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

NO. BHE/PW/PUR/HZGG-TG/628

FOR

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, FINAL PAINTING, COMBINED CYCLE OPERATION AND HANDING OVER OF FR 9 FA GAS TURBINE, GAS TURBINE GENERATOR SET & RELATED AUXILIARIES, BALANCE OF PLANT EQUIPMENTS / SYSTEMS WITH RELATED AUXILIARIES, CONDENSER WITH R.E. JOINTS, STEAM TURBINES, TURBO-GENERATOR AND RESPECTIVE ASSOCIATED AUXILIARIES, POWER CYCLE PUMPS INCLUDING CW PUMPS, HEAT EXCHANGERS, INTEGRAL PIPING, TG AUXILIARIES COOLING WATER PIPING CONDENSER COOLING WATER PIPING & ACW PIPING INCLUDING UNDERGROUND/ BURIED PIPING INCLUDING ANTI CORROSIVE TAPING ETC. WITH ASSOCIATED VALVES INCLUDING BF VALVES, FITTINGS & SUPPORTS, DEAERATOR WITH FST & APPROACH PLATFORM, DG SET WITH ASSOCIATED ELECTRICAL ITEMS, BOUGHT OUT ITEMS, PEM ITEMS / EQUIPMENTS / PACKAGES LIKE MISC. PUMPS, MISC. CRANES AND HOISTS, TANKS & VESSELS ETC. FOR 1X350 MW COMBINED CYCLE POWER PLANT

AT

GUJARAT STATE ENERGY GENERATION LIMITED

NEAR HAZIRA, VILLAGE MORA

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

PART I - TECHNICAL BID

BOOK NO.

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

SN	DESCRIPTION	SECTION/ APPENDIX NO.	NO. OF PAGES
	APPENDICES		
	TENTATIVE SCOPE OF EQUIPMENTS/SYSTEMS	APPENDIX-I	7
	LIST OF TENTATIVE WEIGHT AND DIMENSION OF MAJOR EQUIPMENT	APPENDIX-II	14
	LIST OF T&P TO BE PROVIDED BY BHEL FREE OF CHARGE ON SHARING BASIS	APPENDIX-III	3
	MAJOR TOOL & PLANTS & MMD TO BE DEPLOYED BY THE CONTRACTOR	APPENDIX-IV	3
	DRAWINGS ATTACHED	APPENDIX-V	1
	GSEG"s PAINTING SPEC	APPENDIX-Vi	13
	FORMAT FOR MONTHWISE MANPOWER DEPLOYMENT PLAN	APPENDIX-VII	1
	FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOL & PLANTS OF CONTRACTOR	APPENDIX-VIII	1
	CONCURRENT COMMITMENTS	APPENDIX-IX	1
	ANALYSIS OF UNIT RATE	APPENDIX-X	1
	DETAILS OF SIMILAR WORK DONE IN LAST SEVEN YEARS	APPENDIX-XI	1
	RATE SCHEDULE (PART-II: PRICE BID)	APPENDIX-XII	**@**

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-628".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid-628)'. Hosted in BHEL web page (www.bhel.com) as files titled **"PRICE BID-628"**

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-628"**

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/GSEG HAZIRA-TG/628**

NAME OF THE WORK:

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES /STORAGE YARDS TO SITE OF WORK, ERECTION, TESTING, COMMISSIONING, FINAL PAINTING, COMBINED CYCLE OPERATION AND HANDING OVER OF FR 9 FA GAS TURBINE, GAS TURBINE GENERATOR SET & RELATED AUXILIARIES, BALANCE OF PLANT EQUIPMENTS / SYSTEMS WITH RELATED AUXILIARIES, CONDENSER WITH R.E. JOINTS, STEAM TURBINES, TURBO- GENERATOR AND RESPECTIVE ASSOCIATED AUXILIARIES, POWER CYCLE PUMPS INCLUDING CW PUMPS, HEAT EXCHANGERS, INTEGRAL PIPING, TG AUXILIARIES COOLING WATER PIPING CONDENSER COOLING WATER PIPING & ACW PIPING INCLUDING UNDERGROUND/ BURIED PIPING INCLUDING ANTI CORROSIVE TAPING ETC. WITH ASSOCIATED VALVES INCLUDING BF VALVES, FITTINGS & SUPPORTS, DEAERATOR WITH FST & APPROACH PLATFORM, DG SET WITH ASSOCIATED ELECTRICAL ITEMS, BROUGHT OUT ITEMS, PEM ITEMS / EQUIPMENTS / PACKAGES LIKE MISC. PUMPS, MISC. CRANES AND HOISTS, TANKS & VESSELS ETC. FOR 1X350 MW COMBINED CYCLE POWER PLANT AT GUJARAT STATE ENERGY GENERATION LIMITED, HAZIRA, GUJARAT PROJECT.

EARNEST MONEY DEPOSIT: Please see Special Conditions of Contract.

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

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

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

Dy. General Manager (Purchase)
Place: Nagpur
Date:

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
POWER SECTOR - WESTERN REGION
345, KINGS WAY - NAGPUR 440 001

PROCEDURE FOR SUBMISSION OF SEALED TENDERS

THE TENDERER MUST SUBMIT THEIR TENDERS AS REQUIRED IN TWO PARTS IN SEPARATE SEALED COVERS PROMINENTLY SUPERSCRIBED AS PART-I TECHNICAL BID AND PART-II PRICE BID AND ALSO INDICATING ON EACH OF THE COVERS THE TENDER SPECIFICATION NUMBER AND DUE DATE AND TIME AS MENTIONED IN THE TENDER NOTICE.

PART-I (TECHNICAL BID) COVER-I

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

PART-II (PRICE BID) COVER-II

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

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

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

TENDERER ARE REQUESTED TO MAKE SPECIFIC NOTE OF THE FOLLOWING CONDITIONS:

- CONTRACTOR SHOULD HAVE ADEQUATE RESOURCES INCLUDING MAJOR T&PS AT HIS DISPOSAL FOR THIS JOB.
- CONTRACTOR SHOULD HAVE SOUND FINANCIAL STABILITY.
- TENDERER SHOULD MEET QUALITY REQUIREMENT REGARDING WORKMANSHIP, DEPLOYMENT OF PERSONNEL, ERECTION TOOLS AND NECESSARY INSPECTION, MEASUREMENT & TESTING INSTRUMENTS.
- ALL INFORMATION AS CALLED FOR IN VARIOUS APPENDICES AND CLAUSES OF TENDER SPECIFICATION SHOULD BE FURNISHED IN COMPLETENESS. PLEASE REFER THE CHECKLIST.
- CLARIFICATION ON TENDER IF ANY, SHALL BE OBTAINED BY THE TENDERER BEFORE SUBMITTING THEIR OFFER.
- OFFERS MUST BE SUBMITTED WITHOUT ANY DEVIATION.
- OFFERS RECEIVED WITH ANY DEVIATION OR WITHOUT RELEVANT INFORMATION AS DESCRIBED ABOVE ARE LIABLE TO BE REJECTED. PRICE BIDS RECEIVED IN THE FORM OTHER THAN SPECIFIED IN PART-II (PRICE BID) ARE LIABLE TO BE REJECTED.
- **TENDERER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.**

PROJECT INFORMATION

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

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

CHECK LIST

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

1	NAME OF THE TENDERER WITH ADDRESS		
2	NATURE OF THE FIRM	LIMITED / PARTNERSHIP / PROPRIETARY	
3	EMD DETAILS (Rs. 2.0 LACS BY DD ONLY OR ONE TIME EMD)		
4	VALIDITY OF OFFER (REQUIRED 6 MONTHS FROM DUE DATE)		
5	MOBILIZATION TIME (NOT EXCEEDING 15 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
23	WHETHER THE FOLLOWING DETAILS PERTAINING TO YOUR BANK ACCOUNT DULY ENDORSED BY THE BANK HAVE BEEN FURNISHED {TO ENABLE BHEL RELEASE PAYMENTS THROUGH ELECTRONIC FUND TRANSFER (EFT/RTGS) AS SPECIFIED IN SECTION 12 } 1. Name of the Company 2. Name of Bank 3. Name of Bank Branch 4. City/Place 5. Account Number 6. Account type 7. IFSC code of the Bank Branch 8. MICR Code of the Bank Branch	YES	NO

NOTE : STRIKE OFF YES OR NO, AS APPLICABLE

DATE: SIGNATURE OF TENDERER

DECLARATION BY BIDDER'S AUTHORIZED SIGNATORY

I,.....HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THIS TENDER SPECIFICATION NO. **BHE/PW/PUR/HZGG-TG/628** 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/HZGG-TG/628

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/HZGG-TG/628** for 1X350 MW CCPP Gujarat State Energy Generation Ltd. HAZIRA, Gujarat, 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 of materials from BHEL/client's stores /storage yards to site of work, erection, testing, commissioning, final painting, combined cycle operation and handing over of FR 9 FA Gas Turbine, Gas Turbine Generator set & related auxiliaries, Balance of plant Equipments / systems with related auxiliaries, Condenser with R.E. Joints, Steam Turbines, Turbo- Generator and respective associated auxiliaries, Power Cycle Pumps including CW Pumps, Heat Exchangers, Integral piping including lube oil piping, Jacking oil piping, Control Oil / Governing system piping, Seal Steam piping, Condensate Spray piping, Turbine water drain piping, Extraction Piping, Equipments drains & Vents piping, Generator Seal Oil system with Seal Oil piping, Generator Gas System with Gas Piping (including Hydrogen, Co2 and Nitrogen piping etc.), Central Lube oil piping and other related piping associated as integral part of system piping, TG Auxiliaries Cooling Water piping, Main circulating Water piping / Condenser Cooling Water piping & ACW Piping including underground/ buried piping with anti corrosive taping, Service Water Piping etc. with associated valves including BF Valves, fittings, Hangers & supports, Deaerator with FST & approach platform, Co2 system with related piping, DG set with associated Electrical items, Bought out items, PEM items / equipments / packages like Misc. Pumps, Misc. Cranes and Hoists, Tanks & Vessels etc. for 1x350 MW combined cycle power plant including Ducts, Dampers, GT enclosures, Ladders, Approach platforms, Cross around piping, NDT/radiography / pre-heat treatment / post-heat treatment requirements, Chemical cleaning/flushing, Air blowing, Oil flushing, Steam blowing, Gas Tightness test, Hydraulic testing etc. of GT & GTG, ST & STG systems, and Balance of plant equipments / Skids.

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

1) The work covered under this specification is of highly sophisticated nature, requiring the best quality of workmanship for fabrication, engineering and construction management. The Bidder should ensure timely completion of work. The Bidder must have adequate quantity of tools, construction aids, equipments etc, in his possession. He must also have on his rolls adequate, trained, qualified and experienced supervisory staff and skilled personnel.

2) Collection of material from BHEL/ client's stores/storage yard and transportation to site of work/ pre-assembly yard including heavy consignments like LP Turbine Rotor, Turbo-Generator Rotor, Gas Turbine accessory base, Water wash, LP turbine items, BFP & CEP Pumps, Condenser water chamber assemblies, skids, Deaerator, HT motors and all other equipments / items covered under the scope of this tender specification.

3) Taking the delivery of Heavy Equipments like Gas Turbine, Gas Turbine Generator, Steam Turbines, Turbo-Generator from transporting trailers, unloading, handling, lifting & placement / erection in position at required elevation etc.

4) Pre-assembly, Assembly and pre-erection checks of Equipments, Auxiliaries and piping as applicable.

5) Lifting & Placement, Erection, testing, Fit-up, alignment, welding, NDE, Radiography, commissioning of all Equipments with Aux. systems like complete Gas Turbine with associated Auxiliaries / equipments including integral piping, lube oil pumps, heat exchangers, Enclosure, complete Gas Turbine Generator with stator, rotors and associated Auxiliaries / equipments / systems like brush gear sliprings, Brushgear assembly, Seal Oil System, Gas system (H2, Co2 & N2), Hydrogen Coolers with integral piping etc associated Auxiliaries / equipments including enclosure, Complete Balance of Plant Auxiliaries / skids / Bought out items, complete Steam Turbines with associated Auxiliaries / equipments including associated lube oil pumps, heat exchangers, integral piping including Cross around piping, Power cycle pumps like BFP with associated auxiliaries like Booster Pumps, Hydraulic Coupling, Coolers, re-circulation valves, integral piping with motors etc. , CEP with associated auxiliaries / components & motors, LPBFP, CPHRCP Pumps, Vacuum Pumps, CW pumps including Misc. pumps, Horizontal pumps & Vertical pumps, Sump pumps, BOI Equipments, Misc. Cranes & Hoists, Plate Heat Exchangers, Self Cleaning Strainer, as supplied from BHEL PEM with associated Auxiliaries / items / equipments / parts / components etc., Complete Turbo-Generator with associated Auxiliaries / equipments, complete Condenser which is supplied in loose with associated items / components / tubing / foundation springs, R.E. Joints with tube insertion, expansion, flaring, trimming etc. including conductance of water fill test and Hydraulic test, Gland Steam condenser, Complete 1x625 KVA DG set with associated parts / Equipments / Auxiliaries, electrical, control & instrumentation items and all other items including Battery , Battery charges, Tank, Radiator, Exhaust pipe with support structure, Acoustic treatment / application of Acoustics in DG set room under supervision of DG set equipment supplier, Complete Deaerator with FST with Deaerator heater, approach platform and associated components / level indicator etc., Complete Tanks, vessels, flash tanks, Complete TG Auxiliaries Cooling water piping including buried / underground piping with valves, supports & fittings, Complete CW/Main Circulating water Piping & ACW Piping including buried / underground piping with associated BF valves / valves, supports & fittings including anti corrosive taping and Hydraulic testing, making manhole etc., Complete Service water piping with associated valves, supports and fittings etc. upto all locations as per drawings requirement, Complete Central Lube Oil piping with valves, supports and fittings with tanks etc. all with associated works of welding & NDE, radiography etc. are included under contractor's scope under these tender specifications.

6) Erection, Alignment, Fit-up and welding/bolting/fastening, Pre-heat treatment/Post Heat treatment etc. of Equipments with Aux., systems, piping including Integral Piping with supports etc. including primer painting of site weld joints with Chlorinated based Zinc Phosphate primer.

7) Non-destructive examination, Radiography, pre-heat treatment & post weld heat treatment as per requirement.

8) Chipping, Preparation of equipments & structures foundations.

9) 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.

10) Conductance of Hydraulic test, Water fill test, Gas Tightness test, Oil flushing, Kerosene testing, Chemical cleaning/Flushing, Air blowing/water Flushing, Steam blowing etc.

10) Checking/cleaning & setting of hangers, cold setting and hot setting of hangers & supports.

11) Provisioning, Servicing and setting of valves, actuators, Dampers, Power Cylinders etc.

12) Application of thermal insulation with retainers, fixing components, cladding sheet etc. of Gas Turbine Ducts and related items to the extent as supplied from BHEL Hyderabad and other associated components covered under these specifications.

13) 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.

14) 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.

15) Preservative coating/ Anti corrosive coating of Buried / under ground piping.

16) Pre-commissioning checks/tests, trial runs/testing and commissioning.

17) Gas tightness tests of Turbo-generator at various stages.

18) Trial operation and Combined cycle operation.

19) Surface preparation, preservation and Final painting of equipments, Related Aux., Systems, Structures, Piping with valves, fittings, supports etc.

20) Completion of facility points (as applicable).

21) Hydrogen purging piping / Exhaust pipe shall be terminated to suitable location and elevation outside the TG hall as per instruction of BHEL Engineer and Customer's requirement.

4.1 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 relevant Appendix 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 as scope of work.

4.1.1.17
The contractor shall take delivery of the components, equipments, chemicals, lubricants, H2 & Co2 Cylinders (for Turbo-generator gas filling etc.) 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 relevant Appendix. 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 drawings & 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 any 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/gas tightness test 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, Steam Turbines, Turbo-generator, Turbine Rotor, Generator Rotor, Pumps, Deaerator with FST, H.T. Motors, DG set, Duct items and other GT & STG equipments & associated Auxiliaries and Balance of Plant Equipments etc. as covered under these tender specifications 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 sleepers/ blocks as per instruction of BHEL Engineer at site. 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 issued 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 including 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's delay 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 rotating machines & stationary 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.

4.3 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, wherever 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
Wherever 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 note 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, BALANCE OF PLANT EQUIPMENTS WITH AUXILIARIES & SKIDS, STEAM TURBINES & TURBO-GENERATOR WITH THEIR AUXILIARIES, CONDENSER WITH ASSOCIATED PARTS / ITEMS, R.E. JOINTS AND HEAT EXCHANGERS, POWER CYCLE PUMPS INCLUDING CW PUMPS, MISC. PUMPS, HORIZONTAL & VETICAL PUMPS, SUMP PUMS, MISC. CRANES & HOISTS, COMMON SYSTEM EQUIPMENTS, DEAERATOR WITH HEATER AND APPROACH PLATFORM, TANKS & VESSELS, DG SET WITH ASSOCIATED AUXILIARIES / ACCESSORIES INCLUDING ELCTRICAL AND CONTROL & INSTRUMENATION ITEMS & PARTS, BOUGHT OUT ITEMS AND PEM SUPPLIED PACKAGES / EQUIPMENTS, INTEGRAL PIPING, SERVICE WATER PIPING, CENTRALISED LUBE OIL SYSTEM PIPING WITH EQUIPMENTS/ PUMPS, TG EQUIPMENTS / AUXILIARIES COOLING WATER PIPING, CW COOLING WATER / MAIN CIRCULATING WATER PIPING & ACW PIPING WITH ASSOCIATED VALVES / BF VALVES, FITTINGS AND SUPPORTS AND ALL OTHER EQUIPMENTS / AUXILIARIES / ACCESSORIES / SYSTEMS AS PER TENDER SPECIFICATIONS

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, 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, bends, 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 up to 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 65 mm 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 along with 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
For the skid mounted equipment, the checking and realignment required at site is in the scope of work.

4.4.15
Components like LP turbine with casings, rotor, girders, side walls, base plates, bearings & other associated parts / components, GT Air Filter, Inlet ducting, Off

base enclosure, Exhaust ducting & diffuser, Ventilation ducting, BFP with Booster Pumps & Hydraulic coupling, Coolers, Integral piping, suction strainers etc., CEP pumps with Motors, canister, foundation rings etc., CW pumps with parts like suction casing, impeller casing, pump casing, impellers assemblies, discharge elbow, motor, motor stool, thrust block, shafts, thrust bearings foundation parts etc., Condenser with dome assemblies, hotwell assemblies, water boxes and water chambers, bottom plates, foundation springs, tubes, air extraction pipes, stiffeners etc, Gas turbine Generator with end shields, rotor, slipring shaft, terminal bushings, seals, rotor, bearings etc., Deaerator with FST, heaters, fittings and approach platform, Gas conditioning skids with scrubber skid, filter separator skid, heaters drain tank, coolers etc. Misc. crane hoists & cranes, etc., Generator auxiliary compartment, load gear and enclosures etc and integral piping etc. received loose are to be erected in position by contractor.

4.4.16
Air filter, inlet ducting, exhaust ducting will be supplied in individual assembled sections with inside insulation. Site job involves complete assembly and erection.

4.4.17
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.

4.4.18
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.

4.4.19
Contractor shall provide the following for GTG system, STG system, Power Cycle Pumps including CW pumps, Misc. Pumps, Horizontal & Vertical pumps and sump pumps, all rotating Equipments and Balance of plant equipments and other related equipments with auxiliaries' erection:

1) Temporary bolts of required size for honing of couplings

2) Spanner & torque wrench/bolt stretching device for Tightening of load and accessories coupling bolts.

4.4.20
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 .

4.5 ERECTION OF GAS TURBINE, GAS TURBINE GENERATOR, STEAM TURBINES , TURBO GENERATOR WITH THEIR RESPECTIVE, AUXILIARIES, PUMPS, DG SET WITH AUXILIARIES & ACCESSORIES, CONDENSER AND ALL ROTATING EQUIPMENTS WITH AUX.,TANKS, VESSELS INCLUDING FLASH TANKS, MISC.TANKS, MISC. PUMPS, INTEGRAL PIPING ETC.

4.5.1
Filling of lubricants for purpose of oil flushing, initial fill up and subsequent topping up during various stages is part of scope of work of contractor.

4.5.2
All works such as cleaning, leveling, aligning, hot alignment, 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, grinding, straightening, chamfering, filling, machining, chipping, drilling, reaming, scraping, lapping, shaping, fitting-up, drilling of holes, making dowel pins, minor rectification of foundation bolts etc. are incidental to the erection/commissioning and any other work/activity which is necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

4.5.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, HP Valves, IP Valves, LP Injection valves, LP injection bypass valves, IP Bypass valves, Steam Strainers and their control valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/packing's/lubricants for replacement will be provided by BHEL free of cost.

4.5.4
All equipments shall be preserved and protected periodically before and after erection as per advice of BHEL engineer. The journals of steam turbine rotors, generator rotor, HT motors and other rotating machines shall be thoroughly cleaned, greased/painted with preservative agents periodically as instructed by BHEL engineer.

