B X H (IN M) | APPROX. WEIGHT (MT) |
|---|---|---|---|
| **(a)** | **NAPHTHA FILTER SKID 25 MICRONS** | 2.5X2.5X2.5 | 0.5 |
| **(b)** | **NAPHTHA FILTER SKID 6 MICRONS** | 2.5X2.5X2.5 | 0.5 |
| **(c)** | **HSD FILTER SKID 25 MICRONS** | 2.5X2.5X2.5 | 0.5 |
| **(d)** | **HSD FILTER SKID 6 MICRONS** | 2.5X2.5X2.5 | 0.5 |
| **(e)** | **HITECH ADDITIVE SKID** | 3.0X2.5X2.0 | 2.0 |
| **(f)** | **NAPHTHA FUEL FORWARDING SKID** | 3.0X2.5X3.0 | 2.0 |
| **(g)** | **HSD FUEL FORWARDING SKID** | 3.0X2.5X3.0 | 2.0 |
| **(h)** | **DRAIN TANK** | DIA.1X2.0L | 1.5 |
| **(i)** | **NAPHTHA CALESCENT SKID** | 3.0X3.0X3.0 | 2.0 |
| **(j)** | **WATER TO WATER HEAT EXCHANGER** | DIA.1.0X2.0L | 3.0 |
| **(k)** | **DM WATER CIRCULATING PUMP SKIDS-2 Nos.** | 2.5X2.0X1.0 | 2X2.0 |
| **(l)** | **HSD CENTRIFUGE** | 5.0X5.0X3.0 | 3.0 |
| **(m)** | **DEAERATOR:** | | |
| | • FEED STORAGE TANK | 10.65X4.1X3.55 | 16.85 |
| | • HEADER | 5.55X2.6X2.05 | 7.35 |
| | • LOOSE FIITINGS & OTHER ITEMS | | 1.2 |
| | • PLATFORM STRUCTURE | - | 3.5 |
| (n.1) | LP DOSING SKIDS (HYDRAZINE) | 3000X3000X3000 | 2.5 |
| (n.2) | LP DOSING SKID (MORPHOLINE) | 3000X3000X3000 | 2.5 |
| (o) | DM WATER PUMP FOR GT AUTOMISING COOLER | Dia.0.5X3000 | 1.5 |
| **SUB TOTAL WEIGHT PER UNIT** | | | **56.9** |

| | |
|---|---|
| | **SAY 57** |
| **SUB TOTAL WEIGHT FOR TWO UNITS** | **114 MT** |

**(4) COMMON SYSTEM EQUIPMENTS / ITEMS/SYSTEMS FOR TWO UNITS:**

| SL. NO. | DESCRIPTION OF EQUIPMENT | APPROX. DIMENSIONS (L X B X H (IN M) | APPROX. WEIGHT (MT) |
|---|---|---|---|
| (a) | HP BFP with Motors-3 Sets (Motor supply loose separately) | 5.50X3X3 | 3X10 |
| (b) | Export BFPS with Motors-2 Sets (Motor supply loose separately) | 5X2X3 | 2X8 |
| **(c)** | Compressor Water Wash Skid-1N**o.** | **6.7x3x3.6** | **11.0** |
| (d) | Electrical Hoist with accessories Capacity 5T each, 3Nos. for HP BFP | - | 3x1.5 |
| **(e)** | Electrical Hoist with accessories Capacity 3T each, 2Nos. for Export BFP | - | 2x1.0 |
| **(f)** | Drain Tanks for Gas Condensate-3 Nos. | Dia.0.7x2 | 3x1 |
| **(g)** | **Gas Conditioning Skid /System consisting of:** | | |
| • | Gas Filter Skid-1No. | 5x5x5 | 5.0 |
| • | Gas Fine Filter Skids-2 Nos. | 3x3x5 | 2x2.0 |
| • | Gas Condensate drain tank-1No. for Gas Fine Filter skid | Dia.1.0x2.0H | 2.0 |
| • | Gas condensate Darin tank for Gas Filter Skid – 1No. | Dia.1.0X2.0H | 2.0 |
| **SUB TOTAL WEIGHT FOR COMMON (I.E. FOR TWO UNITS)** | | | **79.5 SAY 80 MT** |