4.5.5
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

4.5.6
After initial trial of rotating equipments, control and power cabling for motors and other equipments/instrumentation may have to be disconnected for checking alignment and resetting/realignment/hot alignment. Contractor will have to provide services for disconnection and reconnection of control and power cables.

4.5.7
All racks or assembled units like Governing Rack, HP Oil supply unit, HP Oil unit for LP injection, LP injection bypass unit, LP injection unit, Non Return Valve, Seal Oil Unit, Gas Unit, Seal Oil Valve Rack, Gas Cylinder Racks etc supplied from manufacturing units will be tested in BHEL/ Customer stores or at site. This may require transportation, filling of oil, water etc in these racks for carrying out testing of these racks. Defects noticed during testing of these racks will have to be rectified by the contractor free of charges. Further, any pipeline / flanges / fittings not found assembled properly, the same have to be rectified / corrected by the contractor free of charges.

4.6 PIPING INSTALLATION

4.6.1
The scope of work in piping system (air, Gas, Water, Oil, Steam, Governing oil/Control oil etc.) will include cutting to required length, edge preparation, laying, fixing and welding of the elbows/fittings/valves etc., fixing supports/hangers/shock absorbers/ guides and restraints etc. and carrying out all other activities/works to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in these specifications as per engineer's instructions and/or as per approved drawings. **Weld joints and NDT requirement for all Integral piping, Central Lube Oil piping, Service Water Piping, TG Auxiliaries Cooling water piping (DMCW system, which includes some lines Hotwell make (50NB), Solution preparation NaoH dosing (25 NB), Return line form NaoH dosing system (25 NB), Emergency make from CEP discharge (50 NB) and from DMCW tank to DM cooling water piping (100NB) are of stainless steel), CW/Main circulating water piping & ACW Piping including buried piping / underground piping and other related pipings as applicable under tender specification shall be as per drawings/schemes and suiting to site requirement. The necessary drawings/documents for these weld joints will be provided at site during execution of work.**

Contractor to note that TG Auxiliaries Cooling water (called DMCW system piping) will also be extended to some of the Auxiliaries/equipments of HRSG area and other relevant equipments. Contractor shall carry out erection, testing, NDE requirements and commissioning of entire system TG Auxiliaries piping of per drawing requirement and instruction of BHEL Engineer at site.

4.6.2
Carrying out of piping as per the specifications between equipments constituting terminal points, whether the terminal equipments fall within the scope of the work/specification or not, is within the scope of the work/ specification. The contractor shall complete terminal joints at either ends, with due NDE & PWHT if applicable, for all the piping schemes covered in the scope of work.

4.6.3
Fit up and welding/bolting/fastening of piping to the terminal points (such as stubs, valves, flanges on terminal points/equipments, stubs on headers, battery limits etc) forming part of the scope of work/specification and stress relieving and radiography of joints so made are also within the scope of work. Permanent fasteners and gaskets will be supplied by BHEL.

4.6.4
Interconnection/ Hook-up, if any, with the existing system shall form part of work. Such interconnections, hook-ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and on extended hours. Contractor's offer shall cover all such contingencies.

4.6.5
All drains / vents / relief / escapes / safety valve piping to various tanks/ sewage / drain canal / flash box / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by contractor is completely covered in the scope of this tender specification.

4.6.6
The following items of work shall be incidental and forming part of piping fabrication and erection:

(1) To locate cause of vibrations in equipments/auxiliaries/pipelines and carrying out necessary corrections in case the same is attributed to the contractor.
(2) Fabrication and erection & welding of racks, steel supports, guides, restraints for all the piping. Steel for this purpose will be supplied by BHEL free of charge in random and running lengths.
(3) Pre-assembly of spring suspension/hangers and shock absorber as per requirement.
(4) Erection of steam traps, filters, flow nozzles/ flow indicators/ flow orifices other measuring elements in the piping. These may have been supplied either by BHEL or their customer. This may involve cutting of pipe lines, fresh edge preparation and welding with stress relieving wherever applicable.
(5) Fabrication / making of bends for pipes and tubes of diameter up to 65mm.
(6) Matching of all fittings like tees, bends, flanges, reducers valves, socket fittings, etc with pipes for welding.
(7) Servicing of valves, Power Cylinders and actuators etc.
(8) Cleaning of all pipes by wire brushing / blowing by compressed air.
(9) Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles/orifices/metering/ measuring elements fixed on piping.
(10) Welding of blanks with stress relieving if required on a temporary basis.

4.4.7
Pipelines will be field routed as per schemes/ suggestive layout or as per the instructions of BHEL engineer. Pipes & tubes will be supplied in random lengths and running lengths. The contractor shall have to lay the piping after carrying out the necessary fabrication, edge preparation, routing etc to suit site requirement in best professional manner.

4.4.8
As far as possible pre-assembly shall be done. The pipe laying shall be carried out from the available terminal point/points or any other area between the terminal points. The erection can be carried out on temporary supports to obtain proper alignment and welding. After fixing the permanent supports, all the temporary supports shall be removed. The alignment, distances and loading of the supports shall be checked and the required settings to be ensured as per requirement.

4.4.9

The detail of Service Water Piping, TG Auxiliaries Cooling water piping, CW / Main circulation Cooling water piping to be erected under this contract is generally as per the indicative weight given in relevant APPEXDIX. These details are approximate and meant only to give a general idea to the bidder 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. **The CW / Main circulating water piping & ACW piping which includes the ACW piping also will run in**

excavated trenches underground as well as over the ground. About 300 meters of CW piping of outside Dia. 2132 mm having, about 75 meters of CW piping of outside Dia. 1422 mm, about 200 meters of ACW piping of outside Dia. 610 mm and 200 Meters of Service water piping of outside Dia. 323 mm are underground / buried piping. Further the actual works shall be as per drawing requirement. The Excavation of trenches, construction of ducts is not in the scope of work. The protection of all above buried piping with anti-corrosive tape of minimum 4 mm thick conforming to IS-10221 and AWWA C 203-93 along with supply of related materials shall be carried out by contractor as scope of work under these tender specifications. The pipe surfaces shall be cleaned by shot blast / sand blasting before application of anti-corrosive taping. Contractor shall also carryout the Bond / Adhesion test and Holiday test on anti-corrosive applied portion of piping as part of scope of work to prove the satisfactory completion of anti-corrosive taping. The payment for Anti-corrosive tapping work including surface preparation & supply of all materials and related works will be made for actual quantum of work carried out at site as per accepted item rate of Sl. No. "DD" of rate schedule.

These pipes will be supplied with internal surface coated with one coat of Epoxy based Zinc rich primer and subsequent finish coat with Coaltar Epoxy paint to the DFT from 125 t0 150 microns. Contractor after completion of welding of site weld joints including the bends etc. shall carry out the zinc rich primer coating and Coltar Epoxy coating to the DFT requirement of 125 to 150 microns of site weld joints internal surface area as scope of work including surface preparation & supply of all required materials and any other extra payment for such work shall not be entertained.

The complete Main CW piping supply piping from CW Pumps to Condenser including the BF vales & R.E. Joints / Rubber expansion joints with spool / make pieces at both the ends and return piping from condenser with R.E. Joints and BF Valves to Cooling Tower (CW PH) & all branches to terminal points/ Battery limits as per respective drawing with all associated accessories, fittings, valves / relief valves etc. is included under these tender specifications. Similarly ACW piping from ACW pumps to all Auxiliaries and all branches to terminal points/ Battery limits as per respective drawing are included under these tender specification. Complete TG Auxiliaries Cooling Water piping as per respective drawings and upto battery limits are also included under these tender specifications.

4.4.10

The work on piping systems include laying, edge preparation, fixing & welding/ bolting of the elbows/fittings/valves of all types and sizes/ strainers (e.g. Self cleaning strainers etc)/ Duplex filter and any other equipment shown in the drawing/documents etc coming in the pipelines, fixing & adjustment of supports/angles 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.

4.4.11
Fittings like bends tees, elbows, miter bends, reducers, flanges etc, will be supplied as loose items.

4.4.12
Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh at no extra cost.

4.4.13
Minor adjustment like removal of ovality in pipes is in the scope of work.

4.4.14
All drains / vents / relief tubes / escape pipes / air relief valves/ safety valve/ piping to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the piping and equipments erected by the contractor is completely covered in the scope of work.

4.4.15
Connection (either flanged/bolted or 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, is also within the scope of work/specification.

4.4.16
Hydraulic test of piping assembly shall be conducted after completion of certain number of weld joints as instructed by BHEL. Supply of suitable blanks/ dished ends, welding/ bolting the same, removal of blanks and fresh edge preparation/ restoration of pipeline after successful completion of hydraulic test is to be carried as part of the work. No separate payment shall be made for this work. BHEL will supply the dummy flanges / dished ends for CW piping.

4.4.17
Manhole door openings have to be cut on the main piping and necessary attachments such as access pipe, flange, pad plates etc is in the scope of work. The access pipe may have to be suitably cut in length and in profile to suit the requirement. Blind/blank flanges have to be bolted later on to close the access opening. Materials, fasteners etc for these permanent installations will be provided by BHEL free of charge.

4.4.18
De-watering of pits and shuttering to avoid land-slide:
de-watering of pits excavated by the respective agency have to be done periodically to ensure safe and proper working condition. Similarly,

contractor shall arrange shuttering with props of side walls to avoid land slide in the pit wherever required for work.

4.5 CONDENSER INSTALLATION

4.5.1
The condenser will be dispatched in loose parts mainly comprising of tubes, front water box assly., Rear water box assly, front water chamber assly, rear water chamber assly, hotwell assly, bottom plate assly, support plate assly, side wall assly, dome assly # 1,2,3, & 4, dome stiffeners, dome stiffeners plates, Air evacuation pipes, Super structure, Condenser Springs and loose items etc. The condenser is to be assembled at site in position by welding the different parts/components. Condenser tubing and tube expansion is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and leveling of turbine, the condenser neck to be welded with LP turbine and followed by fixing & welding of LP extraction pipes between LP turbine and Condenser. **Contractor shall follow the procedure of condenser neck welding as per instruction of BHEL engineer at site. Condenser Tubes plate material SA 516 Gr.70 and Condenser tubes material is S.S. SA 249 TP 304. Condenser Tubes out side dia. is 23 mm and thickness is 0.711 mm.**

4.5.2
Before insertion of tubes, the contractor shall clean the holes in the tube plates and tube support plates to remove paint, corrosion spots, oxide scales etc. Usage of suitable cleaning agent may also be required which has to be supplied by the contractor.

4.5.3
The tubes shall be expanded using an Automatic Electronic Torque Controlled Tube Expanding unit or Pneumatic Tube Expander. Tube expansion shall be checked with dial bore gauge. The total set up including tube expanders and tube cutting tools etc. for carrying out the complete condenser tube expansion works shall be provided by the contractor.

4.5.4
As such no EOT crane will be available for erection of condenser and contractor shall make suitable arrangements for erection of condenser without hampering the progress of work. However on readiness of EOT crane, contractor will be permitted to make use of same as per instruction of BHEL Engineer at site.

4.5.5
The contractor shall carry out the condenser neck welding with LP cylinder exhaust hood only after final installation of LP casing. Neck welding shall be subjected to specified non-destructive testing.

4.5.6
The hydrostatic testing of steam space and hydraulic testing of water space up to the terminal point after assembly of water boxes are also included in the scope.

4.5.7
Work of painting of condenser surfaces in various areas and at various stages of work are specified elsewhere in these specifications.

4.5.8
Contractor shall carry out checking and setting of pre-compression of foundation springs as scope of work.

4.5.9
Complete welding, NDE/NDT and die-penetration tests etc. during welding work of surface condenser work shall be carried out by contractor as scope of work.

4.5.10
Contractor shall carry out the surface preparation and painting of Water Space of Condenser with one coat of chemical resistant Epoxide Primer paint and two Coats of High Build Black Coaltar Epoxide Paint including supply of paints and Shell side surface will be painted with two coats of steam washable paints along with supply of paints. All these shall be carried out as scope of work.

4.6 GAS TURBINE GENERATOR STATOR LIFTING & PLACEMENT

4.6.1
The Gas Turbine Generator (Which is Hydrogen Cooled) comprising of Generator Stator, Generator Rotor, End Shields, Bearings & Brushgear, HV Busing, Sliprings shaft assembly, Seal Rings, Oil catcher etc. The Generator Stator weight is 220 MT (approx.). Contractor shall carry out all the works of unloading from Road Transport Trailer, Handling, Lifting and placement to designed foundation at designed elevation and further works of leveling, centering, generator rotor insertion, assembly of loose items like end shields, HV bushings and other activities of generator rotor alignment, Electrical tests and other tests on Generator, Generator stator Air Leak tests, Leak test of complete generator system with seal oil system etc. in service as per Field Quality plan and requirements at site.

Contractor shall carry out the removal of Generator Hydrogen Coolers which have come as assembled to carry out necessary hydraulic tests and necessary inspection as part of scope of work as per instruction of BHEL Engineer at site.

BHEL will provide 600 T Capacity Manitowoc make crawler crane for unloading and placement of Gas Turbine Generator to nearest location of designed foundation subject to its capacity, reach, accessibility and approachability. All other works of shifting, leveling, centering and alignment etc. will be carried out by contractor as scope of work. There is restricted space for movement of this BHEL crane. Contractor shall have to provide his own for boom extension, reduction, insertion, plates etc. for above 600 T Capacity BHEL crane including the required suitable capacity of crane, arrangements, trailers & assist crane for above as required during handling, transportation of all desired items / components of this crane from stores to site for lifting and placement of Gas Turbine Generator as scope of work.

Contractor shall provide the fuel, lubricants and all other consumables for above BHEL 600 T capacity Crane and all other cranes deployed by contractor. BHEL will provide Operator for above 600 T Capacity BHEL Crane and contractor has to provide crew for BHEL crane during operation. Contractor shall provide the operators and other crew for all his cranes.

4.7 GAS TURBINE LIFTING & PLACEMENT

4.7.1
The Gas Turbine (FRAME-9 FA) weighing about 300 MT is supplied in assembled condition. However its field piping and inter connecting piping shall be supplied loose and erection, testing, welding and NDE/NDT along with radiography etc. shall be carried out by contractor at site.

BHEL will provide 600 T Capacity Manitowoc make crawler crane for unloading and placement of Gas Turbine to nearest location of designed foundation subject to its capacity, reach, accessibility and approachability. All other works of shifting, leveling, centering and alignment etc. will be carried out by contractor as scope of work. There is restricted space for movement of this BHEL crane. Contractor shall have to provide his own for boom extension, reduction, insertion, plates etc. for above 600 T Capacity BHEL crane including the required suitable capacity of crane, arrangements, trailers & assist crane for above as required during handling, transportation of all desired items / components of this crane from stores to site for lifting and placement of Gas Turbine Generator as scope of work.

Contractor shall provide the fuel, lubricants and all other consumables for above BHEL 600 T capacity Crane and all other cranes deployed by contractor. BHEL will provide Operator for above 600 T Capacity BHEL Crane and contractor has to provide crew for BHEL crane during operation. Contractor shall provide the operators and other crew for all his cranes.

4.8 STEAM TURBINES AND STEAM TURBINE GENERATOR STATOR LIFTING & PLACEMENT

4.8.1
The Steam Turbine (with HP & IP combined) & weighing 113 MT (approx.) will be dispatched in assembled condition as module and Steam Turbine Generator (which is Air Cooled) weighing 230 MT (approx.) will also be dispatched in fully assembled condition with generator stator & generator rotor in threaded condition to site by Road on transport trailers. The EOT (capacity 95/25 Tones) available in TG hall shall not be suitable for lifting of these Steam Turbine & Steam Turbine Generator and these Equipments shall be lifted by Strand & Jacks / Lift & Shift arrangement method. The Scope of contractor shall take complete responsibility and carry out the liaison and follow up with transporters, filling of ditches/leveling etc. for marching of trailers to unload at suitable location/point of lifting near the TG building, Shifting of same providing required arrangements to suitable locations / point of lifting etc. (as per requirement), arranging the Strand & Jacks/Lift & Shift arrangements, making resting Foundations /Footings to suit the installation of his Strand & Jacks arrangements (as required) & their assembly /installation with expert supervision till lifting & placement of these equipments to required / designed foundation / elevation. Contractor's responsibility shall also to carry out all related civil works/ footings / foundations with providing of all materials for his strand & jacks / Lift & shift arrangements as scope of work.

4.8.2
Contractor shall plan all his activities / operations so as to avoid the delay in unloading and releasing the transporter's Carriers/trailers. For any demurrage Charges by Transporter / Customer on account of delay in Handling, Unloading

from Trailers after arrival at site shall be the responsibility of Contractor. The all above complete works of receipt from trailers, unloading, shifting, Lifting & placement to required foundation /elevation of Steam Turbines and Steam Turbine Generator is the part of scope of work under this contract.

4.8.3

For lifting and placement of these equipments, it may require to hold the some of structures / casting of certain foundations. Contractor shall visit site and study & discuss with BHEL Engineer at site and submit his plan (which shall not affect the project schedule) for deployment of these arrangements at site for lifting of these equipments along with Technical Bid. Contractor shall deploy these Strand and Jacks arrangements & other resources well in advance to suit the site requirement so as to lift & place these equipments on required foundations in minimum possible time. Some of the renowned agencies such as (1) **M/s. Fagioli PSE India Pvt. Ltd.(203,Krishna Bhavan, Govandi Station Road, Deonar, Mumbai-400088,Tel.No. 022-25564388, Fax No. 022-25562565),** (2) **M/s. Freight Wings (P) Ltd.(309, Rex Chambers, Walchand Hirachand Marg. Ballard Estate, Mumbai-400001,Tel. No.022-22631714/22619988)**, (3) **M/s. Dorman Long Technology Ltd.(233, Bharat Industrial Estate, Lal Bahadur Shashtry Marg, Bhandup-West, Mumbai-400078, Tel No. 022-25961960, Cell No. 09820192807**), (4) **M/s. Basu & Basu Engineers (Pvt.) Ltd.(Kolkata, Tel. No. 033-24642967/24664069, Fax No. 033-24664621**) who are in this field in the country, can be contacted (if required) by contractor along with other agencies known to contractor.

Contractor may contact above agencies or any other similar agencies known to contractor and have tie up for lifting & placement of these equipments. The lifting and placement of these equipments shall be required to be done and put on foundation within one week time after availability of material and other essential inputs, and clear the holds for further civil & structural works.

Lifting of these equipments by Jacks and Sleeper method is not permitted.

4.8.4

The Steam Turbines and Steam Turbine Generator shall have to be placed on designed foundation at an elevation of about 11.5 Meters inside the TG building and have to be handled & lifted from transport carrier / trailer etc. Contractor shall take note of same.

4.8.5

Immediately after completion of lifting of these Steam Turbines and Steam Turbine Generator lifting work, Contractor shall dismantle his Strand and Jack arrangements and vacate the holds within a week time to enable customer to proceed with further works of civil foundations and structural works kept under hold for Generator Stator lifting.

4.8.6

The Air Coolers of Steam Turbine Generator will be supplied loose with related Frames etc.. Contractor shall carry out hydraulic testing, assembly and erection of

these air coolers as per instruction of BHEL Engineer & requirements of drawings / documents.

4.9
The field test to be conducted on Gas Turbine Generator and Steam Turbine Generator at site at various stages as per requirement at site and instruction of BHEL Engineer shall include but not limited to those listed below by contractor as scope of work with providing all necessary testing & measuring instruments, T&Ps and skilled manpower / experts resources / agencies.

(i) Measurement of Insulation Resistance of the Stator and the Rotor windings to the frame and between phases, after drying out the machine, and measurement of Polarization Index.
(ii) Measurement of the DC resistance of all windings and embedded temperature detectors.
(iii) Measurement of insulation resistance of bearings.
(iv) Capacitance measurement and dissipation factor between the winding and body.
(v) Open circuit and short circuit tests.
(vi) Measurement of temperature rise at the rated load.
(vii) Performance capability of the machine.
(viii) Line charging capacity.
(ix) Short Circuit tests on Generator end.
(x) Hydrogen leakage test
(xi) Vibration test.
(xii) Over speed test.
(xiii) Hydraulic tests on coolers.
(xiv) Bearing and shaft current test.

4.10 HANDLING OF HEAVIER EQUIPMENTS

All other Heavy and voluminous Equipments/consignments like Gas Turbine Generator Rotor, LP Rotor, LP turbine casings, Deaerator Feed Storage Tank, Gas Turbine Accessory Base, Water Wash Skid and other equipments / skids etc. along with other Equipments shall be handled carefully by providing contractor's his own lifting Crane and T&P with manpower arrangements. BHEL shall not provide any T&P other specifically indicated in relevant appendix. However contractor will be permitted to use the special erection devices / special erection tools which have been supplied along with main equipments from works and contractor shall return these erection devises / tools in perfectly working condition after completion of work.