**(5) OFF BASE PIPINGS WITH VALVES, FITTINGS, SUPPORTS AND ALL OTHER EXTERNAL PIPING/ CO-GEN PIPING SCHEMES LIKE FUEL,**

**GAS, NAPHTHA, HSD, HP FEED WATER, FEED WATER, LP & HP STEAM, INSTRUMENT AIR & SERVICE AIR, COOLING WATER, SERVICE WATER PIPING, PORTABLE WATER PIPING, DM WATER PIPING, CONDENSATE PIPING, UNDERGROUND / BURIED PIPING, PROCESS AIR/N2 PIPING ETC. (EXCLUDING GTG SETS INTEGRAL PIPING) FOR GTGs, HRSGs, COMMON SYSTEM EQUIPMENTS AND BALANCE OF PLANT EQUIPMENTS / SYSTEMS & RELATED AUXILIARIES FOR TWO UNITS:**

| SL. NO. | DESCRIPTION OF MATERIALS | APPROX. WEIGHT (MT) |
|---|---|---|
| (a) | CARBON STEEL | 315.0 |
| (b) | ALLOY STEEL | 130.0 |
| (c) | STAINLESS STEEL | 22.0 |
| | **SUB TOTAL** | **467.0** |

**(6) INSULATION MATERIALS INCLUDING WOOL MATTRESS, GI / ALUM. SHEETING ETC. FOR PIPINGS / VALVES/ FITTINGS, EQUIPMENTS, TANKS & VESSELS OF GTG SETS, BOP AND MECHANICAL EQUIPMENTS WITH RELATED AUX. FOR TWO UNITS**

| SL. NO. | DESCRIPTION OF MATERIALS | APPROX. WEIGHT (MT) |
|---|---|---|
| **1** | **INSULATION WITH SHEETING MATERIALS AND ANCILLARY ITEMS** | **50.0** |

NOTE:

1. WEIGHT AND DIMENSIONS ARE APPROXIMATE.

2. PIPING (FOR C.S. A.S. AND S.S.) WEIGHT WITH VALVES, FITTINGS, SUPPORTS ETC. INDICATED ABOVE IS COMMON FOR ALL PIPING SCHEMES (EXCEPT INTEGRAL PIPING AND THEIR SITE WELDING JOINTS AND NDT/PRE-POST HEAT TREATEMNT REQUIREMENTS BOTH FOR IBR & NON-IBR PIPINGS/SYSTEM SHALL BE AS PER BHEL DRAWINGS/DOCUMENTS AND SITE REQUIREMENT.

3. FOLLOWING ARE THE TENTATIVE SIZES(OD x Thick in mm) OF PIPE OF MAJOR SCHEMES:

i) HP Steam:-508x26.19(AS), 323.9x17.48(AS), 237.1x15.09(AS), 762x12.7(CS

ii) LP Steam to Deaerator: 610x9.53(CS), 457x9.53(CS), 219.1x8.18(CS), 168.3x7.11(CS).

iii) HP Feed Water: 273.1x15.1(CS), 219.1x18.26(CS), 168.3x10.97(CS), 60.3x5.54(CS),

iv) Make up water: 273.1x4.2(SS), 219.1x3.76(SS), 114.3x6.0(SS), 88.9x5.5(SS), 60.3x3.9(SS)

v) Feed water system: 273.1x15.1(CS), 168.3x10.97(CS), 88.9x5.49(CS), 406.4x9.52(CS), 219.1x8.18(CS), 168.3x7.11(CS), 88.9x5.49(CS).

vi) Cooling water: 508x9.53(CS), 406.4x9.42(CS), 323.9x10.31(CS), 219.1x8.18(CS), 168.3x7.11(CS), 88.9x5.49(CS), 114.3x6.0(SS), 88.9x5.5(SS).

vii) Service water distribution system: 114.3x6.02(CS), 88.9x5.49(CS).

THE SIZE OF OTHER PIPING SHALL BE AS PER RESPECTIVE ERECTION DRAWINGS WHICH WILL BE MADE AVAILABLE DURING EXCUTION OF WORK AT SITE.