4.11 DEAERATOR INSTALLATION

4.11.1
Deaerator Feed Storage Tank along with Deaerator Heater, approach platform and other loose items will be supplied as loose. The FST weighing 25 MT (approx) have to be placed at an elevation of about 17 Meters. Contractor shall have to make his own arrange of crane / lifting and placement arrangements of Deaerator FST at designed location & elevation and further erection and placement of Deaerator Heater and erection of platforms any other T&P as required.

4.11.2
Erection of Permanent approach platform and ladders etc for De-aerator and FST is in the scope of work. The structural steel and other members will be supplied in random length/size & will have to be cut to required size and profile as incidental to work.

4.12 **HYDROSTATIC TESTING, PRESERVATION AND OTHER TESTS**

4.12.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the GTT and STG Sets along with related systems & equipments:

(1) Hydraulic testing of individual equipments like condenser, coolers, heaters, other auxiliaries and equipments. Required capacity Hydraulic test pump/Fill pump and other necessary arrangement shall be provided by contractor to carry out hydraulic testing, chemical cleaning of the equipments and piping as part of scope of work under this tender specification.

(2) Ultrasonic test
(3) Dye Penetrant test
(4) Magnetic Particle Test.

All above facilities (men, materials, equipments, consumables etc) with operating engineer/experienced person and proper approach wherever required shall be provided by the contractor for satisfactory completion of the above tests.

4.12.2
Contractor shall lay all necessary temporary piping, welding, supports, install pumps, valves, pressure gauges, electric cables and switches etc, required for the Hydro test, Air leak test, Chemical cleaning, Steam blowing etc.. After the test is over, all the temporary piping, pumps, etc will be removed. It may also specifically be noted that servicing, erection and dismantling of piping and equipments for conducting above tests will be done by the contractor. No separate payment shall be made for this purpose.

4.12.3
All the above tests shall be repeated till all the equipments, piping and systems satisfy the technical and statutory requirements. All related works form part of the scope.

4.12.4
Suitable welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration/ venting /drain points with valves as per BHEL engineer's instruction, for performing hydro test of piping is within the scope of work**.** After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL engineers' instruction.

4.12.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

4.12.6

While conducting hydraulic test of steam lines, water lines, oil lines either individually or grouping a few lines or in portions. Blanks/spools may have to be put up at terminal points, strainers, walls, flanges etc. After conducting the tests, the blanks shall be removed and the lines restored. Also interconnecting piping between boiler and turbine, the hydraulic test may have to be done section wise and some–times piping of other agencies may have to be combined. Contractor shall carry out all such incidental work to satisfactorily conduct the hydro test. Wherever work is involved in the terminal points, Contractor shall carryout the same as per instruction of BHEL engineer. The decision of BHEL engineer is final and the same is binding on the contractor.

The contractor shall carry out any other tests as desired by BHEL engineers on erected equipment covered in the scope of this contract during testing and commissioning to demonstrate the satisfactory completion of any part or whole of work performed by the contractor.

4.13 Other products and systems

4.13.1
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.

4.13.2
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.

4.13.3
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.

4.14.0 Testing, pre-commissioning, commissioning and post commissioning

4.14.1
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, Barring Gear operation, Synchronization, Trial operation, combined cycle 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.

4.14.2
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.

4.14.3

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.

4.14.4
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 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.

4.14.5
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.

4.14.6
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.

4.14.7
For various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals / Lube Oil for fresh filling, Flushing, Top-up, Gas (Co2 & H2) cylinders for Generator initial fill up and subsequent make till handing over of equipments etc. from BHEL/ customer’s stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers /drums/cylinders to BHEL / Customer’s stores is the responsibility of the contractor.

4.14.8
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.

4.14.9
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.

4.14.10

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.

4.14.11
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.

4.14.12
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.

4.14.13
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.

4.14.14
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.

4.14.15
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.

4.14.16
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.

4.14.17
There is provision of EOT crane of capacity 1x95/25 T in TG hall for maintenance work, EOT crane of capacity 1x50 T for Gas Turbine Generator

Rotor handling in GT hall, EOT crane of capacity 1x25 T in CW Pump house for maintenance work and EOT crane of capacity 1x15 T in BFP building for maintenance work. On readiness of these cranes, contractor will be permitted to use these cranes for erection works as per prior permission of BHEL Engineer at site. Contractor shall have to provide skilled crane operator for operation of these crane and shall carry out the routine maintenance like maintaining the cleanliness, changing the Gear Box Oil, applying the cadmium compound on slings etc. of these cranes as per instructions of BHEL Engineer at site as scope of work. Contractor shall also provide manpower assistance as scope of work for holding the trailing cables during operation of these EOT cranes till permanent DSL systems are commissioned. BHEL will provide the consumable for these EOT cranes free of charges.

4.14.18
The weight of integral piping and central lube oil system piping indicated in relevant appendix with relevant system is tentative. Contractor shall carry out erection, welding, testing along with radiography and NDE/NDT works as drawings requirement as scope of work. Any other separate payment on account of any variation in weight & welding joints for these integral piping shall not be entertained.

4.14.19
Payment for TG Auxiliaries Cooling Water piping, Main Circulation Water Piping (CW piping & ACW piping) and Service water piping along with valves, fittings and Hangers & supports will be made on actual quantity executed at site as per applicable item rate of rate schedule. Contractor shall carry out the erection, testing and commissioning of 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.

4.14.20
The erection, welding, laying, hydraulic testing including buried / under ground CW piping, ACW piping and Plant / Service water piping shall be carried as scope of work. The payment for all such work shall be paid as applicable rate of rate schedule for piping erection, testing & commissioning.

4.15 SECURITY, HOUSE KEEPING & OTHER RESPONSIBILITIES OF THE CONTRACTOR

4.15.1
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.

4.15.2 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.

4.15.3
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.

4.15.4
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.

4.15.5
The entire surplus, damaged, unused materials, packaging materials / containers, special transporting frames, gunny bags, etc., shall be returned to BHEL stores by the contractor.

4.15.6
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.

4.16 **FINAL PAINTING**

4.16.1
GSEG's specification **No.TCE.4915A-H-500-001** with regard to surface preparation and final painting with colour codes / scheme for surface preparation and finish paints coating including primer coating for shop and field painting is attached separately along with this tender specification for ready reference. Contractor shall carry out surface preparation and final painting works as per customer specification and instruction of bhel engineer at site

4.16.1
BHEL will provide the primer, thinner & paints for final painting. All other consumables like brush, cleaning agents etc. All T&P, manpower, scaffolding materials, supervision etc. is contractor's scope.

4.16.2
All exposed metal parts of the equipment including piping, supports, structures, railing, tanks/vessels, GTG & STG sets with associated Equipments / Auxiliaries, DG set, Skids, Power Cycle Pumps including Misc. Pumps, Vertical Pumps, Horizontal Pumps, Sump pumps, Misc. Cranes & Hoists, integral and CW cooling water piping & ACW cooling water piping, Service water piping, TG Auxiliaries piping and all other items & equipments under these tender specification etc. including Balance of Plant Equipments, Skids & BOI items etc. 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.

4.16.3
Components of the GTG & STG with Auxiliaries and Pumps etc. will in general be supplied painted by bhel manufacturing units as per their standard applicable painting schemes. Contractor shall carry out primer and finish painting coats and DFT requirement with colour codes & specifications as per requirement of customer..

4.16.4
In addition to components/equipment as above, there could be few others without any protective coating. In general Piping will be supplied with one coat of primer. Such components shall first be thoroughly cleaned of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping, washing, wiping with solvent or any appropriate method and the same being inspected and approved by bhel followed by application of primer coat and final finish paints coats of required DFT shall be as per customer requirement & procedure prescribed by the paint manufacturer.

4.16.5
Where the shop painting has peeled off, the affected area shall be cleaned thoroughly by the specified method and then apply primer coats and finish paint coats.

4.16.6
This work requires working at higher altitudes from ground level. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of appropriate quality for safe and smooth execution of work.

4.16.7
Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by contractor, bhel shall have the right to recover the cost of such damages from the contractor.

4.16.8
Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the contractor without any extra charges.

4.16.9
In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/ equipment inaccessible for manual painting have to be painted by spray painting. The decision of bhel engineer, in this regard, shall be final and binding on the contractor. For the purpose of spray painting contractor will his own compressed air arrangement, spray equipments etc. Including laying of air pipeline, hose and any other line required shall be done by contractor at his cost.

4.16.10
The contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

4.16.11
Final painting work shall be started after obtaining clearance from bhel engineers and as per his instructions

4.16.12
In addition, color banding, legend and identification marking, direction of flow/rotation marking etc. is part of work.

4.16.13
The surface preparation/cleaning, treatment, Identification marking Colour Codes and Final/Finish painting works shall be carried out by contractor as per Specification "PAINTING WORKS" with Addendums (the Specifications is attached separately). For any non-confirmation/dispute between BHEL & Customer specification, the procedure/instructions as laid down in customer & their consultant's specification shall supercede BHEL specification and shall be binding on contractor.

4.17.0 OTHER POINTS:

4.17.1
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.

4.17.2
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.

4.17.3
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.

4.17.4
The contractor shall perform all required services which may not be specified herein but nevertheless required for the completion of work within quoted rates.

4.17.5
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.

4.17.6
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 Customer rules & Regulations at site.

4.17.7
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.

4.17.8
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.

4.17.9
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.

4.17.10
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 GUJARAT STATE ENERGY GENERATION LIMITED HAZIRA 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 also be essential for taking the gate pass / entry pass etc. from Customer & their departments / consultant at site. The insurance policy shall be kept in force till completion of contract.

4.17.11

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

4.17.12
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.

4.17.13
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.

4.17.14
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.

4.17.15
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.

4.17.16
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 BHEL/Customer. All vehicles/ electrical motors, devices shall have to be provision of fire extinguisher/muffler facilities etc.

4.17.17
Contractor shall abide by all Safety Rules, Laws & regulations and statutory requirements as per requirement of BHEL/Customer at project premise and same shall be binding on contractor.

4.17.18
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.

4.17.19
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.

4.17.20
Contractor under these specification shall carry out his internal covering/ 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 BHEL/Customer at site before under taking the day-to-day works. All such works/arrangements shall be carried out by contractor as scope of work.

4.17.21
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.

4.17.22
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.

4.17.23
1x625 KVA DG set comprises of Engine, Brush less Alternator, Radiator, Base Frame with Foundation bolts, 990 Litres of Day Tank, Auxiliary Power distribution board, Battery Bank and Battery Charger, Control & Relay cum AMF panels, Exhaust Piping and M.S. Support , Manually operated fuel Transfer Pump, Accessories like Cables, cable accessories, Earthing and Fuel piping, Acoustic enclosure for DG set room and first fill of fuel and lube oil etc. Contractor under these specification shall carry out complete erection, assembly, leveling, alignment, welding with radiography & NDE etc., foundation chipping & grouting, all electrical and control & instrumentation work, commissioning, erection / extension of exhaust pipes upto suitable height as per drawings requirement with supports etc., application of acoustics in DG set room under supervision of equipment supplier and final painting shall be carried out by contractor under these tender specifications as scope of work. Exhaust pipe with support structure shall be extended upto safe location as per drawing requirement and instruction of BHEL Engineer.

4.17.24
Gas Turbine will be supplied without base piping and all Field piping and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. work shall be done at site.

4.17.25
Accessory Package (Accessory base) will be supplied as package and all Field piping and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. work shall be done at site.

4.17.26
Turning Gear will be supplied as package and all Field piping and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. work shall be done at site.

4.17.27
Water Wash Skid will be supplied as package and all Field piping and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. work shall be done at site.

4.17.28
Co2 Fire fighting with tank will be supplied as skid and interconnection of piping will be done at site.

4.17.29

Air Processing Unit will be supplied as package and all Field piping and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. works shall be done at site.

4.17.30GT Air Filter will be supplied loose and all assembly, fabrication and erection works of about 25 Boxes materials & weight about 140 MT shall be done at site.

4.17.31
Inlet ducting will be supplied as loose and all assembly, fabrication and erection works of about 20 Boxes materials & weight about 135MT shall be done at site

4.17.32
Off base enclosure will supplied as loose and all assembly, fabrication and erection of about 30 boxes materials weighing about 135 MT shall be done at site.

4.17.33
Exhaust Frame Blowers will be supplied as package and all Field piping erection and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT etc. work shall be done at site.

4.17.34
Mist Eliminators will be supplied as package and all Field piping erection and interconnecting piping, erection, assembly, welding, Radiography / NDE/NDT, etc. work shall be done at site.

4.17.35
Exhaust Duct will be supplied as loose and all fabrication, assembly and erection works of about 15 boxes materials weighing about 120 MT shall be done at site.

4.17.36
Exhaust Diffuser duct will be supplied as loose and all fabrication, assembly and erection works of about 2 pieces materials weighing about 30 MT shall be done at site.

4.17.37
Lube oil interconnecting piping of GT and GT Generator will be supplied as loose and all field piping work, including fabrication, assembly, welding, Radiography / NDE/NDT, cleaning, hydraulic testing etc. and erection works of about 12 boxes materials weighing about 58 MT shall be done at site.

4.17.38
Lube oil Filed Flushing piping will be supplied as loose and all field piping work, including fabrication, assembly, welding, Radiography / NDE/NDT, cleaning, hydraulic testing etc. and erection works of about 5 boxes materials weighing about 18 MT shall be done at site.

4.17.39

Gas Inter Connecting piping will be supplied as loose and all field piping work, including fabrication, assembly, welding, Radiography / NDE/NDT, cleaning, hydraulic testing etc. and erection works of about 5 boxes materials weighing about 18 MT shall be done at site.

4.17.40
Water Wash Piping will be supplied as loose and all field piping work, including fabrication, assembly, welding, Radiography / NDE/NDT, cleaning, hydraulic testing etc. and erection works shall be done at site.

4.17.41
Field drain piping and headers piping of gas Turbine will be supplied as loose and all field piping work, including fabrication, assembly, welding, Radiography / NDE/NDT, cleaning, hydraulic testing etc. and erection works shall be done at site.

4.17.42
Ventilation ducting will be supplied as loose and all field piping work, including fabrication, assembly, welding and erection works of about 12 boxes weighing about 45 MT shall be done at site.

4.17.43
Assembly on base components and piping (removed for transportation purpose) will be supplied as loose and all field piping work, including fabrication, assembly, welding and erection works of about 12 boxes weighing about 25 MT shall be done at site.

4.17.44
Structural Steel comprising of Channels, Beams, Angles, Floor Grills for Deaerator platform will be supplied loose in standard running meters. Contractor shall carry out the cutting to suitable size as per drawing requirement, fabrication, welding etc. at site as scope of work.

4.17.45
Gas system piping comprises of Co2 system piping, H2 system piping, Seal oil piping system supplied as loose for Gas Turbine Generator, the erection, laying, welding, Radiography, NDE/NDT and hydraulic tests etc. shall be carried out as scope of work at site as per drawings requirements and instruction of BHEL Engineer at site as scope of work.

4.17.46
The integral piping supplied from BHEL Hyderabad for Condenser Vacuum, Turbine drains, Condensate Spray, Seal Steam, Lube oil Piping, Control oil / Governing oil piping (all comprising of Stain less Steel, Alloy Steel, Carbon Steel with valves, supports and fittings etc.) as loose. Contractor shall carry out the erection, laying, welding, Radiography, NDE/NDT at site as per drawing requirement and instruction of BHEL Engineer at site as scope of work.

4.17.48
The piping for BFP lube oil system, Working Oils system, Seal water Cooling system etc. is supplied loose. Contractor shall carry out the erection, laying, welding, Radiography, NDE/NDT at site as per drawing requirement and instruction of BHEL Engineer at site as scope of work.

4.17.49
Critical piping / Power Cycle piping (Main Steam, HRH Steam, LP steam etc.) work is being carried by other agency. Contractor under this specification shall carry out erection of MS Steam Strainer, HRH Steam Strainer and LP Injection Steam Strainers on priority to give the clearance for erection of piping of these systems. Contractor shall also carry out the fixing of dummy and subsequent removal to carry out the Hydraulic test and Steam Blowing activates as pet instruction of BHEL Engineer at site as scope of work.

4.17.50
LP Turbine comprising of inner Casings, Bearings with bearing pedestals, LP Rotor, Girders, Diffusers, Base plates, Side walls, Cross around piping, outer casing, foundation parts and other loose items etc. is to be assembled at site as per drawings requirement and instructions of BHEL Engineer at site.

4.10 EXCLUSIONS

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

I) E&C work of cable trays, cables and earthing except specifically mentioned.
II) Erection of control panels, MCC etc., Calibration of instruments.
III) All electrical and control & instrumentation items except those specifically included in these tender specifications.
IV) Civil works except to the extent specifically indicated elsewhere in this tender.
V) Pneumatic copper tubing and fittings thereof.
VI) 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, Lift & Jacks arrangements and other suitable arrangements and all T&Ps required for erection, commissioning and testing of equipments/components/items for satisfactory completion of work other than those which are specifically provided by BHEL free of hire charges. Please refer relevant Appendix 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 of equipments on required foundation/elevation, erection of equipments including for heavier consignments like gas turbine, Gas Turbine generator, Steam Turbines, Steam Turbine Generator, Tanks, GT inlet ducts, GT Load Gear Box, GT off base enclosure, Filter unit of GT, Feed Storage Tank & Heater of Deaerators, Accessory base, all Pumps and all other equipments including Skids etc as per scope.

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.**

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 occur 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 BHEL/Customer 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, STG set, All Pumps, Misc. Cranes & Hoists etc.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 Customer & 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 including paints for painting of Condenser Steam side (Shell side) space and Water boxes / Water chambers are in the contractor's scope. Contractor shall also provide the required consumables

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

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

5.6 AREA LIGHTING

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

5.7 CONSTRUCTION POWER & WATER

5.7.1 CONSTRUCTION POWER:

5.7.1
Construction power (three phase, 415v / 440v) will be provided at one point near the site approximately 300 meters from erection site free of charge. However the contractor shall provide energy meter (calibrated) for measuring the consumption of power in their works. all cables, fuses, distribution boards, switches, switchboards, bus bars, earthing arrangements, protection devices e.g. ELCB if any and any other installation as specified by statutory authority/client in this regard for drawl of construction power and further distribution shall be arranged by the contractor. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to these being put to use or as may be specified, shall be the responsibility of the contractor.

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

5.7.2
It shall be the responsibility of the contractor to provide, maintain the complete installation on the load side of the supply with due regard to the safety requirements at site. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.

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

5.7.4
Contrcator shall make his own arrangement of drinking water.

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

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

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

5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

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

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

5.8.2
BHEL / customer may insist for witnessing the regular payment to the labour. They may also like to verify the relevant records for compliance with statutory requirements. Contractor shall enable such facilities to BHEL / customer.

5.8.3
It is the responsibility of the contractor to arrange gate pass for all his employees, T&P etc for entering the project premises. Necessary coordination with customer officials is the responsibility of the contractor. Contractor to follow all the procedures laid down by the customer for making gate passes. Where permitted, by customer / BHEL, to work beyond normal working hours, the contractor shall arrange necessary work permits for working beyond normal working hours.

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

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

5.8.6
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 Customer.

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

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

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

5.8.10
Contractor shall also comply with the provisions of ESI act in vogue and submit evidence thereof to BHEL site incharge. Also all other employees benefits to be borne by the contractor as per the labour laws. Contractor shall produce necessary certificates towards their compliance with such statutes and payment of all statutory dues.

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

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

5.9 TAXES, DUTIES, LEVIES

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

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

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

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

VAT (Sales Tax /WCT)

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

Modalities of Tax Incidence on BHEL

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

New Taxes/Levies

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

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

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

5.10.0 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-VII. 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.

6.6

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

6.7

The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men,

equipment, material and environment in his scope of work or another contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations shall be borne by the contractor.

6.9 INDUSTRIAL RELATIONS AND LABOUR LAWS

6.9.1
An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition act) and also coordinate with the local labour authorities. Contractor has to ensure minimum wages payment to their labours as per the rule of the state and they have to produce documentary evidence to that effect to bhel.

6.9.2
Contractor shall provide the names and details of engineer/ supervisors at the time of mobilization to bhel as per the proposed organization chart.

6.9.3
In case at any time the contractor is not in a position to deploy the required engineers/supervisors due to any reason, BHEL shall have the option to deploy their engineers/supervisors. The expenditure incurred with overheads on this account will be recovered from the contractor's bills.

6.9.4
The contractor's supervisory staff shall execute the work in the most substantial and workmanlike manner in the stipulated time. Accuracy of work and aesthetic finish are essential part of this contract. They shall be responsible to ensure that the assembly and workmanship conform to dimensions and tolerances given in the drawings/ instructions given by bhel engineer from time to time.

6.9.5
The supervisory staff employed by the contractor shall ensure proper outturn of work and discipline on the part of the labour put on the job by the contractor and in general, see that the works are carried out in a safe and proper manner and in coordination with other labour and staff employed directly by bhel or other contractors of bhel or BHEL's client.

6.9.6
Contractor will deduct the necessary amount from his employees towards provident fund and contribute the equal amount as per government of India rules. This amount will be deposited regularly to the provident fund commissioner and an account code obtained. Contractor shall submit the above account code duly certified by pf commissioner to bhel project in-charge. Also all other employees' benefits are to be borne by the contractor as per statutory laws.

6.9.7
The contractor shall obtain independent labour license under the contract labour (regulation and abolition) act from the concerned authorities based on the certificate (form-v) issued by the principal employer/customer.

6.9.8
The contractor shall pay for all taxes, fees, license charges, local body clearance, duties, tools, royalty, commissions and other charges, gate passes which may be leviable on account of his operation in executing the contract. In case bhel is forced to make any such payments, bhel shall have the right to recover the same from contractor's bills.

6.10 WATCH AND WARD

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

6.11

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.

6.12

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.

6.13 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:

6.13.1 Overall planning, monitoring & control

6.13.2 Quality control and quality assurance

6.13.3 Materials management

6.12.4 Safety, Fire & security

6.13.5 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.
All cost in qualification of his welders shall be borne by the contractor.

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 in relevant Appendix free of hire charge on sharing & 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 will make available the 600 T Capacity crane (as per relevant appendix) free of hire charges to the contractor on sharing basis mainly for lifting and placement of Gas Turbine and Gas Turbine Generator as enumerated vides notes in the above referred appendix. Allocation of this crane has to be shared with other agencies / contractors of BHEL, which will be binding on the contractor. Contractor shall make all arrangements of all other arrangements, T & P, cranes and other suitable arrangements as required for satisfactory completion of work as scope of work of this tender specification.

7.3.1.2
Any boom reduction, extension for their use and restoration to pervious state / condition or as directed by BHEL after the use shall be the contractor's responsibility. Contractor shall arrange at his cost suitable capacity of assist crane for boom extension & reduction, handling of plates, boom inserts and suitable trailers for shifting of the plates boom inserts from bhel store's to site and return back to stores after completion of work

7.3.1.3
BHEL shall not provide any other crane and any other T&P or transportation arrangement for this work. **Contractor shall make all arrangements for the crane and other suitable arrangements including the Lift & Shift / Strand**

Jacks as required for completion of work in contractor's scope including the handling, lifting, placement, erection of heavy equipments like HP & IP Turbine module, Steam Turbine Generator, LP Turbine parts, LP Turbine Rotor, Gas Turbine Generator Rotor, Feed Storage Tank and Heater of Deaerator, Accessory Base, Pumps and other equipments covered under these tender specifications.

7.3.1.4
The day-to-day upkeep and running maintenance like filling / topping up of lubricants, etc, of BHEL T & P shall be the responsibility of the contractor. Spares if any, required in normal course will be provided by BHEL. Major breakdowns will be attended to by BHEL.

7.3.1.5
All arrangements, including providing & laying of sleeper beds, backfilling of approaches wherever necessary for safe movement of the cranes as directed by BHEL shall be the responsibility of the contractor. Sleepers for this purpose shall be provided by the contractor.

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

8.0

INSPECTION/QUALITY ASSURANCE/QUALITY CONTROL/ STATUTORY INSPECTION

8.1

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

8.2

Preparation of quality assurance log sheets and protocols with engineers, welding logs and other quality control and quality assurance documentation as per BHEL engineer's instructions, is within the scope of work/specification.

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

8.3

A daily logbook should be maintained by every supervisor/ engineer of contractor on the job in duplicate (one for BHEL and one for contractor) for detailing and incorporating alignment/ clearance/ centering/leveling readings and inspection details of various equipments, structures, piping, and others.

All the important measurements like pre-assembly records, foundation levels, equipment alignment, etc shall be recorded in the daily logbook with sketches based on bhel drawings indicating readings/ measurements taken and signed by bhel contractor's representatives.

Welding details like serial number of weld joints, welders name, date of welding, details of repair, heat treatment etc shall be documented in welding log as per bhel engineer's instructions.

8.4

All the electrical/mechanical measuring and monitoring devices/ gauges, feeler gauges, height gauges, dial gauges, micrometers, precision levels, spirit levels, water level micrometers surface plates, straight edges, Vernier calipers and all other measuring instruments shall be provided by the contractor for checking, leveling, alignment, centering etc of the erected equipments at various stages.

The instruments/gauges/tools etc provided should be of brand, quality and accuracy, specified by bhel engineer and should have necessary calibration and other certificates as per the requirements of bhel engineer.

8.5

In the course of erection, it may be necessary to re-check or counter check or finally check the work with instruments recently calibrated, recalibrated or of inspection grade gauge/tools or special measuring instruments. Such instruments whenever necessary will be provided by bhel on specific authorization by bhel engineer.

8.6

The instruments mentioned in clause 8.5 shall be drawn by the contractor from bhel stores on the specific authorization and use the same on the specific job for the purpose of inspection/ rechecking/counter checking/ finally checking of the work and shall be returned to bhel stores immediately on completion of the inspection.

8.7

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

8.8

The welder's performance will be reviewed from time to time as per the bhel standards and any welder not performing to the standards set by bhel will be removed from working. Contractor shall arrange for the alternate welders immediately.

8.9

All the welders shall carry identity cards as per the pro forma prescribed by bhel only welders duly authorized by bhel shall be engaged on the work.

8.10

Contractor shall ensure speedy alignment and welding of all equipments erected by him soon after placement. also all alignments, welding, ndt tests required for stage inspection shall be completed as per the quality assurance procedures.

8.11

STAGE INSPECTION BY FES/QA ENGINEERS

Apart from day-to-day inspection by BHEL engineers and Customer Engineers, stage inspection of equipments at various stages of erection and commissioning by teams of engineers from field engineering services /field quality assurance groups of BHEL's manufacturing units and commissioning engineers from technical services of bhel may also be conducted. Contractor shall arrange all labour, tools and tackles etc, for such stage inspections within their quoted rate.

8.11.1

Any modifications suggested by FES / FQA engineers team shall be carried out. Claims of contractor, if any, shall be dealt as per clause 13.1 to 13.8.

8.11.2

Any minor rectification or minor repairs of defective work found at during stage inspection shall be rectified free of cost, by the contractor.

8.11.3

Any major rectification or major repair/major rework of defective work, found out during stage inspection as per clause 8.11, but not attributable to contractor shall also be carried out. Claims of contractor, if any, shall be governed as per clause 13.1 to 13.8.

8.12

STATUTORY INSPECTION

8.12.1

During the statutory inspection, contractor shall provide all the manpower assistance as per the requirement within their quoted rate. However, all other arrangements for visiting of statutory authorities at site including fee etc shall be borne by bhel also refer section 5 in this regard.

8.13.0

BHEL, Power Sector- Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect, which needs special mention, is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMD (measuring and monitoring devices). The MMD shall have test/calibration certificates from authorized / government approved/ accredited agencies traceable to national / international standards. Retesting / recalibration shall also be arranged at regular intervals during the period of use as advised by bhel engineer within the contract price.

The contractor will also have alternate arrangements for such MMD so that work does not suffer when the particular equipment/ instrument is sent for re-calibration. also if any MMD is not found fit for use, bhel shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument, failing which bhel may deploy MMDs and retake the readings at contractor's cost.

8.14.0

In addition of above, contractor shall strictly follow the statutory rules & regulations requirements, safety rules and other statutory requirements as per customer's requirement and instructions of bhel engineer at site. Contractor shall abide by all statutory law wherein chewing of pan, Gutkha, smoking of Bidi & Cigarettes is banned at public and it has been enforced by state government of Gujarat.

8.15.0
Contractor shall have to obtain the permits / clearance from following statutory authorities as per requirement of works with assistance of customer:

8.15.1
The chief inspector of boilers (Gujarat):- for boiler HRSG & other pressure parts including pipes and valves.

8.15.2
The chief electrical inspector (Gujarat) : for electrical works

8.15.3
Air port authority of India : for stack obstruction light / painting

8.15.4
The chief inspector of factories (Gujarat : for buildings, pipe layout routes, acid and other chemical storage

8.15.5
Gujarat pollution control board : for stack emission levels, water effluent quality, solid wastes etc.

8.15.6
Elevator and lift inspector (Gujarat): for lifts, cranes and hoists.

8.15.7
Naval wireless centre for frequency allocation for communication equipments like radio, PLCC , remote operated cranes.

8.16.0
Contractor shall have to obtain the permits / clearance from following statutory authorities as part of his responsibility and scope of work as required under this tender specification:

8.16.1
Labour commissioner, govt. of Gujarat: license for labour commissioner for construction labour and registration of works and staff etc..

8.16.2
Govt. of Gujarat, home deptt. : for purpose of blasting (if any)

8.16.3
Electrical inspectorate, govt. of Gujarat for temporary construction power lines within the power plant area.

8.16.4
Inspector of weight and measures, govt. of Gujarat : for weigh bridge and weigh scales.

8.16.5
Gujarat pollution control board: for collection, storage and disposal of waste, site clearance, safe report and safety audit.

8.16.6
Municipal corporation, executive engineer, building proposal or concerned authorities: for building proposals and layouts (as applicable)

8.16.7
Municipal corporation, chief fire officer or concerned authorities: for building layout with fire safety concerns and receipt of no objection certificate.

8.16.8
Municipal Corporation, Executive Engineer, Storm water drainage design or concerned authorities: no objection certificate for storm water drainage design.

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 authorized by the Customer/Client

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

9.1.5
Prepare a signboard giving the following information and display it near work site:

i) Name of Contractor
ii) Name of Contractor Site-in-charge & Telephone number
iii) Job Description in short
iv) Date of start of job
v) Date of expected completion

vi) Name of BHEL Site-in-charge.

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

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

9.2 SPECIAL CONDITIONS

9.2.1 Safety

9.2.1.1 Safety Plan

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

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

9.2.1.2
The contractor shall take all necessary safety precautions and arrange for appropriate appliances and/or as per direction of BHEL or it's 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 energized by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

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

9.2.1.8
Where it becomes necessary to provide and/or store petroleum products, explosives, chemicals and liquid or gaseous fuel or any other substance that may cause fire or explosion, the contractor shall be responsible for carrying out such provisions and/or storage in accordance with the rules and regulations laid down by the relevant government acts, such as petroleum act, explosives act, petroleum and carbides of calcium manual of the chief controller of explosives, Government of India etc. The contractor in all such matters shall also take prior approval of the authorized BHEL official at the site.

9.2.1.9
Proper means of access must be used e.g. ladders, scaffolds, platforms etc. No makeshift access such as oil drums or pallets shall be used. Design of these will be in accordance with relevant standards and certified by competent persons before use.

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

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

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

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

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

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

9.2.1.16
Gas Cylinders shall be handled and stored as per Gas 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 authorized BHEL official, BHEL shall have the right to take corrective steps

at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **Emergency Response**

BHEL will have an Emergency Response Plan for each Project Site in consultation with the Owner as the case may be, detailing the procedure for 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 organized by BHEL.

9.2.2 **OCCUPATIONAL HEALTH**

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

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

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

9.2.2.4
In order to protect personnel from associated health hazards, the following main areas will be focused

- Issue of approved Personnel Protective Equipment
- Verification that the 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.

9.6.1 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

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

SN	Incidence of Violation	Fine (in Rs)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
14.	Accident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
15	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 No	YEAR	Amd upto	DESCRIPTION
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 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 No	YEAR	Amd upto	DESCRIPTION
IS 1646	1997		CODE OF PRACTICE FOR FIRE SAFETY OF BUILDINGS (GENERAL): ELECTRICAL INSTALLATIONS
IS 1904	1986		CODE OF PRACTICE FOR DESIGN AND CONSTRUCTION OF FOUNDATIONS IN SOIL
IS 1905	1987		STRUCTURAL SAFETY OF BUILDINGS MASONARY WALLS
IS 2082	1985		ELECTRICAL GEYSERS
IS 2171	1985		PORTABLE FIRE EXTINGUISHERS DRY POWDER TYPE (CARTRIDGE)
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS AND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION

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

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

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 COUSTOMER AT SITE AND IN THE EVENT OF ANY DEVIATION/ DISPUTE, THE REQUIREMENTS OF COUSTOMER IN ABOVE REGARD SHALL SUPERSEDE THE BHEL REQUIREMENTS. 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 COUSTOMER/BHEL.

FOR NON-COMPLIANACE/VIOLATION OF SAFETY RULES AND FINE/PANELY IMPOSED BY COUSTOMER/BHEL 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.

SECTION-10
SPECIAL CONDITIONS OF CONTRACT

10.0 DRAWINGS AND DOCUMENTS

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

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

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

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

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

10.6
In case of any conflict between general instructions to tenderness, general conditions of contract contained in sections 1 & 2 respectively and special conditions of contract contained in sections 4 to 15 and appendices, provisions contained in special conditions of 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 **15 Days** 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 works envisaged under the tender specification are completed to achieve the following schedule from date of start of work at site:

SN	MILESTONE	COMPLETION SCHEDULE (FROM START OF WORK AT SITE)
1.	GT ERECTION COMPLETION	6^{TH} MONTH
2.	GT RACHETING	7^{TH} MONTH
3.	FSNL OF GT	7 ½ MONTH
4.	GT SYSNCHRONISATION	8^{TH} MONTH
5.	CONDENSER ERECTION	5^{TH} MONTH
6.	BOX UP OF TURBINE	6^{TH} MONTH
7.	OIL FLUSHING	6 ½ MONTH
8.	STG BARRING GEAR OPERATION	7^{TH} MONTH
9.	STG SYNCHRONISATION	8^{TH} MONTH
10	STABILISATION & RELIABILITY RUN IN COMBINED CYCLE MODE	11^{TH} MONTH

Start of contract period shall be reckoned from the date of 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 **11 (ELEVEN) 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

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

11.3.1
85% COMPONENT OF CONTRACT VALUE SHALL BE PERMITTED TO BE ADJUSTED FOR VARIATION IN VARIOUS RELEVANT INDICES DURING EXECUTION OF WORK. THE REMAINING 15% SHALL BE TREATED AS FIXED COMPONENT.

11.3.2
THE BASIS FOR CALCULATION OF PRICE VARIATION IN EACH CATEGORY, THEIR COMPONENT, BASE INDEX, BASE DATE OF ACCOUNTING SHALL BE AS UNDER:

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

11.3.3

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

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

Where

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

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

R = Value of work done for the billing month

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

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

11.3.4

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

11.3.5

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

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

11.3.6

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

11.3.7

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

11.3.8

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

11.3.9

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

11.4 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 SHALL BE PRIME LEADING RATE OF SBI PLUS 2% PER ANNUM, ON MONTHLY REDUCING BALANCE BASIS) RECOVERABLE ADVANCE LIMITED TO 5% OF THE CONTRACT VALUE MAY BE PAID BY BHEL AT ITS DISCRETION DEPENDING ON THE MERIT OF THE CASE AGAINST RECEIPT & ACCEPTANCE OF BANK GUARANTEE FROM THE CONTRACTOR FOR THE AMOUNT SOUGHT. THIS BANK GUARANTEE (BG) SHALL BE VALID AT LEAST FOR ONE YEAR OR THE RECOVERY DURATION. IN CASE RECOVERY OF DUES DOES NOT GET COMPLETED WITHIN THE AFORESAID BG VALIDITY PERIOD, THE CONTRACTOR MUST RENEW THE VALIDITY OF BG OR SUBMIT FRESH BG FOR THE OUTSTANDING AMOUNT AND REMAINING RECOVERY PERIOD. BHEL IS ENTITLED TO MAKE RECOVERY OF THE ENTIRE OUTSTANDING AMOUNT IN CASE THE CONTRACTOR FAILS TO COMPLY WITH THE BG REQUIREMENT AS ABOVE.

RECOVERY OF DUES WILL BE MADE MINIMUM @ 10% OF THE ADMITTED GROSS RUNNING BILL AMOUNT FROM THE FIRST APPLICABLE RUNNING BILL ONWARDS TILL ENTIRE DUE (PRINCIPAL PLUS INTEREST) IS RECOVERED. IN THE EVENT SUFFICIENT TIME DURATION IS NOT LEFT FOR RECOVERY @10%, THE RATE OF RECOVERY SHALL BE SUITABLY ENHANCED SO THAT ENTIRE DUE IS RECOVERED BY THE TIME CONTRACTOR REACHES 90% BILLING OF TOTAL VALUE OF WORK EXECUTED & WITHIN THE CONTRACT PERIOD (INCLUDING EXTENSIONS GRANTED OR FORECLOSURE IF ANY).

11.6 DEFINITION OF WORK COMPLETION

The contractor's scope of work under these specifications will 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 RA account bills with all the details required by BHEL on specified date every month covering progress of work in all respects and areas for the previous calendar month.

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

12.0.3
Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period of **12 months** from the date of completion of entire work as certified by BHEL.

However, on specific request of vendor, this amount may be released on pro rata basis for the value of work executed and accepted by BHEL, along with any RA Bill and onwards, subject to receipt and acceptance of bank guarantee of equal amount in BHEL's prescribed format. The BG shall be kept valid till completion of such guarantee period and an additional six months claim period. This is also subject to the condition that the contractor has started the work and also furnished/remitted the initial Security Deposit as per contract.

12.0.4
The payment for running bills will normally be released within around 30 days of submission of running bill with measurement sheets. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

12.0.5
BHEL will release payment through Electronic Fund Transfer (EFT)/RTGS. In order to implement this system, the following details are to be furnished by the Contractor pertaining to his Bank Accounts where proceeds will be transferred through BHEL's banker:

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 PAYMENT FOR ERECTION, TESTING, COMMISSIONING, WELDING WITH RADIOGRAPHY/NDE/NDT AND FINAL PAINTING ETC. OF GAS TURBINE - GENERATOR SETS WITH AUX., STEAM TURBINE & TURBO GENERATOR WITH AUX., INTEGRAL PIPING, SURFACE CONDENSER WITH AUX., PUMPS & AUX. AND OTHER RELATED EQUIPNMENTS & AUXILIARIES ETC. (AS PER FOLLOWING BREAK UP DETAILS OF ACCEPTED RATE OF RATE SCHEDULE ITEM UNDER SL. "AA" OF RATE SCHEDULE).