4. ABOUT 100 METER PIPES OF DIA.6" IS UNDER GROUND/BURIED PIPING. THIS PIPE SHALL REQUIRE THE RAPPING & COATING AS PER APPLICABLE DRAWIN AND SAME SHALL BE CARRIED OUT BY CONTRACTOR AS SCOPE OF WORK UNDER QUOTED RATE OF CARBON STEEL PIPING WORK.

5. BESIDES PRODUCT GROUPS INDICATED ABOVE, THERE IS LIKELIHOOD OF ADDITION OF NEW PRODUCT GROUPS BY BHEL's UNIT FOR RELEASE OF SOME ITEMS, INTEGRAL TO THIS WORK. TENDERERS' QUOTED UNIT RATES SHALL BE APPLICABLE FOR SUCH PRODUCT GROUPS ALSO.

6. BHEL's DECISION WITH REGARD TO CLASSIFICATION OF A PARTICULAR PRODUCT GROUP IS BINDING ON THE CONTRACTOR.

7. ERECTION, ALIGNMENT, WELDING, SUPPORTING & NDE TESTS ETC. OF TEMPORARY PIPING WITH VALVES & FITTINGS AS REQURED FOR CARRYING OUT HYDRAULIC TEST, OIL FLUSHING AND OTHER TESTS SHALL BE CARRIED OUT BY CONTRACTOR FOR PIPING, EQUIPMENTS OF GT, GT GENERATOR, BALANCE OF PLANT EQUIPMENTS AND OTHRE RELATED EQUIPMENTS AS SCOPE OF WORK. NO ANY SEPARATE EXTRA PAYMENT FOR SUCH TEMPORARY WORK SHALL BE MADE BY BHEL

8. FOR PAYMENT OF TEMPORARY SYSTEM FOR CHEMICAL CLEANING AND STEAM BLOWING OF PIPING THE MEASUREMENT FOR THE PIPING, FITTING, VALVES ETC AND EQUIPMENTS LIKE TANKS, STRUCTURES PROVIDED BY BHEL & NOT FIGURING IN SHIPPING LIST WILL BE BASED ON JOINTLY MEASURED QUANTITY AND CORRESPONDING STANDARD WEIGHTS. THE PAYMENT OF THIS TEMPORARY PIPING WORK FOR **CHEMICAL CLEANING/ALKALI BOIL OUT & STEAM BLOWING** WILL BE MADE AT THE RATE APPLICABLE FOR CARBON STEEL PIPING RATE OF RATE SCHEDULE. NO PAYMENT WILL BE MADE FOR THE EQUIPMENTS BROUGHT BY THE CONTRACTOR SUCH AS PUMPS ETC AND FOUNDATIONS MADE BY THE CONTRACTOR FOR TEMPORARY SYSTEMS.

9. ERECTION, ALIGNMENT, WELDING, SUPPORTING, NDE TESTS INCLUDING RADIOGRAPHY ETC. OF INTEGRAL PIPING (CS, AS, SS) SUCH AS LUBE OIL PIPING, CONTROL OIL PIPING, GOVERNING OIL PIPING OF GTG EQUIPMENTS WITH THEIR AUX., BALANCE OF PLANT EQUIPMENTS, DRAINS AND VENT LINES OF RESPECTIVE INDIVIDUAL EQUIPMENT SHALL TREATED AS INTEGRAL PART AND SHALL BE CARRIED OUT AS SCOPE OF WORK UNDER LUMSUM QUOTED RATE OF EQUIPMENTS. NO SEPRATE RATE FOR SUCH PIPING WORK SHALL BE PAID BY BHEL.

**APPENDIX - III**

**LIST OF T&P TO BE PROVIDED BY BHEL FREE OF CHARGES ON SHARING BASIS**

| SL.NO. | DESCRIPTION & CAPACITY OF T&P | QUANTITY | REMARKS |
|---|---|---|---|
| 01 | STEAM BLOWING VALVE SET WITH ACTUATOR | 1 SET | AS PER REQUIREMENT |
| 02 | PIPING, VALVES & FITTINGS, SUPPORTING STRUCTURES, PLATES/ TANKS FOR TEMPORARY SYSTEMS FOR HYD TEST, CHEMICAL CLEANING, STEAM BLOWING ETC. | 1 SET | AS PER SITE REQUIREMENT. |
| 03 | CHEMICAL CIRCULATING PUMPS FOR CHEMICAL CLEANING OF MAJOR / BIGGER SIZE OF PIPING | 2 SETS OR (AS SUITABLE) | AS PER SITE REQUIREMENT |