S.N.	Description	%
A	**GAS TURBINE, DUCTING AND AUXILIARIES ETC. (14 %)**	
a.1	Preparation and chipping of foundation of Gas Turbine	0.50
a.2	Placement, leveling & centering of Gas Turbine with accessories on foundation	1.25
a.3	Assembly of on base components, piping & fittings	0.50
a.4	Erection & Installation of Accessory package (accessory base)	0.25
a.5	Assembly of Turning Gear	0.25
a.6	Alignment of Gas Turbine with Gas Turbine Generator	0.50
a.7	Box up of Bearings	0.25
a.8	Erection of Water Wash Skid	0.50
a.9	Erection and installation of Co2 Fire fighting system with tanks and accessories	0.50
a.10	Erection and installation of Air processing unit with accessories	0.25
a.11	Assembly and Erection of GT Air Filter with accessories	1.25
a.12	Assembly and Erection of Inlet Ducting with fittings	1.25
a.13	Assembly and Erection of Off base enclosure with accessories	1.25
a.14	Erection and installation of Exhaust Blowers with accessories	0.25
a.15	Erection and installation of Mist Eliminators with accessories	0.25
a.16	Assembly and erection of Exhaust ducts with fittings	1.00
a.17	Assembly and erection of Exhaust Diffuser duct with accessories	0.25
a.18	Assembly and Installation of LO field flushing system with accessories	0.25
a.19	Assembly and erection of Ventilation ducting with accessories	0.50
a.20	Erection of Gas Scrubber Skid with accessories	0.25
a.21	Erection of Fuel Gas Filter Separator Skid with accessories	0.25
a.22	Erection of Pressure Regulating Station with accessories	0.25
a.23	Erection of Fuel Gas Startup Heater Skid with accessories	0.25
a.24	Erection of Fuel Gas Final Scrubber Skid with accessories	0.25
a.25	Erection of Fuel Drain tank with accessories	0.25
a.26	Grouting of foundations of Gas Turbine and other equipments	1.25
a.27	Erection of miscellaneous equipments	0.25
	SUB TOTAL of (A)	**14.00%**

B	GAS TURBINE GENERATOR & AUX (8%)	
b.1	Preparation of foundation	0.50
b.2	Placement, Leveling and Centering of Generator Stator on foundation	1.25
b.3	Testing of Hydrogen Coolers and insertion	0.25
b.4	Rotor Insertion and lowering on bearings.	0.75
b.5	Erection and assembly of Exciter / sliprings & Brushgear with accessories	0.50
b.6	Alignment of Generator Rotor, Gas Turbine rotors	0.50
b.7	Grouting of foundations	0.75
b.8	Reaming and coupling of Generator rotor and Gas Turbine rotors.	0.75
b.9	Boxing up of Generator and assembly of Hydrogen Seals	0.75
b.10	Erection of Seal Oil unit skids, Storage tank with Auxiliaries	0.50
b.11	Erection of Gas system racks with related accessories and Auxiliaries	0.50
b.12	Completion of Gas tightness test of Generator system	0.75
b.13	Erection of misc. equipments	0.25
	SUB-TOTAL OF (B)	**8.00%**
C	**STEAM TURBINE & AUXILIARIES (17 %)**	
c.1	Placement, alignment and grouting of base plates of LP Turbine and bearing pedestals	1.00
c.2	Placement and alignment of LP outer casing bottom portion and centre guide keys	1.00
c.3	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.00
c.4	Assembly, alignment & welding of LP Outer Casing upper half.	0.75
c.5	Placement of HP-IP Turbine, lowering of Rotor on bearings and checking of clearances, coupling etc.	5.00
c.6	Boxing up of LP inner-inner & inner- outer and roll check	0.75
c.7	Alignment of all Rotors including reaming, honing and fixing of coupling bolts	1.00
c.8	Assembly of regulation system	0.50
c.9	Installation of HP Valves, IP Valves, LP injection valves, IP Bypass Valves, LP injection bypass valves, MS Strainers with internals, HRH	1.50

	strainers with internals, LP injection steam strainer with internals etc.	
c.10	Erection of HP oil supply system, HP oil supply unit for LP injection, HP Governing Oil Coolers with accessories.	1.00
c.11	Erection of Main oil pumps, Emergency oil pumps, Lifting oil Pumps (AC & DC), Oil purifier unit, Lube oil filter, Lifting Oil filter, Vapour fan extractors, Lube oil system, Steam Turbine Oil coolers with accessories	1.50
c.12	Final box-up of LP turbine	1.0
c.13	Completion of Turbo-visory works	0.50
c.14	Final boxing up of Pedestals	0.50
	SUB-TOTAL OF (C)	**17.00 %**
D	**TURBO GENERATOR (10%)**	
d.1	Preparation of foundation of foundation	0.50
d.2	Placement, leveling and centering of Generator Stator on foundation.	6.00
d.3	Alignment of Generator Rotor & LP Turbine Rotor Generator Exciter rotor and foundation grouting.	1.00
d.4	Reaming and coupling Generator Rotor and LP rotor holes	0.50
d.5	Bearing boxup of Generator	1.00
d.6	Erection of Air coolers.	0.50
d.7	Erection of Misc. auxiliaries	0.50
	SUB-TOTAL OF (D)	**10.00%**
E	**ERECCTION, ALIGNMENT, FITUP, WELDING, NDE/NDT/RADIOGRAPHY, HYDAULIC TESTING AND SUPPRING OF INTEGRAL PIPING (10%)**	
e.1	Lube and control oil piping of Gas Turbine and Gas Turbine Generator	1.50
e.2	Gas interconnecting piping of GT system	0.75
e.3	Water wash piping and Field drain pipings & headers of GT system	0.50
e.4	Seal Oil System and Gas system piping of Gas Turbine Generator	1.00
e.5	Cross around piping of Steam Turbine	0.50
e.6	Central Lube oil piping	0.50
e.7	Steam piping of STG system	1.25
e.8	Turbine water Drains piping of STG system	0.75
e.9	Condensate spray piping of STG system	0.75
e.10	Lube oil piping and Control oil piping including HP, IP and LP Governing control oil of STG system	1.50
e.11	BFP / LPBFP/CP HRCP oil piping	0.50

e.12	Other Misc. piping	0.50
	SUB-TOTAL OF (E)	**10.00%**
F	**CONDENSER (10%)**	
f.1	Preparation of foundation	0.50
f.2	Placement, alignment, assembly and welding of bottom plate segments, hot well, NDT and spring elements placement	1.00
f.3	Assembly and positioning of water chamber, water boxes, side plates, bottom plates, welding and NDT	1.00
f.4	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	1.00
f.5	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device etc.	1.00
f.7	Insertion, expansion, end milling of condenser tubes	1.50
f.8	Hydro test of steam and water side	1.50
f.9	Welding of condenser neck joint and NDT & completion of balance works	1.50
f.10	Assy. and Erection of R.E. Joints and Butterfly valves	1.00
	SUB TOTAL of (F)	**10.00%**
G	**PUMPS AND AUXILIARIES (16 %)**	
g.1	Erection, testing and commissioning of BFPs with AUXILIARIES - 2 Sets (3 %)	
i	Foundation chipping, blue matching of foundation and leveling, centering of grillage/foundation frame and bolt grouting.	0.50
Ii	Placement of feed pump, booster pump, motor, hydraulic coupling and preliminary alignment.	1.00
Iii	Grouting of grillage/ foundation and final alignment of BFP, BP, Motor and HC	1.00
iv	Erection of lube Oil coolers, Working oil coolers & other balance piping like mechanical seal water coolers, Gauge Board racks and Instrument racks	0.50
g.2	Erection, Testing & commissioning of Condensate Extraction Pumps- 2 Sets (1%)	1.00
g.3	Erection, Testing and commissioning of LPBFP with Auxiliaries - 2 Sets (1%)	0.75
g.4	Erection ,Testing and commissioning of CPHRCP with Auxiliaries- 2 Sets (1%)	0.75
g.5	Erection ,Testing and commissioning of CW Pumps with Auxiliaries – 3 Sets (3%)	
I	Preparation of foundation	0.25
Ii	Assembly and lowering of Pumps in pit	1.00
Iii	Erection of Motors, Alignment & coupling with pumps	1.00
Iv	Grouting of foundation	0.25
v	Erection, alignment and leveling of R.E. Joints & B.F. Valves	0.50
g.6	Erection, testing and commissioning of Vacuum Pumps, Aux., accessories and B.F. Valves-2 sets	0.50
g.7	Erection, testing and commissioning of ACW pumps with Aux. and B.F. Valves, Accessories etc.-3 sets	1.00
g.8	Erection, testing and commissioning of DMCW pumps with Aux. & Accessories etc.-2 sets	0.50
g.9	Erection, testing and commissioning of Raw Water Pumps with Aux., Accessories etc.-2 sets	0.50

g.10	Erection, testing and commissioning of Portable Pumps with Aux., Accessories etc.-2 sets	0.50
g.11	Erection, testing and commissioning of Hotwell make up Pumps with Aux., Accessories etc.-3 sets	0.50
g.12	Erection, testing and commissioning of HRSG Fill Pumps -1 set and Sump Pumps – 6 sets with respective Aux., Accessories etc.	0.50
g.13	Erection and testing of Plate Heat Exchangers with BF Valves and fittings- 2 sets	0.25
g.14	Erection and testing of Self Cleaning Strainers with BF Valves and fittings- 2 sets	0.25
g.15	Erection, testing and commissioning of De-aerator, Feed Storage Tank and associated approach platform with ladders etc.	1.00
g.16	Erection of Misc. Oil Tank, ECW O/H tank, Steam Drain Flash tank and Unit flash tank with accessories & fittings.	0.50
g.17	Erection, testing and commissioning of DG set with Aux. , Accessories, Fittings, Electrical, Control & Instrumentation items and Acoustic application etc.	1.00
g.18	Erection of Misc. / other Auxiliaries	0.50
	SUB TOTAL OF (G)	**16.00%**
H	**FINAL PAINTING (5%)**	
h.1	Progressive Final Painting of GTG system equipments	1.00
h.2	Progressive Final Painting of STG system Equipments	1.25
h.3	Progressive Final Painting of Pumps and Auxiliaries	1.25
h.4	Progressive Final Painting of Integral Piping	1.00
h.5	Completion of Misc. equipments	0.50
	SUB TOTAL OF (H)	**5.00%**
I	**Commissioning 10%**	
i.1	Oil flushing completion of GT system	0.50
i.2	Cranking of GT	0.50
i.3	Full speed no load sum of GT	1.00
i.4	Synchronisation of GT set	0.50
i.5	Commissioning of feed water system	0.50
i.6	Oil flushing completion of STG system	1.00
i.7	Steam Blowing completion	0.50
i.8	Barring Gear Operation of STG set	0.50
i.9	Rolling and Synchronization of STG set	1.00
i.10	Completion of Trial run operation in combined cycle mode of GT & STG and PG test related works	1.00
i.11	Commissioning of CW and ACW systems	1.00
i.12	Commissioning of BFP , LPBFP and CPHRCP systems	1.00
i.13	Completion of all facilities	1.00
	SUB TOTAL OF (I)	**10.00%**
GRAND TOTAL OF (A), (B), (C), (D), (E), (F), (G), (H) & (I)		**100.00%**

12.1.2

STAGE BREAK UP PAYMENT FOR ERECTION, INSTALLATION / ASSEMBLY, TESTING, COMMISSIONING, LOAD TESTING / OVER LAOD TESTING AND FINAL PAINTING ETC. OF MISC. CRANES & HOISTS, CHAIN PULLEY BLOCKS WITH ASSOCIATED ACCESSORIES, FIXING ARRANGEMENTS, SUPPORT STRUCTURES, DSL SYSTEMS AND RAILS ETC. (AS PER

FOLLOWING BREAK UP DETAILS OF ACCEPTED RATE OF RATE SCHEDULE ITEM UNDER SL. "BB" OF RATE SCHEDULE).

SL. No.	DESCRIPTION (STAGE OF COMPLETION)	PERCENTAGE OF ACCEPTED RATE
1	ERECTION / FABRICATION OF SUPPORT STRUCTURES	30 %
2	ERECTION, ASSEMBLY AND ALIGNMENT OF EQUIPMENTS WITH ACCSSORIES & FITTINGS	30 &
3	COMMISSIONING AND DRY RUN TEST	20 &
4	FINAL PAINTING COMPLETION	5 %
5	LOAD TEST & OVERLOAD TEST	10 %
6	COMPLETION OF MISC. WORKS	5 %
	TOTAL	**100 %**

12.1.3

STAGE BREAK UP PAYMENT FOR ERECTION, WELDING, NDE/ NDT, RADIOGRAPHY, SUPPORTING, HYDRAULIC TESTING, FINAL PAINTING ETC. OF CW COOLING WATER PIPING, ACW COLING WATER PIPING, TG AUX. (DMCW) COOLING WTAER PIPING, SERVICE WATER PIPING INCLUDING BURIED /UNDER GROUND PIPING WITH VALVES, SUPPORTS & FITTING ETC. (AS PER FOLLOWING BREAK UP DETAILS OF ACCEPTED RATE OF RATE SCHEDULE ITEM UNDER SL. "CC" OF RATE SCHEDULE).

SL. No.	DESCRIPTION OF ACTIVITY COMPLETED	PERCENTAGE OF ACCEPTED ITEM RATES
1	TRANSPORTATION TO SITE OF WORK, ERECTION / PLACEMENT IN POSITION	30 %
2	ALIGNMENT, FIT-UP & WELDING	40 %
3	NDT / NDE AND HEAT TREATMENT	7 %
4	HYDRAULIC TEST OF PIPE LINE	8 %
5	CLEANING OF PIPE LINE	5 %
6	PRESERVATIVE / FINAL PAINTING	5 %
7	SYNCHRONISATION	2 %
8	TRIAL RUN OPERATION IN COMBINED OPERATION OF GTG AND STG SYSTEM AND COMPLETION OF PG TEST RELATED WORKS	3 %
	TOTAL	**100 %**

12.1.4

STAGE BREAK UP PAYMENT FOR SURFACE PREPARATION AND APPLICATION OF ANTI CORROSIVE TAPING OF MINIMUM 4MM THICK CONFIRMING TO IS-10221 AND AWWA C 203-93 INCLUDING SUPPLY OF REQUIRED COMPLETE MATERIALS ALONG WITH SURFACE PREPARATION (BY SHOT OR SAND BLASTING) BEFORE APPLICATION, CARRYING OUT HYDRO TEST BEFORE APPLICATION OF ANTI- CORROSIVE TAPING AND CARRYING OUT BOND / ADHESION TEST & HOLIDAY TEST AFTER COMPLETION OF ANTI- CORROSIVE TAPING ETC. OF UNDERGROUND PIPING / BURIED PIPING HAVING OUTSIDE Dia.-2132 mm TO OUTSIDE Dia-323 MM (AS PER FOLLOWING BREAK UP DETAILS OF ACCEPTED RATE OF RATE SCHEDULE ITEM UNDER SL. "DD" OF RATE SCHEDULE).

SL. No.	DESCRIPTION (STAGE OF COMPLETION)	PERCENTAGE OF ACCEPTED RATE
1	COMPLETION OF SURFACE PREPARTION	15 %
2	APPLICATION OF ANTI CORROSSIVE TAPING AS PER SPECIFICATIONS	60 &
3	CARRYING OUT AND COMPLETION OF BOND / ADHESION TEST AND HOLIDAY TEST AS PER SPECIFICATION	10 %
4	COMPLETION OF TRIAL RUN OPERATION IN COMBINED CYCLE OPERATION OF GTG AND STG SYSTEMS	5 %
	TOTAL	**100 %**

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.

12.3 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.

SECTION-13
SPECIAL CONDITIONS OF CONTRACT

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.

SECTION-15
SPECIAL CONDITION OF CONTRACT

15.0 EARNEST MONEY DEPOSIT , SECURITY DEPOSIT & BANK GUARANTEE

15.1 Earnest Money Deposit:

i) EMD for this tender is Rs. 2,00,000/- (Rupes Two lakhs only).
ii) Bidders who have already deposited One Time EMD of Rs. 2.00 lakh are exempted from submission of EMD for this tender. However a copy of 'One Time EMD' certificate issued by BHEL/PSWR, Nagpur shall be enclosed along with the Offer.
iii) EMD is to be paid in cash (as permissible under Income Tax Act), Pay order or Demand Draft in favour of Bharat Heavy Electricals Limited and payable at Nagpur.
iv) No other form of EMD remittance shall be acceptable to BHEL.

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

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

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

15.1.2 EMD shall not carry any interest.

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

15.2 Security Deposit

15.2.1 Security Deposit shall be furnished by the successful bidder. The rate of Security Deposit will be as below:

SN	Contract Value	Security Deposit Amount
1	Up to Rs. 10 lakhs	10% of Contract Value
2	Above Rs. 10 lakhs upto Rs.50 lakhs	1 lakh + 7.5% of the Contract Value exceeding Rs. 10 lakhs.
3	Above Rs. 50 lakhs	Rs 4 lakhs + 5% of the Contract Value exceeding Rs. 50 lakhs.

The security Deposit should be furnished before start of the work by the contractor.

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

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

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

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

iv. Securities available from Post Offices such as National Savings Certificates, Kisan Vikas Patras etc. (Certificates should be held in the name of Contractor

furnishing the security and duly pledged in favour of BHEL and discharged on the back).

v. Bank Guarantee from Scheduled Banks / Public Financial Institutions as defined in the Companies Act. The Bank Guarantee format should have the approval of BHEL.

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

vii. Security deposit can also be recovered at the rate of 10% from the running bills. However in such cases at least 50% of the Security Deposit should be remitted (either by cash/DD or **BG for maximum 50%** of total SD) before start of the work and the balance 50% may be recovered from the running bills.

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

ix. The Security Deposit shall not carry any interest.

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

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

15.3 BANK GUARANTEE

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

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

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

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

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

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

15.3.1 Guidelines for acceptance of Bank Guarantees are as follows :

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

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

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

APPENDIX-I

TENTATIVE SCOPE OF EQUIPMENTS/SYSTEMS COVERED UNDER THIS TENDER SPECIFICATION.

(1) GAS TURBINE - GENERATOR SETS WITH AUX., STEAM TURBINE & TURBO GENERATOR WITH AUX., INTEGRAL PIPING, SURFACE CONDENSER WITH AUX., PUMPS & AUX. AND OTHER RELATED EQUIPNMENTS & AUXILIARIES ETC.

(A) Frame -9 FA Gas Turbine and Aux.: Comprises of following Aux. & Equipments:

(i) Gas Turbine with interconnecting piping.
(ii) Accessory Package with interconnecting piping.
(iii) Turning Gear with interconnecting piping.
(iv) Water Wash Skid with interconnecting piping.
(v) Co2 Fire Fighting System skid with interconnecting piping.
(vi) Air processing Unit with interconnecting piping.
(vii) GT Air Filter
(viii) Inlet ducting.
(ix) Off base enclosure.
(x) Exhaust frame blowers with interconnecting piping and frames.
(xi) Mist Eliminator with interconnecting piping and frames.
(xii) Lube oil interconnecting piping for GT & GT Generator.
(xiii) LO field flushing
(xiv) Gas Inter connecting piping
(xv) Water Wash piping.
(xvi) Field drain piping and headers.
(xvii) Ventilation ducting
(xviii) Assembly on base components and piping
(xix) Lube Oil Pumps , AC&DC Lube oil Pump, AC MOP, AC&DC JOP, etc.
(xx) Oil Purifier
(xxi) Stainless steel lube oil feed pipe
(xxii) Carbon Steel lube oil drain pipe
(xxiii) Lube system valve stainless steel trim
(xxiv) Fuel Gas Skid
(xxv) Fuel Gas Filter Separator Skid
(xxvi) Pressure Regulating Station
(xxvii) Fuel Gas Startup Heater Skid
(xxviii) Fuel Gas Final Scrubber Skid
(xxix) Drain Tank for Fuel gas
(xxx) Loose items
(xxxi) Lube oil Tank

(B) GAS TURBINE GENERATOR (GTG) with Static Excitation and Auxiliaries: Comprises of:

I. Foundation items
II. Generator Stator
III. Generator Rotor
IV. End Shields (both side, top & Bottom)
V. HV bushings
VI. Wound stator

VII. Generator Accessories
VIII. Gas Baffle ring
IX. Bearings.
X. Seal Rings
XI. Terminal Connector
XII. Seal Oil Units
XIII. Seal Oil Storage Unit
XIV. Gas Unit
XV. H2 Distributor
XVI. Co2 Distributor
XVII. Liquid Detectors
XVIII. Co2 Vapouriser
XIX. Slip ring shaft Assembly
XX. Slipring cover and sealing wall
XXI. Accessories of Slip ring shaft
XXII. Bed Plates
XXIII. Brushgear
XXIV. Generator piping (Gas system, Seal Soil System)
XXV. Enclosure

(C) STEAM TURBINES AND AUXILIARIES: Comprises of :

I. Combined HP-IP (K) module
II. HP Exhaust Insert
III. HP Valve Casing
IV. IP Valve Casing
V. LP Injection Valve casing
VI. Valve Actuators
VII. Front bearing pedestal (K-turbine)
VIII. Rear Bearing pedestal (K- turbine)
IX. Rear Bearing pedestal (LP- turbine)
X. Bearing pedestal loose parts
XI. LP Rotor
XII. Upper LP Inner casing – I
XIII. Upper LP Inner casing – II (including Guide wheels)
XIV. Lower LP Inner casing –II (Including Lower LP Inner casings-I &Guide wheels)
XV. Diffuser (LP)
XVI. LP Longitudinal Girder
XVII. LP Side wall
XVIII. LP Outer casing (Middle pieces)
XIX. LP outer casing (End Pieces)
XX. LP Turbine loose parts
XXI. Cross around pipings
XXII. Cross around piping loose parts
XXIII. IP by pass valve
XXIV. LP injection bypass valve
XXV. LP base plates
XXVI. MS steam strainer
XXVII. HRH Steam strainer
XXVIII. LP injection steam strainer
XXIX. Foundation bolts
XXX. HP Oil unit
XXXI. HP oil supply unit for LP injection
XXXII. Main oil pump assembly with AC Motor
XXXIII. Emergency oil pump assembly DC motor
XXXIV. Lifting oil pump assembly with AC motor

XXXV. Lifting oil pump assembly with DC motor
XXXVI. Turbine oil purification unit
XXXVII. Lube oil filters
XXXVIII. Lube oil accumulator assembly
XXXIX. Centrifugal ext. fan assembly
XL. Demister
XLI. Lube oil tank
XLII. HP Governing Twin oil cooler
XLIII. S.T. oil cooler

(D) STEAM TURBINE GENERATOR: Assembled Generator stator, Rotor, Bearings and Exciter with frame (4 Nos. Air Coolers with Frames loose to be assembled at site along with Hydro Test etc.)

(E) TG Integral Piping and other Piping:

- Turbine Water drain piping
- Condensate spray piping.
- Seal Steam Piping.
- Lube Oil piping (Lube oil & Jacking oil piping).
- Control oil / Governing oil piping
- Gas System piping.
- Seal Oil system piping
- Coolers drain piping.
- Equipment Drains & Vents piping.