NOTE: ABOVE T&Ps SHALL BE SHARED BY HRSG ERECTION AGENCY. CONTRACTOR SHALL HAVE PLAN HIS RESOURCES & ACTIVITIES AND COMPLTE OF THE WORKS OF SUCH PIPINGS SO THAT CHEMICAL CLEANING / ALKALI BOILOUT OPERATIONS CAN BE COMPLETED TOGETHER AS SYSTEM REQUIREMENT. DECISION OF BHEL SITE ENGINEER INCHARGE FOR PLANNING OF SUCH DATE AND COMPLETION OF WORKS SHALL BE FINAL AND BINDING ON CONTRACTOR.

**APPENDIX-IV**

MAJOR TOOLS AND PLANTS & MMD TO BE DEPLOYED BY THE CONTRACTOR

A: TOOL & PLANTS

| SL. NO. | DESCRIPTION OF EQUIPMENTS | CAPACITY | MINIMUM QUANTITY |
|---|---|---|---|
| 01 | CRAWLER CRANE OF SUITABLE CAPACITY / SUITABLE ARRANGEMENTS TO FACILITATE ERECTION OF HYPASS STACK, GAS TURBINE, GAS TURBINE GENERATOR, FEED STORAGE TANK AND OTHER EQUIPMENTS ETC. | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 02 | MOBILE PICK AND CARRY CRANE | 10-12 TON | 01 |
| 03 | TRAILER WITH HORSE | AS PER REQUIREMENT | AS REQUIRED |
| 04 | AIR COMPRESSOR (ELECTRIC) | 140 CFM | AS REQUIRED |
| 05 | TIG WELDING SET | - | 6 SETS, AS PER REQUIREMENT |
| 06 | 3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER & FITTED WITH ENERGY METER | 200 Amps-2 SETS<br>600 Amps-2 Sets | 4 SETS/ AS PER REQUIREMENT |
| 07 | PRE HEATING / STRESS RELIEVING SET ( HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS ETC.) | AS PER REQUIREMENT | 4 SETS, AS PER REQUIREMENT |
| 08 | RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE | IR 192 | 3 SETS, AS PER REQUIREMENT |
| 09 | ELECTRO-HYDRAULIC PIPE BENDING MACHINE | FOR UP TO 100 mm Nb PIPES | AS PER SITE REQUIREMENT |
| 10 | WELDING GENERATOR (ELECTRIC & DIESEL) | 300 AMPS | APPROX. 30 Nos. OR AS REQUIRED |
| 11 | RADIOGRAPHY FILM VIEWER | AS PER REQMT | 1 NO. |
| 12 | ELECTRIC WINCH | 3 TON / 2 TON | AS PER REQMNT |
| 13 | HAND WINCH | 1 TON | -DO- |
| 14 | ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER | AS PER SITE REQUIREMENT | AS PER SITE REQUIREMENT |
| 15 | PIPE BENDING MACHINE – HAND OPERATED | UP TO 50 mm Nb PIPES | AS PER SITE REQUIEREMENT |
| 16 | BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES | AS PER REQUIREMENT | 02 EACH |
| 17 | PORTABLE OVEN FOR COATED | AS PER | 15 |

| | | | |
|---|---|---|---|
| | WELDING ELECTRODES | REQUIREMENT | |
| 18 | ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC. | 150 Kg/Cm$^2$ | 1 NO. |
| 20 | MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 21 | VACUUM CLEANER (INDUSTRIAL) | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 22 | CONDENSER TUBE EXPANDER SET | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 23 | JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 24 | GANG OPERATED AND HAND OPERATED HYDRAULIC JACKS WITH SUFFICIENT LONG HOSES OF VARIOUS CAPACITIES FOR GT, STEAM TURBINE AND GTG & ST GENERATOR | 50 MT, 100 MT ADEQUATE NOS. | AS PER REQUIREMENT |
| 25 | TORQUE WRENCH 0 TO 200 N-M CAP | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 26 | SLINGS OF VAROIUS CAPACITY AND QUANTITIES FOR HANDLING OF EQUIPMENTS | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 27 | BOLT STRETCHING DEVICE | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 28 | FEELER GAUGE S OF VARIUOS SIZES | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 29 | SPANNERS / EYE BOLTS ( OF ALL SIZES) | AS PER REQUIREMENT | AS PER REQUIREMENT |
| 30 | ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS. | AS PER REQUIREMENT | AS PER REQUIREMENT |