(F) Surface Condenser mainly comprising of the following parts:

- Welded type Condenser Stainless Steel
- Front & Rear Water Boxes and Water Chambers
- Bottom Plate assly and Support Plate assly.
- Hot well Assly
- Side wall Assly.
- Dome Assemblies-1, 2, 3 &4
- Dome stiffeners and dome stiffeners plate
- Turbine end & Generator end Side Plates.
- Dome walls
- Front & Rear water chambers with tube plates
- Support plates.
- Hot Well
- Spring Elements and supports
- Steam Throw Device
- Air Extraction Pipe and Baffle
- Stand pipes & Fittings, loose parts etc.
- Foundation Springs
- Condenser R.E. Joints (Water boxes and Water Chambers side)

- Electrically operated B.F. Valves (both in supply and return lines & in both side condensers)

(G) Pumps & Auxiliaries:

a) Boiler Feed Pumps: 2 Sets, Each comprising of followings:
- BFP skid (Pump assembly, base plate , tubing, seal coolers)
- Booster pump skid (pump assembly, base plate, tubing)
- Motor with cooler
- Hydraulic coupling assembly
- Hydraulic coupling W.O. Cooler
- Hydraulic coupling L.O. Cooler
- Hydraulic Coupling loose items
- Suction strainer at BP suction
- BFP recalculation valve
- Loose items

b) **CEP :** Two numbers each comprising of following
- CEP assembly
- Motor
- Canister
- CEP foundation ring
- CEP SUCTION STRAINER
- Loose items

c) LPBFP : Two numbers each comprising of following:
- LPBFP assembly
- LPBFP drive motor
- LPBFP suction strainer
- LPBFP re-circulation valve
- Common foundation frame

d) CPHRCP : Two numbers each comprising of following:
- CPHRCP assembly
- CPHRCP drive motor
- CPHRCP suction strainer
- CPHRCP re-circulation valve
- Common foundation frame

e) CW Pumps with associated items/ components, Accessories/ Auxiliaries, fittings per pump (Total 3 Nos. CW Pumps):

- Suction casing
- Pump Casing
- Impeller casing
- Impeller
- Element-1
- Element-2
- Element-3
- Discharge Elbow
- Inter foundation Ring
- Thrust Block
- Motor stool

- Shafts (set of three numbers for each pump)
- Thrust bearing
- Connecting coupling
- Counter flange
- Drive Motor with fittings
- Hardware & Miscellaneous items
- R.E. Joints
- Electrically operated B.F. Valves

f) Vacuum Pumps with accessories like foundation frame, drive motor, suction tanks, fittings and manually B.F. Valves etc.

g) Misc. Pumps:

- ACW Pumps: Three numbers each comprising of pump, drive motor, foundation parts , fittings, R.E. Joints and Electrically operated B.F. Valves etc.
- DMCW Pumps: Two numbers each comprising of pump, drive motor, foundation parts & fittings etc.
- Raw Water Pumps: Two numbers each comprising of pump, motor, foundation parts, fittings and R.E. Joints etc.
- Portable pumps: Two numbers each comprising of pump, motor, foundation parts & fittings etc.
- Hot well make up pumps: Three numbers each comprising of pump, motor, foundation parts & fittings etc.
- DM Transfer pumps: Two numbers each comprising of pump, motor, foundation parts & fittings etc.
- HRSG fill pump: One numbers each comprising of pump, motor, foundation parts & fittings etc.
- Sump pumps/submersible pumps: Six numbers each comprising of pump, motor, foundation parts & fittings etc.

h) Plate Heat Exchangers Two numbers with Manually operated B.F. Valves.

i) Self Cleaning Strainers Two numbers With Manually operated B.F. Valves

H) Deaerator with Approach Platform
Comprising of Feed Storage Tank (in single segments) and Deareator with following associated items:

- Safety Relief Valves
- Deaerator Heater
- Orifice Plates
- Stand pipes-2 Nos.
- Vent & Drain Valves
- Isolation Valves for Stand pipe & Instruments
- Anchor Bolts, Sliding Plates, Roller support
- Level Gauges
- Level Switches
- Pressure Gauges & Temperature Gauges
- Associated approach platform

(I) Gland Steam Condenser: Gland Steam Condenser with following associated items:

- Exhaust Fans with motors –2x100%

- Water Expansion Relief valve – 1No.
- Stand pipes-1 Nos.
- Vent & Drain Valves
- Isolation Valves for Stand pipe & Instruments
- Counter Flanges for inlet/outlet branch flanges with fasteners .
- Sole Plates & Anchor Bolts
- Level Gauges
- Level Switches
- Pressure Gauges & Temperature Gauges

(J) Misc. Tanks & Flash Tanks:

- Maintenance Oil Tank (15 Cu. M) with central lube oil piping (PGMA 80-673) weighing approx. 3.7 MT with valves and fittings.
- ECW overhead tanks capacity 5 Cu. M
- Steam drain flash tank
- Unit flash tank

(K) 1X625 KVA, 415 VOLTS THREE PHASE 1500 RPM DG SET Comprising of following Equipment:

- Engine
- Brush Gear alternator
- Radiator
- Base frame & foundation bolts/ ABM Pads
- 990 Liters Day tank
- Auxiliary power distribution board
- Battery & battery charger
- Control and relay cum AMF panels
- Exhaust piping and MS supports
- Manually operated fuel transfer pump
- Accessories like cable accessories, Earthing & fuel piping
- Acoustic enclosure for DG set including application of Acoustic in DG set room under supervision of DG set supplier vendor.

(L) MISC. CRANES & HOISTS, CHAIN PULLEY BLOCKS WITH ASSOCIATED ACCESSORIES, FIXING ARRANGEMENTS, SUPPORT STRUCTURES, DSL SYSTEMS AND RAILS ETC.

For Assembly, Erection, Testing, Commissioning including load testing etc. at various locations/places and elevations of project site as per drawings and instructions of BHEL Engineer at site. The Equipments / systems comprising of:

- 1 No. 5 T capacity under slung EOT Crane for Clarified water pump house.
- 1 No. 5 T capacity under slung EOT Crane for raw water / fire water pump house.
- 1 No. 5 T capacity under slung EOT Crane for DG Building.
- 1 No. 7 T capacity electric hoist for handling of screens and gates in CW Pump House.
- 1 No. 7 T capacity electric hoist for Generator and Shield.
- 1 No. 2 T capacity electric hoist for DM transfer Pumps.
- 1 No. 5 T capacity under slung HOT Crane for LPBFP & CPH RC Pumps in BFP building.
- 1 No. 3 T capacity electric hoist for Elevator Machine Room in Power House.

- 1 No. 3 T capacity electric hoist for Vacuum Pump motor handling.
- 1 No. 5 T capacity under slung EOT Crane for Compressor House.

(M) CW COOLING WATER PIPING, ACW CCOLING WATER PIPING, TG AUX. (DMCW) COOLING WTAER PIPING, SERVICE WATER PIPING INCLUDING BURIED /UNDER GROUND PIPING WITH VALVES, SUPPORTS & FITTING etc.

- TG aux. cooling water piping with valve, fittings, supports.
- Main circulation (CW & ACW) cooling water piping with valve, fittings, supports.
- Service Water piping with valve, fittings, supports.

(L) SURFACE PREPARATION AND APPLICATION OF ANTI CORROSIVE TAPING OF MINIMUM 4MM THICK CONFIRMING TO IS-10221 AND AWWA C 203-93 INCLUDING SUPPLY OF REQUIRED COMPLETE MATERIALS ALONG WITH SURFACE PREPARATION (BY SHOT OR SAND BLASTING) BEFORE APPLICATION, CARRYING OUT HYDRO TEST BEFORE APPLICATION OF ANTI- CORROSIVE TAPING AND CARRYING OUT BOND / ADHESION TEST AND HOLIDAY TEST AFTER COMPLETION OF ANTI- CORROSIVE TAPING ETC. OF UNDERGROUND PIPING / BURIED PIPING HAVING OUTSIDE Dia.-2132 mm TO OUTSIDE Dia.-323 MM.

NOTE:

1. The information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components / items / system according to the site requirements / customer requirements to complete various systems in all respects.
2. Any other systems / components, quantities which are the integral to equipment supplied by the manufacturing units also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.
3. The dimensions, weights, quantities for scope of works are tentative. The works for complete scope as per site, systems/schemes and drawing requirement shall be carried out within accepted lump sum price where lump sum price has been offered. Where as for scope of works where unit rate has been offered, the works shall be carried out as per site, systems and drawing requirement based on actual requirement at site and payment for such actual quantum of work executed shall be made as per accepted applicable unit rate.

APPENDIX – II

Tentative weight details and dimensions schedule of various equipments / systems of Gas Turbine with aux. with Balance of Plant (Mechanical) and other related Equipments & aux. piping with Valves / fittings / supports etc., Gas Turbine generator with aux., Steam Turbine with aux., Steam Turbine Generator with aux., TG Integral Piping, Surface Condenser with aux., Dearator with approach platform, Gland Steam Condenser, Pumps and aux. with DG set, Misc. Cranes & Hoists and TG aux. (DMCW) Cooling Water Piping, Main Circulation (CW & ACW) Water Piping and Service water piping with valves, supports and fittings, Anti-corrosive taping of buried / underground piping etc.

(AA) GTG SET WITH AUX., STG SET WITH AUX., INTEGRAL PIPING, SURFAE CONDENSER WITH AUX., PUMPS & AUX. ETC.

(A) Frame – 9 FA Gas Turbine, Ducting and Auxiliaries etc.:

S.N.	Description	Dimensions (mm)	Wt.(MT)	REMARKS
1	Gas Turbine	10600x4953x4986	300	GT supplied as a unit without on base piping. Field erection and interconnection piping,
2	Accessory Package (Acc. Base)	9200x 3440x 4100	37	Supplied as package. Field erection and interconn. piping, cabling, instrumentation etc to be done at site
3	Turning gear	1500x 1200x 2300	12	Supplied as package. Field erection and interconn piping, cabling, instrumentation etc to be done at site
4	Water wash skid	6000x 3200x 3700	25	Supplied as package. Field erection and interconn. piping, cabling, instrumentation etc to be done at site
5	CO2 Fire fighting system Skid with tank (Low Pressure)	7500x 2500x 3000	15	Supplied as skid, interconn. Piping and instrumentation etc. to be done at site
6	Air processing unit	2500x 1500x 2000	3	Supplied as package. Field erection and interconn. piping, cabling, instrumentation etc to be done at site

7	GT Air Filter	12000x 3500x 3000	140	Supplied loose for field fabrication and erection. 25 boxes total weight is 140 tons
8	Inlet ducting	11200x3500- 3500	180	Supplied loose for field fabrication and erection. 20 boxes total weight 180 tons
9	Off base enclosure	12000x 3500x 3500	135	Supplied loose for field fabrication and erection. 30 boxes total weight 135 tons
10	Exhaust blowers with frame	4500x 2500x 2000	5	Supplied as package. Field erection and interconn. piping, cabling, instrumentation etc to be done at site
11	Mist Eliminator	2500x 2000x 2500	4	Supplied as package. Field erection and interconn piping, cabling, instrumentation etc to be done at site
12	Exhaust Duct	3900x 7800	120	Supplied loose for field fabrication and erection 15 boxes total weight 120 ton,
13	Exhaust Diffuser duct	3800 x8000	30	Supplied loose for field fabrication and erection 2 pieces total weight 30 tons
14	LO field flushing	3500 x3000x6000	18	Supplied loose for field fabrication and erection 5 boxes total weight 18 tons
15	Ventilation ducting	3500 x3000x10000	45	Supplied loose for field fabrication and erection 12 boxes total weight 45 tons
16	Assembly on base components and piping (removed for transport purpose)	3500 x3000x6000	25	Supplied loose for field fabrication and erection 12 boxes total weight 25 tons
17	Fuel Gas Scrubber Skid, 1 set	2500x4000x4600	6	-

18	Fuel Gas Filter Separator skid, 1 set	6000x4500x4600	12	-
19	Pressure Regulating Station, 1 set	10000x2000x2000	8	-
20	Fuel Gas Startup Heater skid, 1 set	10000x4000x10000	10	-
21	Fuel Gas Final Scrubber skid, 1 set	2500x4000x4600	6	-
22	Drain tank for fuel gas, 1 set	1000x4100x1500	4	-
		Total	**1140**	

(B) Gas Turbine Generator & Auxiliaries:

S.N.	DESCRITION	PKG SIZE	NET WT (KG)
1	FOUNDATION ITEMS OF GENERATOR	3550x 715x 880	4306.00
2	FOUNDATION ITEMS OF GENERATOR	3100x 1050x 850	2974.00
3	CONSUMABLES FOR FOUNDATION	500x 500x 200	5.00
4	GENERATOR STATOR	7520x 4200x 4900	220000.00
5	GENERATOR ROTOR	10550x 1560x 1660	42968.00
6	END SHIELD (TE) LOWER HALF	3640x 1140x 2000	5050.00
7	END SHIELD (EE) LOWER HALF	3640x 1140x 2000	5050.00
8	H.V.BUSHING	2000x 1350x 600	550.00
9	LOOSE ITEMS OF WOUND STATOR	1500x 1200x 1000	860.00
10	GENERATOR ACCESSORIES	1800x 1000x 550	1046.00
11	GAS BAFFLE RING,INSERT COVER ETC.	3700x 3500x 1340	2388.00
12	BEARING SHELLS	1100x 835x 950	782.00
13	END SHIELD (EE) UPPER HALF	3640x 1140x 2000	4650.00
14	END SHIELD (TE) UPPER HALF	3640x 1140x 2000	4650.00
15	SEAL RINGS	600x 600 x 200	48.00
16	DEVICE FOR ROTOR INSERTION INTO STATOR	2240x 940x 1220	691.00
17	ERECTION DEVICES	2250x 1180x 800	535.00
18	WIRE ROPES	1800x 1450x 400	204.00
19	DRY AIR BLOWER	1350x 1250x 800	40.00
20	TERMINALCONNECTORS	1840x 660x 400	186.00
21	CONSUMABLES	500x 600x 300	20.00
22	SEAL OIL UNIT	6000x 2500x 3000	7825.00
23	SEAL OIL STORAGE TANK	3500x 1300x 1280	1025.00

24	GAS UNIT	2550x 1790x 2560	572.00
25	HYDROGEN DISTRIBUTOR	3480x 1540x 440	150.00
26	CO2 DISTRIBUTOR	2770x 1240x 440	116.00
27	LIQUID DETECTOR RACK	1700x 900x 1800	274.00
28	LOOSE VALVES	2000x 1000x 1000	759.00
29	LOOSE INSTRUMENTS	500x 500 x 300	25.00
30	CO2 VAPOURISER	1520x 640x 840	145.00
31	SLIP RING SHAFT ASSEMBLY	2540x 1110x 1200	1610.00
32	SLIP RING COVER & SEALING WALL	2540x 2390x 2750	1954.00
33	ACCESSORIES OF SLIP RING SHAFT	2600x 2300x 500	935.00
34	BED PLATE, BEARING & BRUSHGEAR	4160x 1550x 1765	3635.00
35	LOOSE INSTRUMENTS	1000x 600x 400	19.60
	TOTAL		**316047.60**

C) Weight & Dimension Schedule of Steam Turbine and Aux. Accessories:

S.N.	Description	Dimension	Qty.	Wt./Piece (Tons)	Total Weight
1	Combined HP - IP (K)-module	6370x4360x3120	1	113.00	113.00
2	HP exhaust insert	1150x1100x1100	1	2.00	2.00
3	HP valve casing	3915x3350x1300	2	5.80	11.60
4	IP Valve casing	4230x1350x4360	2	9.30	18.60
5	LP injection Valve casing	1575x1725x800	2	2.50	5.00
6	Valve actuators	1500x400x400	12	1.00	12.00
7	Front bearing pedestal (K-turbine)	1700x2500x1435	1	9.00	9.00
8	Rear bearing pedestal (K-turbine)	1660x3100x1610	1	10.60	10.60
9	Rear bearing pedestal (LP turbine)	1360x2320x1725	1	6.50	6.50
10	Bearing pedestal loose parts	1000x1000x1000	1	1.10	1.10
11	LP rotor	6307x2850x2850	1	41.00	41.00
12	Upper LP inner casing - I	1210x3100x1390	1	5.00	5.00
13	Upper LP inner casing - II (incl. Guid wheels)	2710x6260x1750	1	16.50	16.50
14	Lower LP inner casing-II (incl. Lower LP inner casing - I & guid wheels)	2710x6260x2120	1	22.00	22.00
15	Diffuser (LP)	675x4150x4150	2	1.70	3.40
16	LP longitudinal girder	6110x1750x1650	2	12.00	24.00
17	LP side wall	925x6200x3600	2	8.50	17.00
18	LP outer casing (middle pieces)	3030x6500x2660	1	10.00	10.00
19	LP outer casing (end pieces)	1235x6500x2660	2	4.50	9.00
20	LP turbine loose parts	2000x2000x2000	1	7.30	7.30
21	IP bypass valve	850x2300x4300	2	3.50	7.00
22	LP injection bypass valve	700x1800x3800	1	3.00	3.00
23	LP base plates	570x1070x170	4	0.80	3.20
24	MS steam strainer	1400x685x960	2	1.50	3.00
25	HRH steam strainer	2075x860x1260	2	2.50	5.00
26	LP injection steam strainer	1670x1010x850	1	1.10	1.10
27	Foundation bolts	4500x3000x2000	1	4.60	4.60
28	HP oil supply unit	2900x1300x2350	1	3.00	3.00
29	HP oil supply unit for LP Injection	2000x1200x1500	1	2.10	2.10
30	Main oil pump assembly with A.C motor	1060x1000x1500	2	1.50	3.00
31	Emergency oil pump assembly D.C motor	1060x1000x1500	1	0.80	0.80
32	Lifting oil pump assembly with A.C motor	1060x1000x1700	1	0.75	0.75
33	Lifting oil pump assembly with D.C motor	1200x1100x1800	1	1.00	1.00
34	Turbine oil purification unit	2200x2500x1800	1	2.50	2.50
35	Lube oil filter	1850x900x1675	1	0.50	0.50

36	lifting oil filter	350x300x400	1	0.30	0.30
37	Lube oil accumulator assembly	1350x500x2300	1	0.80	0.80
38	Centrifugal ext. fan assembly	400x400x650	2	0.20	0.40
39	Demister	400x400x1000	1	0.10	0.10
40	Lube oil tank	4500x2700x2450	1	7.70	7.70
41	HP Governing Twin Oil cooler	2700x700x1700	1	2.7	2.7
42	Steam Turbine Oil Cooler	4800x1200x1200	2	11	22
		Total Weight			**419.15**

(D) Steam Turbine Generator:

Weight 230 Tones, Generator Package Comprising of Generator Stator, Rotor and Bearings.
Size of the Package: 9500mm (length) x 4300 mm (width) x 3900 mm (height)

(E) Tentative TG Integral Piping (For GTG set & STG set):

(a) Alloy Steel Piping with valves, supports and fittings : 11MT
(b) Carbon Steel Piping with valves, supports and fittings : 104MT
(c) Stainless Steel Piping with valves, supports and fittings : 25MT
(d) Cross Around Piping, supports and fittings : 10MT
(e) Central lube oil piping with pump, valve, supports & fittings : 4 MT

Total: 154 MT

(F) Condenser Weight and Dimensions Detail:

S.N.	Equipment	Overall Dimensions (in mm)	Quantity	Unit Weight (Kg)	Weight (Kg)
1)	**Surface Condenser:**				
A	Tubes	OD 23x Thk 0.7112 x L 10000	16300	3.984	64939.200
B	Front water box assly.	L 5000 x W 3300 x H 2000	2 nos.	11100.000	22200.000
C	Rear water box assly.	L 5000 x W 3300 x H 2000	2 nos.	7600.000	15200.000
D	Front water chamber assly	L 4600 x W 3200 x H 500	2 nos.	5600.000	11200.000
E	Rear water chamber assly.	L 4600 x W 3200 x H 500	2 nos.	5600.000	11200.000
F	Hotwell assly	L 10000 x W 2500 x H 1200	1 no.	5500.000	5500.000
G	Bottom assly	L 5000 x W 6000 x H 900	2 nos.	5800.000	11600.000
H	Support plate assly	L 2800 x H 4900 x Thk 12	32 nos.	950.000	30400.000
I	Side wall assly.	L 10000 x H 2500 x W 50	4 nos.	3000.000	12000.000
J	Dome assly #1	L 8700 x W 3800 x H 500	1 no.	6200.000	6200.000
K	Dome assly #2	L 8700 x W 3800 x H 500	1 no.	6200.000	6200.000
L	Dome assly #3	L 6300 x W 4000 x H 500	1 no.	5500.000	5500.000
M	Dome assly #4	L 6300 x W 4000 x H 500	1 no.	5500.000	5500.000

N	Dome stiffeners	Dia 168.3 x Thk 21.97 x L 6000	35 nos.	2900.000	2900.000
O	Dome stiffeners plate	Pl 32 x 2500 x 6300	2 nos.	4000.000	4000.000
P	Loose items		1 set	20000	20000
Q	Condenser springs with packers plate	700 Kgs/spring	34	700.000	23800.000
R	Butter Fly Valve (Elect. Operated)	2000x1800x500	4	3523	14092
S	R.E. Joints (1400 NB - Comp. Type , Total 8 Assy.)	1422 OD x 14 Tk. (3.2/ Assy.)	8 Assy.	3200.000	25600.000
				Sub Total	**278031.2**