**B: MEASURING AND MONITORING DEVISES (MMD):**

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

**NOTE :**

THIS ABOVE LIST IS ONLY INDICATIVE AND NEITHER EXHAUSTIVE NOR LIMITING. QUANTITIES INDICATED ABOVE ARE ONLY THE MINIMUM REQUIRED. CONTRACTOR SHALL DEPLOY ALL NECESSARY T&P TO MEET THE SCHEDULES & AS PRESCRIBED BY BHEL ENGINEER AND REQUIRED FOR COMPLETION OF WORK.

APPENDIX-V

FORMAT FOR MONTH-WISE MANPOWER DEPLOYMENT PLAN
(CATEGORY-WISE NUMBERS TO BE INDICATED FOR EACH MONTH)

| SN | CATEGORY | MONTHS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 01 | RESIDENT ENGINEER | | | | | | | | | | | | |
| 02 | ERECTION ENGINEERS | | | | | | | | | | | | |
| 03 | ERECTION SUPERVISORS | | | | | | | | | | | | |
| 04 | QUALITY ASSURANCE ENGINEER | | | | | | | | | | | | |
| 05 | SAFETY ENGINEER | | | | | | | | | | | | |
| 06 | MATERIALS MANAGEMENT SUPERVISORS | | | | | | | | | | | | |
| 07 | HIGH PRESSURE WELDERS | | | | | | | | | | | | |
| 08 | STRUCTURAL & OTHER WELDERS | | | | | | | | | | | | |
| 09 | FITTERS | | | | | | | | | | | | |
| 10 | CRANE OPERATOR | | | | | | | | | | | | |
| 11 | TRUCK/TRAILER DRIVERS | | | | | | | | | | | | |
| 12 | STORE KEEPERS | | | | | | | | | | | | |
| 13 | ELECTRICIANS | | | | | | | | | | | | |
| 14 | SEMISKILLED/ UNSKILLED WORKERS | | | | | | | | | | | | |
| | MONTH WISE TOTAL | | | | | | | | | | | | |

SIGNATURE OF TENDERER

DATE:

APPENDIX–VI

# FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

| SL. NO. | DESCRIPTION & CAPACITY OF T&P | MONTHS | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 01 | | | | | | | | | | | | | |
| 02 | | | | | | | | | | | | | |
| 03 | | | | | | | | | | | | | |
| 04 | | | | | | | | | | | | | |
| 05 | | | | | | | | | | | | | |
| 06 | | | | | | | | | | | | | |
| 07 | | | | | | | | | | | | | |
| 08 | | | | | | | | | | | | | |
| 09 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |

SIGNATURE OF THE TENDERER

DATE:

**APPENDIX-VII**
**CONCURRENT COMMITMENTS**

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

SIGNATURE OF THE TENDERER

DATE:

**APPENDIX-VIII**

**ANALYSIS OF UNIT RATE QUOTED**

| SL.NO. | 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 | | |

SIGNATURE OF THE TENDERER

DATE:

**APPENDIX–IX**

**DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS**

| SL. NO. | FULL POSTAL ADDRESS OF CLIENT & NAME OF OFFICER IN CHARGE | DESCRIP-TION OF WORK | VALUE OF CONTRAC T | DATE OF AWARD OF WORK | DATE OF COMMENC EMENT OF WORK | TIME SCHEDULE (MONTHS) | DATE OF ACTUAL COMPLETI ON OF WORK | REMARKS |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

SIGNATURE OF TENDERER WITH SEAL

PLEASE USE ADDITIONAL SHEET IF NEEDED **IN THE SAME FORMAT.**
PLEASE ENCLOSE COPIES OF WORK ORDERS INCLUDING DETAILED BILL OF QUANTITIES, COMPLETION CERTIFICATES IN SUPPORT OF THIS STATEMENT.