(G) PUMPS AND AUXILIARIES.

a) Boiler Feed Pumps With Aux.:

S. N.	Description of Equipment	Dim. (mm) LxBxH	Unit Wt (kg)	Qty.	Total Wt. (kg)
1	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250 x 1000 x1050	5770	2	11540.00
2	BP Skid (Pump Assly. + Base Plate + tubing)	1650 x 1200 x 950	2511	2	5022.00
3	Hydraulic Coupling (DD) Assly.	1800 x 1700 x 1800	3560	2	7120.00
4	Hyd. Coupling W. O. Cooler (DD)	3700 x 1500 x 500	1475	2	2950.00
5	Hyd. Coupling L. O. Cooler (DD)	3100 x 1300 x 450	775	2	1550.00
6	Hyd. Coupling Loose Items	-----	710	2	1420.00
7	Suction Strainer at BP Suction DD)	900 x 800 x 1400	800	2	1600.00
8	BFP Recirculation valve (DD)	1800 x 550 x 1400	350	2	700.00
9	Loose Items	-----	2449	2	4898.00
10	BFP Motors	4000x3000x3000	15000	2	30000.00
		Sub Total (a)			**67800.00**

b) Condensate Extraction Pumps with Aux.:

S. N.	Description of Equipment	Dim. (mm) LxBxH	Unit Wt (kg)	Qty.	Total Wt. (kg)
1	CEP Assembly	5,200 x 1200 x 1200	5750	2	**11500.00**
2	Canister	3250 x 850 x 1000	1300	2	**2600.00**
3	CEP Foundation Ring	1200 x 1200 x 300	500	2	**1000.00**
4	CEP Suction Strainer	1100 x 1100 x 1600	1350	2	**2700.00**
5	Loose Items	-----	210	2	**420.00**
6	CEP Motor	2020x1810x1150	4000	2	**8000.00**
		Sub Total (b)			**26820.00**

c) LPBFP With Aux. :

S.N.	Description of Equipment	Dim. (mm) LxBxH	Unit Wt (kg)	Qty.	Total Wt. (kg)
1	LPBFP Assembly	1,000 x 600 x 350	1000	2	**2000.00**
2	LPBFP drive motor	1,000 x 600 x 250	600	2	**1200.00**
3	LPBFP Suction Strainer	300 x 300 x 400	300	2	**600.00**
4	LPBFP R.C. Valve	800 x 300 x 1000	300	2	**600.00**
5	Common foundation frame	2500 x 600 x 200	1500	2	**3000.00**
		Sub Total (c)			**7400.00**

d) CPHRCP With Aux. :

S.N.	Description of Equipment	Dim. (mm) LxBxH	Unit Wt (kg)	Qty.	Total Wt. (kg)
1	CPHRCP Assembly	1,000 x 600 x 350	1000	3	**2000.00**
2	CPHRCP drive motor	1,000 x 600 x 250	600	3	**1200.00**
3	CPHRCP Suction Strainer	300 x 300 x 400	300	3	**600.00**
4	CPHRCP R.C. Valve	800 x 300 x 1000	300	3	**300.00**
5	Common foundation frame	2500 x 600 x 200	1500	3	**3000.00**
		Sub Total (d)			**7100.00**

e) CW Pumps with Aux.: Total – 3 Nos. CW Pumps

Size and Weight Schedule of Cooling Water Pumps per CW pump:

S. N.	DESCRIPTION OF ITEM	QTY/ PUMP	SIZE (LxBxH) mm	WEIGHT/PUMP IN KG	TOTAL WEIGHT
1	SUCTION CASING	1	1900x1900x850	735.00	2205.00
2	IMPELLER CASING ASSEMBLY	1	1500x1500x400	560.00	1680.00
3	PUMP CASING ASSEMBLY	1	1500x1500x900	1840.00	5520.00
4	IMPELLER ASSEMBLY	1	1250x1250x500	385.00	1155.00
5	ELEMENT-1 ASSEMBLY	1	1500x1500x1750	1180.00	3540.00
6	ELEMENT-2 ASSEMBLY	1	1800x1800x1750	1220.00	3660.00
7	DISCHARGE ELBOW ASSEMBLY	1	2500x2500x2400	5215.00	15645.00
8	MOTOR STOOL ASSEMBLY	1	1850x1850x1350	2300.00	6900.00
9	INTER FOUNDATION RING	1	2800x2800x400	1320.00	3960.00
10	THRUST BLOCK ASSEMBLY	1	1500x650x350	350.00	1050.00
11	SHAFTS	3	550x550x3500	1200.00	3600.00
12	THRUST BEARING	1	900x900x550	650.00	1950.00
13	CONNECTING COUPLING	1	350x350x850	200.00	600.00
14	COUNTER FLANGE	1	1850x1850x55	350.00	1050.00
15	HARDWARE & MISCILLANEOUS	1 SET	1000x1000x1000	750.00	2250.00

16	R.E. Joints (1400 NB Total 3 Assy.) for CW pump Disch.	1 set	1422 OD x 14 Tk. (1.4/ Assy.)	1400.000	4200.000
17	B.F. Valves for CW Pump Disch. (Elect. Operated)	1 set	2000 X 1800 X 500	3523.00	10569.00
18	CW Pump Motor	1	3370x3000x4200	18000.00	54000.00
			Total (e)		**123534.00**

f) Vacuum Pump with Accessories like Foundation Frame, Fittings & Manually Operated B.F. Valves :

g)

Two Nos. (2x100%), unit weight 6300 kg and Total weight 12600 kgs.

h) Misc. Pumps & Aux. :

S.N.	Description / Service	Dimension (Base Plate)	Quantity	Weight (KG)
1 (a)	ACW Pumps	3.0M X 2.5M (Each)	3	18000.00
1 (b)	Elect. Operated B.F. Valve	1.1x.6x.3 (Each)	4	1122.00
2	DMCW Pumps	3.0M X 2.5M (Each)	2	16000.00
3	Raw water Pumps	3.0M X 2.5M (Each)	2	10000.00
4	Potable Pumps	3.0M X 2.5M (Each)	2	3000.00
5	Hot Well M/U Pumps	3.0M X 2.5M (Each)	3	6000.00
6	DM Trf Pumps	3.0M X 2.5M (Each)	2	6000.00
7	HRSGFill Pumps	3.0M X 2.5M (Each)	1	2000.00
8	Sump Pumps/ Submersible Pumps	-	6	2,400.00
			Total (g)	**64522.00**

i) Plate Heat Exchangers With Fittings and Manually Operated B.F. Valves 4 Nos. :

Two Nos. each of size 4x2.5 weighing 17500.00 kg (Including 4 Nos. B.F. Valves)

j) Self Cleaning Strainers With Manually Operated B.F. Valves (4 Nos.), Fittings & accessories :

Two Nos. each of size 300x300 weighing 13000.00 kg (Including 4 Nos. BF Valves)

j) Deaerator with FST, Deaerator Heater & approach Platform

S.N.	Equipment	dim. (LxBxH)	Qty.	Wt. T	Weight (kg.)
1	Storage Tank	13950x3600x4150	1	24.45	24450.00
2	Deaerator Heater	6850x2550x2850	1	9.9	9900.00

3	Performance Gas Heater (Two coolers mounted one over another)	9000x1200x3800	1	15	15000.00
4	Deaerator Platform Str. Steel	Loose & assorted size	lot	10	10000.00
		Total (j)		**59.35**	**59350.00**

k) Misc. Tanks & Flash Tanks with fittings :

S.N.	Description	Shipping Dimensions (mm)	Weight (Kgs)	Weight (MT)
	Misc. Tanks :			
1	Maintenance Oil Tank, 15 Cu. M	3000x2500x 2300	4200.00	4.20
2	ECW O/H Tank, 5 Cu. m	2000X 2000 X 2200	2500.00	2.50
	Flash Tanks :			
1	Steam Drain Flash Tank	2200x 16x 3100	5000.00	5.00
2	Unit Flash Tank	1200x 12 x 2500	1800.00	1.80
		Total (k)	**13500.00**	**13.50**

(l) 1X625 KVA, 415 V, THREE PHASE DG SET WITH AUX. , CONTROL PANNELS, BATTERY, BATTERY CHARGER & CABLING ETC.:

1) DG set with acoustic enclosure : 15 Tons
2) Control Panels : 7 Tons
3) Fabrication of Supports & Exhaust Pipe :15 Tons

Total (l):37 Tons

(BB) Misc. Cranes & Hoists, Chain Pulley Blocks with associated accessories, Fixing arrangements, Support Structures, DSL System and Rails etc. :

S.N.	DESCRIPTION (LOCATION)	Type of lifting device	QTY. FOR STATION	CAPACITY (TONS)	WEIGHT (KG)
1	CW PUMP HOUSE (for handling of screens and gates)	EH	1	7	**4000**
2	Clarified water pump house	U/S EOT	1	5	**4000**
3	RAW WATER / FIRE WATER PUMP HOUSE	U/S EOT	1	5	**3000**
4	FOR GENARATOR END SHEILD.	EH	1	7	**2500**
5	FOR DM TRANSFER PUMPS	EH	1	2	**1800**
6	LPBFP & CPH RC Pumps in BFP building	U/S HOT	1	5	**3000**
7	DG Building	EH		5	**4000**
8	Elevator Machine Room in POWER HOUSE	EH	1	3	**2000**
9	Vacuum Pump motor handling	EH	1	3	**2000**
10	Compressor House	U/S EOT	1	5	**4000**

	TOTAL WEIGHT (BB)	**30300**

Note EH MEANS ELECTRIC HOISTS, U/S MEANS UNDERSDLUNG CRANE , EOT MEANS ELECTRIC OPERATED, HOT MEANS HAND OPERATED

(CC) CW COOLING WATER PIPING, ACW COOLING WATER PIPING, TG AUX. (DMCW) COOLING WATER PIPING AND SERVICE WATER PIPING INCLUDING BURIED / UNDER GROUND PIPING WITH VALVES, SUPPORTS & FITTINGS etc.

Sl. No.	PGMA	Description	Weight (Kgs)	Weight (MT)
1	80463	TG Aux. Cooling Water	245000.00	245.00
2	80468	Main Circulation Water Piping	1010000.00	1010.00
3	80477	Service Water Piping	97000.00	97.00
4	80901	Sub Delivery Valves for Light Up	1000.00	1.00
5	80933	H&S for LP Piping	15000.00	15.00
		Total (CC)	**1368000.00**	**1368.00**

(DD) SURFACE PREPARATION AND APPLICATION OF ANTI CORROSIVE TAPING OF MINIMUM 4MM THICK CONFIRMING TO IS-10221 AND AWWA C 203-93 INCLUDING SUPPLY OF REQUIRED COMPLETE MATERIALS ALONG WITH SURFACE PREPARATION (BY SHOT OR SAND BLASTING) BEFORE APPLICATION, CARRYING OUT HYDRO TEST BEFORE APPLICATION OF ANTI-CORROSIVE TAPING AND CARRYING OUT BOND / ADHESION TEST AND HOLIDAY TEST AFTER COMPLETION OF ANTI-CORROSIVE TAPING ETC. OF UNDERGROUND PIPING / BURIED PIPING HAVING OUTSIDE Dia.-2132 MM TO OUTSIDE Dia.-323 MM = 3000 Sq. M

SUMMARY OF WEIGHT DETAILS:

S.N.	Description	WT (MT)
AA	**GTG Set with aux., STG set with aux., Integral Piping, Surface Condenser with aux., Pumps & aux. etc.**	
A	Frame - 9 FA Gas Turbine, Ducting and Auxiliaries etc.	1140.00
B	Gas Turbine Generator & Auxiliaries	316.00
C	Steam Turbine and Aux. & Accessories	419.00
D	Steam Turbine Generator with Aux.	230.00
E	Tentative TG Integral Piping (For GTG set & STG set, AS, CS, SS & Cross around)	154.00
F	Condenser with aux.	278.00
G	**Pumps & Aux. :**	
a)	B.F.P. with aux.	67.80
b)	C.E.P. with aux.	26.82

c)	LPBFP with aux.	7.50
d)	CPHRCP with aux.	7.10
e)	CW Pumps with aux.	123.50
f)	Vacuum Pump with accessories like Foundation Frame, Fittings & Manually Operated B.F. Valves	12.60
g)	Mic. Pumps & aux.	65.00
h)	Plate Heat Exchanger with fittings and Manually Operated B.F. Valves (4 nos.)	17.50
i)	Self Cleaning Strainer with Manually Operated B.F. Valves (4 nos.), fittings & accessories	13.00
j)	Deaerator with FST, Deaerator Heater & approach Platform	59.50
k)	Misc. Tanks & Flash Tanks with fittings	13.50
l)	1 x 625 KVA, 415 V, Three Phase DG set with aux., Control Panels, Battery, Battery Charger & Cabling etc.	37.00
	Sub-Total (AA)	**2986.22**
BB	Misc. Cranes & Hoists, and Chain Pulley Blocks with associated accessories with fixing arrangements, supports structures, DSL System, Rails etc.	30.00
CC	CW & ACW, TG aux. (DMCW) Cooling water piping and Service water piping inc. Buried / Under ground piping with valves, supports & fittings etc.	1368.00
	TOTAL WEIGHT	**4384.22**

(DD) SURFACE PREPARATION AND APPLICATION OF ANTI CORROSIVE TAPING OF MINIMUM 4MM THICK CONFIRMING TO IS-10221 AND AWWA C 203-93 INCLUDING SUPPLY OF REQUIRED COMPLETE MATERIALS ALONG WITH SURFACE PREPARATION (BY SHOT OR SAND BLASTING) BEFORE APPLICATION, CARRYING OUT HYDRO TEST BEFORE APPLICATION OF ANTI- CORROSIVE TAPING AND CARRYING OUT BOND / ADHESION TEST AND HOLIDAY TEST AFTER COMPLETION OF ANTI- CORROSIVE TAPING ETC. OF UNDERGROUND PIPING / BURIED PIPING HAVING OUT SIDE Dia. 2132 mm TO 323 MM = 3000 Sq. M

NOTE:

1. WEIGHT AND DIMENSIONS ARE APPROXIMATE AND ENTIRE WORK SHALL BE CARRIED OUT AS PER RELEVANT DRAWINGS RECEIVED AND AS EQUIPMENTS SUPPLIED FROM WORKS.

2. PIPING (FOR C.S. A.S. AND S.S.) WEIGHT WITH VALVES, FITTINGS, SUPPORTS ETC. INDICATED ABOVE FOR INTEGRAL PIPING IS WITH WELDING JOINTS AND TENTATIVE. THE WORK SHALL BE CARRIED FOR ENTIRE WORK OF INTEGRAL PIPING WITH WELDING AND RELATED RADIORAPHY & NDE/NDT, POST HEATING, PRE-HEATING WORK ETC. AS PART OF SCOPE OF WORK OF LUMPSUM WORK OF EQUIPMENTS COVERED UNDER THESE TENDER SPECIFICATION. NO ANY

CLAIM ON ACCOUNT OF ANY VARIATION OF WEIGHT IN INTEGRAL PIPING WEIGHT SHALL BE ENTERTAINED.

3. THE WEIGHT OF CW PIPING, ACW PIPING, TG (DMCW) COOLING WATER PIPING AND SERVICE WATER PIPING WITH VALVES, FITTINGS, SUPPORTS ETC. INDICATED ABOVE IS TENTATIVE AND INCLUDES THE WELD JOINTS WITH NDT/PRE-POST HEAT TREATEMNT REQUIREMENTS BOTH FOR IBR & NON-IBR PIPINGS/SYSTEM COVERED UNDER THESE TENDER SPECIFICATION AND WORK SHALL BE CARRIED OUT AS PER BHEL DRAWINGS/DOCUMENTS & SITE REQUIREMENT.
4. FOLLOWING ARE THE TENTATIVE SIZES (OD XTHK) OF PIPE OF MAJOR SCHEMES:

   (i) CW & ACW COOLING WATER ; 2132X18, 2032X18, 1422X14, 610X6, 508X6, 457X6, 406.4X6, 355.6X6, 323.9X6, 273X6, 219.1X6, 166.5X4.8, 115X4.5, 89.5X4, 76.6X3.6, 60.8X3.6, 48.8X3.2, 34.2X3.2, 21.8X2.6

   (ii) SERVICE WATER DISTRIBUTION SYSTEM: 406.4X7.9, 355.6X7.9 323.9X6.4, 273X6.4, 219.1X6.4, 166.5X5.8, 115X5.4, 89.5X4.8, 76.6X4.5, 60.8X4.5, 48.8X4, 34.2X4, 21.8X3.2

   (iii) TG AUX. COOLING WATER : 711X6, 610X6, 508X6, 457X6, 406.4X6, 355.6X6, 323.9X6, 273X6, 219.1X6, 166.5X5.4, 115X5.4, 89.5X4.8, 76.6X4.5, 60.8X4.5, 48.8X4, 34.2X4 (ALL THESE ARE OF C.S.). SOME LINES HOTWELL MAKE (50NB), SOLUTION PREPARATION NAOH DOSING (25 NB), RETURN LINE FORM NAOH DOSING SYSTEM (25 NB), EMERGENCY MAKE FROM CEP DISCHARGE (50 NB) AND FROM DMCW TANK TO DM COOLING WATER PIPING (100NB) ARE OF STAINLESS STEEL.

5. ABOUT 300 METERS OF CW PIPING OF OUT SIDE DIA. 2132 MM HAVING, ABOUT 75 METERS OF CW PIPING OF OUTSIDE DIA. 1400 MM, ABOUT 200 METERS OF ACW PIPING OF DIA. 600 MM AND 200 METERS OF SERVICE WATER PIPING OF DIA. 300 MM ARE UNDERGROUND / BURIED PIPING. FURTHER THE ACTUAL WORKS SHALL BE AS PER DRAWING REQUIREMENT. THE PROTECTION OF ALL ABOVE BURIED PIPING WITH ANTI-CORROSIVE TAPE OF MINIMUM 4 MM THICK CONFORMING TO IS-10221 AND AWWA C 203-93 ALONG WITH SUPPLY OF RELATED MATERIALS SHALL BE CARRIED OUT BY CONTRACTOR AS SCOPE OF WORK UNDER THESE TENDER SPECIFICATIONS. THE PIPE SURFACES SHALL BE CLEANED BY SHOT BLAST / SAND BLASTING BEFORE APPLICATION OF ANTI-CORROSIVE TAPING. CONTRACTOR SHALL ALSO CARRYOUT THE BOND / ADHESION TEST AND HOLIDAY TEST ON ANTI-CORROSIVE APPLIED PORTION OF PIPING AS PART OF SCOPE OF WORK TO PROVE THE SATISFACTORY COMPLETION OF ANTI-CORROSIVE

6. 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.

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

8. 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 GT, GTG, ST, STG, MISC. PUMPS, AUXILIARIES, INTEGRAL PIPING ETC. COVERED UNDER LUMPSUM ERECTION SCOPE OF WORK UNDER THESE SPECIFICATIONS AS SCOPE OF WORK. NO ANY SEPARATE EXTRA PAYMENT FOR SUCH TEMPORARY WORK SHALL BE MADE BY BHEL.

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, FUEL PIPING OF GTG EQUIPMENTS WITH THEIR AUX., STG EQUIPMENTS WITH AUXILIARIES, MISC. PUMPS AND OTHER 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 HIRE CHARGES ON SHARING BASIS :

SL.NO.	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
01	600 MT Capacity Manitowoc make crawler crane (Medel no. 18000) having main boom – 67 Mtrs (max) & luffing Jib – 42 Mtrs (max)	1 No.	This will be made available for handling, lifting and placement of gas turbine and gas turbine generator on sharing basis.
02	95/25 T EOT Crane	1 No.	For Erection of STG erection in TG hall on sharing basis only on its readiness.
03	50 T EOT Crane	1 No.	For handling and erection of Gas Turbine Generator Rotor in GT hall on its readiness.
04	25 T EOT crane	1 No.	For erection of CW pumps in CW Pump House Building only on its readiness

NOTES:

1. BHEL WILL PROVIDE MANITOWOC MAKE BRAND NEW CRAWLER CRANE MODEL NO. 18000, CAPACITY 600 MT WITH THE FOLLOWING FEATURES (AS PER ITEM UNDER SL. 05 OF APPENDIX–III) FREE OF CHARGE TO THE CONTRACTOR ON SHARING BASIS.

MAIN BOOM – 67 MTRS (MAXIMUM)
LUFFING JIB – 42 MTRS (MAXIMUM)

BHEL CRANE HAS TO BE SHARED WITH OTHER AGENCIES / CONTRACTOR'S OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR.

BHEL SHALL PROVIDE 45 MM MS PLATE (9-10 MTRS (L) X 2.5 MTRS (W) X 45 (THK) FOR MARCHING OF THE CRANE IN WORKING AREA. ALL ARRANGEMENTS, INCLUDING TAKING DELIVERY, SHIFTING AND HANDLING OF THESE PLATES FROM BHEL STORE TO SITE / WORK AREA & LAYING OF PLATES FOR MOVEMENT / OPERATION OF CRANE, BACKFILLING OF APPROACHES WHEREVER NECESSARY FOR SAFE MOVEMENT AND SAFE OPEARTION OF THE CRANE AS DIRECTED BY BHEL SHALL BE THE RESPONSIBILITY OF CONTRACTOR.

ANY BOOM REDUCTION, EXTENSION FOR THEIR USE AND RESTORATION TO PREVIOUS STATE / CONDITION OR AS DIRECTED BY BHEL AFTER THE USE SHALL BE THE CONTRACTOR'S RESPONSIBILITY. CONTRACTPOR SHALL ARRANGE AT HIS COST SUITABLE CAPACITY OF ASSIST CRANE FOR BOOM EXTENSION &

REDUCTION, HANDLING OF PLATES, BOOM INSERTS AND SUITABLE TRAILER FOR SHIFTING OF THE PLATES, BOOM INSERTS FROM BHEL STORE'S TO SITE AND RETURN BACK TO STORE AFTER COMPLETION OF WORK WITH ALL EXPENDITURE AT HIS OWN COST.

CONTRACTOR SHALL PROVIDE THE FUEL (DIESEL) FOR ABOVE BHEL CRANE, HOWEVER LUBRICANTS LIKE ENGINE OIL, CARDIUM COMPOUND, HYDRAULIC OIL, GEAR OIL, AND GREASE FOR BHEL'S CRANES WILL BE PROVIDED BY BHEL FREE OF CHARGE. SIMILARLY FILTERS FOR CRANES WILL BE PROVIDED FREE OF CHARGE BY BHEL. ALL OTHER CONSUMABLES LIKE COTTON WASTE, CLEANING FLUIDS ETC SHALL BE ARRANED BY CONTRACTOR AT HIS OWN EXPENSES.

BHEL WILL PROVIDE CRANE OPERATOR FOR MANITOWOC 18000 CRAWLER CRANE ONLY, HOWEVER ONE HELPER SHALL BE PROVIDED BY CONTRACT FOR ASSISSTING THE CRANE OPERATION DURING OPERATION OF CRANE AS SCOPE OF WORK.

THE DAY TO DAY UPKEEP AND RUNNING MAINTENANCE LIKE FILLING / TOPPING UP OF LUBRICANTS, CHANGING FILTERS, CLEANING ETC, OF BHEL CRANE SHALL BE THE RESPONSIBILITY OF CONTRACTOR. SPARES IF ANY, REQUIRED IN NORMAL COURSE WILL BE PROVIDED BY BHEL. MAJOR BREAKDOWNS WILL BE ATTENDED TO BY BHEL. THE CRANE PROVIDED BY BHEL WILL BE WITHDRAWN FOR REGULAR AND CAPITAL MAINTENANCE AS PER RESPECTIVE SCHEDULE OF MAINTENANCE. AS FAR AS POSSIBLE SUCH SCHEDULES WILL BE INTIMATED TO CONTRACTOR IN ADVANCE AND MAY BE ADJUSTED DEPENDING ON WORK REQUIREMENTS AT SITE. HOWEVER NO CLAIM WHATSOEVER WILL BE ENTERTAINED ON ACCOUNT OF NON-AVAILABILITY OF CRANES.

WHERE THE SERVICES OF CRANE PROVIDED BY BHEL ARE TO BE SHARED BY OTHER AGENCIES/ CONTRACTORS OF BHEL, THE CONTRACTOR'S RESPONSIBILITIES DEFINED ABOVE WILL ALSO BE APPORTIONED ACCORDINGLY TO THE BENEFICIARY AGENCY. WORKING ARRANGEMENTS IN THIS REGARD WILL BE DONE AT SITE BY BHEL ENGINEER AND IN ANY CASE HIS DECISION SHALL BE FINAL AND BINDING ON CONTRACTOR.

THERE IS SPACE CONSTRAINTS AT SITE FOR MOVEMNET OF SUCH A HEAVY DUTY AND GIANT CRANE. THEREFORE, THE MOVEMENT OF THIS CRANE SHALL BE RESTRICTED IN THE VICINITY OF HRASG, STACK AND GT AREA ONLY AND THIS CRANE WILL BE UTILISED FOR ERECTION OF HRSG WITH ASSOCITAED AUX, STRUCTURE, HEAT TRANFER MODULES, DRUMS, STACK/CHIMNEY, PLATFORMS ETC. AND HANDLING OF ERECTION MATERIALS DURING ERECTION PROCESS AT SITE SUBJECT TO ITS CAPACITY, REACH, APPROACHABILITY AND ACCESSIBILITY WITHIN THIS RESTRICTED SPACE MOVEMENT OF ABOVE CRANE AT SITE. FOR ERECTION AND HANDLING (INCLUDING AT STORES / STORAGE YARD AND AT SITE) OF EQUIPMENTS, ITEMS, AUXILIARIES WHICH ARE BEYOND THE REACH, CAPACITY OF ABOVE BHEL CRANE, CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENT OF REQUIRED SUITABLE CAPACITY CRANES / ALTERNATE ARRANGEMENTS, T&P ETC. AT HIS OWN COST. **ANY CLAIM OF CONTRACTOR ON SUCH ACCOUNT SHALL NOT BE ENTERAINED BY BHEL. CONTRACTOR SHALL HAVE TO VISIT SITE AND GET ACQUINTED AT SITE REGARDING EARMARKED SPACE FOR MOVEMENT OF BHEL CRANE DURING ERECTION AND ITS REACH / ACCESSIBILITY / APPRACHABILITY.**

2. CONTRACTOR SHALL HAVE TO PROVIDE SKILLED CRANE OPERATOR FOR OPERATION OF THESE CRANES 95/25 T EOT CRANE IN TG HALL, 50 T EOT CRANE IN GT HALL, 25 T EOT CRANE IN CW PUMP HOUSE BUILDING FOR OPERATIONS OF THESE CRANES.

3. CONTRACTOR SHALL CARRY OUT THE ROUTINE MAINTENANCE LIKE MAINTAINING THE CLEANLINESS, CHANGING THE GEAR BOX OIL, APPLYING THE CADMIUM COMPOUND ON SLINGS ETC. OF THESE CRANES AS PER INSTRUCTIONS OF BHEL ENGINEER AT SITE AS SCOPE OF WORK.

BHEL WILL PROVIDE THE CONSUMABLE FOR THESE EOT CRANES FREE OF CHARGES.

4. CONTRACTOR SHALL ALSO PROVIDE MANPOWER ASSISTANCE AS SCOPE OF WORK FOR HOLDING THE TRAILING CABLES DURING OPERATION OF ABOVE EOT CRANES TILL PERMANENT DSL SYSTEMS ARE COMMISSIONED.

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	SUITABLE CAPACITY LIFT & SHIFT / STRAND JACKS ARRANGEMENTS TO FACILITATE HANDLING, LIFTING AND ERECTION OF STEAM TURBINE, STEAM TURBINE GENERATOR,	AS PER REQUIREMENT	AS PER REQUIREMENT
02	SUITABLE CAPACTY OF CRANE FOR HANDLING, LIFTING OF EQUIPMENTS INCLUDING THE DEAERATOR & ITS HEADER	AS PER REQUIREMENT	AS PER REQUIREMENT
03	MOBILE PICK AND CARRY CRANE	12-15 TON	01
04	TRAILER WITH HORSE	AS PER REQUIREMENT	AS REQUIRED
05	AIR COMPRESSOR (ELECTRIC)	140 CFM	AS REQUIRED
06	TIG WELDING SET	-	3 SETS, AS PER REQUIREMENT
07	3 ph DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER & FITTED WITH ENERGY METER	200 Amps-2 SETS 400 Amps-1 Set	3 SETS/ AS PER REQUIREMENT
08	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS ETC.)	AS PER REQUIREMENT	2 SETS, AS PER REQUIREMENT
09	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE	IR 192	2 SETS, AS PER REQUIREMENT
10	ELECTRO-HYDRAULIC PIPE BENDING MACHINE	FOR UP TO 100 mm Nb PIPES	AS PER SITE REQUIREMENT
11	WELDING GENERATOR (ELECTRIC & DIESEL)	300 AMPS	APPROX. 20 Nos. OR AS REQUIRED
12	RADIOGRAPHY FILM VIEWER	AS PER REQMT	1 NO.
13	ELECTRIC WINCH	3 TON / 2 TON	AS PER REQMNT
14	HAND WINCH	1 TON	-DO-
15	ELECTRIC CABLE FOR DRAWAL & DISTRIBUTION OF CONSTRUCTION POWER	AS PER SITE REQUIREMENT	AS PER SITE REQUIREMENT
16	PIPE BENDING MACHINE – HAND OPERATED	UP TO 50 mm Nb PIPES	AS PER SITE REQUIEREMENT
17	BAKING OVEN AND HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR BAKING COATED WELDING ELECTRODES	AS PER REQUIREMENT	02 EACH

18	PORTABLE OVEN FOR COATED WELDING ELECTRODES	AS PER REQUIREMENT	15
19	ELECTRIC MOTOR DRIVEN HYDRAULIC TEST PUMP WITH DRIVE AND STARTER ETC.	150 Kg/Cm^2	2. NOS.
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	HYDRAULIC JACKS FOR CW PIPING AREA	100 MT	8 NOS. AND SUBSEQUENT AS PER REQUIREMENT
26	DEWATERING PUMP- VACUUM SUCTION, COMPLETE WITH MOTORS, STARTER, CABLES, SWITCHES ETC.	5 TO 10 HP	AS PER REQUIREMENT
27	TORQUE WRENCH 0 TO 200 N-M CAP	AS PER REQUIREMENT	AS PER REQUIREMENT
28	SLINGS OF VAROIUS CAPACITY AND QUANTITIES FOR HANDLING OF EQUIPMENTS	AS PER REQUIREMENT	AS PER REQUIREMENT
29	BOLT STRETCHING DEVICES OF CAPACITY AS PER SITE REQUIREMENT	AS PER REQUIREMENT	AS PER REQUIREMENT
30	FEELER GAUGE S OF VARIUOS SIZES INCLUDING LONG FEELER GAUGES	AS PER REQUIREMENT	AS PER REQUIREMENT
31	SPANNERS / EYE BOLTS (OF ALL SIZES)	AS PER REQUIREMENT	AS PER REQUIREMENT
32	SURFACE PLATES	1 M X 1M	AS PER REQUIREMENT
33	CENTRIFUGAL PUMP WITH MOTOR, STARTER PANEL, CABLES BETWEEN STARTER PANEL AND MOTORS, INLET AND OUTLET VALVES FOR THE PUMPS FOR FILLING AND HYDRAULIC TESTING OF CW, ACW SYSTEMS	2 SETS EACH OF CAPACITY 150-200TPH	AS PER REQUIREMENT
34	24 V TRANSFORMERS	24 V OUTPUT	4 NOS.
35	ELECTRIC CABLE FOR DRAWL & DISTRIBUTION OF CONSTRUCTION POWER	-	AS PER REQUIREMENT
36	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. S

CONTRACTOR SHALL DEPLOY ALL NECESSARY T&P TO MEET THE SCHEDULES & AS PRESCRIBED BY BHEL ENGINEER AND REQUIRED FOR COMPLETION OF WORK.

APPENDIX-V

DRAWINGS ATTACHED AS PART OF TENDER DOCUMENT

1. CW & ACW System (P&I diagram) - **PE- DG- 293- 165- N 001 (Rev-02)**

2. DMCW System (P & I Diagram) - **PE- DG- 293- 179- N 001 (Rev-02)**

3 Plant water System (P & I Diagram) - **PE- DG- 293- 172- N 001 (Rev-01)**

4 TG Equipment & Layout Plan at 0.0 M level- **PE- DG- 293- 172- N 001 (Rev-01)**

5 Cross Section of Main Building - - **PE- DG- 293- 100- M 006 (Rev-A)**

6 Cross Section of GT Building, HRSG & Stack- **PE- DG- 293- 100- MSK01**

7 Plot Plan**- PE- DG- 293- 100- M 001 (Rev-0A)**

NOTE:
THE ABOVE DRAWINGS ARE PROVIDED ONLY FOR INFORMATION AND WORK HAS TO BE DONE WITH REFERENCE TO THE LATEST APPLICABLE DRAWING.

Above drawings are not hosted in the web-page. Bidders are requested to obtain these drawings from BHEL PSWR Nagpur.

GSEG	GUJARAT STATE ENERGY GENERATION LIMITED TITLE 350 MW COMBINED CYCLE POWER PLANT AT HAZIRA PAINTING	SECTION: C13 SHEET 1 OF 13 SPEC. NO. TCE.4915A-H-500-001

13.0 This section defines the technical requirements for surface preparation selection and application of paints on equipment, vessels, machinery, piping, ducts etc. However, manufacturers shall follow their standard procedures for painting their equipment. The Bidder shall submit a detailed painting procedure for approval of Employer / Employer's Representative after the award of contract.

13.1 The following surface and material shall require painting:

(a) All un-insulated carbon steel and alloy steel equipment like columns, vessels, drums, storage tanks, heat exchangers etc.

(b) All un-insulated carbon steel and low alloy piping, fitting and valves (including painting of identification marks).

(c) All pipe structural steel supports, walkways, platforms, hand rails, ladders etc.

13.2 The following surfaces and material shall not require painting:

(a) Non-ferrous materials

(b) Austenitic stainless steel

(c) Plastic and / or plastic coated materials

(d) Insulated surface of equipment and pipes except colour coating wherever required.

(e) Painted equipment like blowers, pumps, valves, etc., with finishing coats in good condition and with matching colour-code.

13.3 **Codes and Standards**

Painting of equipment shall be carried out as per the specifications indicated below and shall conform to the relevant IS specification for the material and workmanship.

The following Indian Standards may be referred to carrying out the painting job.

IS : 5	:	Colours for ready mixed paints and enamels
IS : 1303	:	Glossary of terms relating to paints
IS : 2379	:	Colour code for identification of pipelines.
IS : 2395	:	Code of practice for finishing of concrete, masonry and plaster surfaces (Parts I and II)

ISSUE R0

IS : 2338	:	Code of practice for finishing of wood and wood based materials (Parts I & II)
IS : 158	:	Ready mixed paint, brushing, bituminous, black, lead free, acid, alkali, water and heat resisting
IS : 2074	:	Ready mixed paint, air drying, red oxide zinc chrome, and priming.
IS : 104	:	Ready mixed paint, brushing, zinc chrome, priming
IS : 2932	:	Enamel, synthetic, exterior (a) undercoating (b) Finishing.
SIS : 55900	:	Swedish standard for blasting

13.4 **Surface Preparation**

The surface shall be prepared in a manner suitable for coatings. Chemical derusters or rust converters shall not be applied. Acid cleaning is subject to approval of Purchaser / Purchaser representative.

13.4.1 **Blasting**

The surface of the part / component shall be blasted before the coating material is applied.

Unless otherwise specified in the documents, the surface shall satisfy the following requirements after blasting:

(a) Blasting according to SIS 055900, Grade Sa-$2^{1}/2$.

Depending on production flow, weldable, ethyl zinc silicate shop primer, dry film thickness 15 – 25 microns shall be used.

13.4.2 **Manual Rust Removal**

Manual rust removal shall be allowed for welded zones and for touching up installed components.

ISSUE R0

13.4.3 **Cleaning**

Removal of impurity

	Impurity	Removal
(a)	Dust, loose deposits	Vacuum-cleaning, brushing
(b)	Adhesive deposits	Power brushing
(c)	Oils, greasy impurities	Wet blasting, use of detergent additives by agreement
(d)	Salt deposits	Rinsing
(e)	Markings (e.g., felt tip pen)	Organic solvents to manufacturer's specifications e.g., Trichloro trifluoro ethane and solvents containing acetone (renew solvent and rag frequently).

13.5 **Processing**

13.5.1 **General**

Application Conditions

The primer shall be applied to properly prepared surfaces only. The specifications of the coating material manufacturers shall be observed. The minimum temperature shall be $+5^0$C and the relative humidity shall not exceed 80%. The temperature of the work piece shall be atleast 3 ^{0}C above dew point.

13.5.2 **Application Procedure**

The primer shall be applied by means of brush or by spray. The top coats shall be applied by means of brush, roller or by spray.

At points where coating application is interrupted, the individual layers shall be adequately stepped to ensure proper layer sequence when coating operations are resumed.

13.5.3 **Touching Up**

Before each layer is applied, previous coating shall be touched up where necessary by way of rust removal and cleaning, according coating manufacturer's specifications. The final top coat shall be reapplied completely, if required.

13.5.4 **Uncoated Surfaces**

Moving parts of machines (e.g., stems, shafts, sliding and locating bearings), nameplates, instruments and sealing surface shall not be coated. Welds shall be left free of coating upto a distance of 30 mm on each side of the weld edge until erection and weld examinations, if any, have been completed.

13.5.5 **Bond Strength**

The pull-off stress determined using the pull-off test method for adhesion shall be not less than 1.5 N/mm^2, according to ISO 4624.

13.6 **Surface Conditions of Coating Surfaces**

The coating surface shall have a uniform film thickness, shade and gloss and shall be free from inclusions, sags and wrinkles.

13.7 **Coating Systems**

13.7.1 **General Requirements for Coating Systems**

Coating materials according to SSPC, BS 5493 or DIN 55 928 shall be used. Intermediate coats are to be pigmented with micaceous iron oxide. The materials shall be matched with each other so that they are compatible. Coatings deviating this specification shall be subject to approval. Standards of surface preparation and painting shall give a time to first maintenance of 10 years.

The colour and gloss of top coats shall be in accordance with sub-clause suggested colour codes for painting (Sub-clause 13.10).

13.7.2 **Standard Coating System (External Coatings)**

(a) For painting of civil structures in general and other steel structures not covered below shall be carried out as specified in the Civil Section D4.3 of the specification

(b) **Galvanised iron and steel requiring paint finish at site**

(i) At site

Surface Treatment

Mechanical cleaning from contaminants by means of washing or steam jetting and sweep blasting with fine sand or etching (T-Wash).

Touch-up mechanical damages:

De rusting St 3 and application of high build epoxy primer DFT 80 µm.

Finish coating:

Analogous to standard painting scheme

13.7.3 **Painting of indoor components such as valves, pumps, motors, electrical parts, tanks etc.**

At works

Surface preparation:

Blasting according to SIS 055900: grade Sa 2 ½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer dry film thickness 15 – 25 µm, may be used.

Prime coat:

Two (2) layers of zinc phosphate epoxy, total dry film thickness 75 µm.

At site

Thorough cleaning to remove oil, grease, dirt and any other contaminants. Derusting of all mechanical damages according to SIS 055900 Grade ST3. Touch up with 1 pack inorganic ethyl zinc silicate, dry film thickness 50 µm

Finish coat:

Two (2) layers of a 2 pack epoxy polyamide glossy, according to colour specification, dry film thickness 60 µm.

Total system dry film thickness 135 µm.

Remarks:

Equipment coated with a standard application system can be accepted if the quality of this application system is corresponding with the quality of the above mentioned system.

13.7.4 **Painting of Outdoors equipments (external surfaces) such as piping, valves, pumps, motors, electrical parts, tanks etc.**

Weather exposure, weather resistance, temperature upto 120°C as per 13.7.1 and 13.7.3 however.

Surface Preparation:

Blasting according to SIS 055900: grade Sa 2 ½. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer dry film thickness 15-25 µm, may be used.

Prime Coat:

Two (2) layers of zinc phosphate epoxy, total dry film thickness 75 µm.

Intermediate Coat:

One (1) layer 2 pack high build epoxy polyamide Mio, dry film thickness 100 µm.

Finish Coat:

One (1) layer of a 2 pack aliphatic polyurethane glossy minimum dry film thickness 50 µm. Total system dry film thickness 225 µm.

13.7.5 **Special Coating System (External Coatings)**

(a) Parts exposed to temperatures above 120°C, upto 200°C, not insulated

(i) At works

Surface Preparation:

Blasting according standard SIS 55900 Grade Sa 2 1/2 and ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 µm, may be used.

Prime coat
Inorganic ethyl zinc silicate, dry film thickness 75 µm.

(i) At site

Pre-treatment:

Derusting of all mechanical damages, according to ISO 8501-1: 1989, grade St 3 Touch-up with 1 pack inorganic ethyl zinc silicate, dry film thickness 50 µm.
Removal of all decontaminants from prime coat.

ISSUE R0

Intermediate Coat:

1 pack silicon acrylic, dry film thickness 35 µm.

Final coat :

1 pack silicon acrylic, dry film thickness as 35 µm.
Total system dry film thickness 145 µm.
Final coat according to colour code.

(b) **Parts exposed to temperatures above 200°C, upto 400°C, not insulated**

(i) At works

Surface Preparation:

Blasting according to ISO 8501-1: 1988 grade Sa 2^{1}/2. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film 15-25 µm, shall be used.

Prime coat:

Inorganic ethyl zinc silicate, dry film of thickness 75 µm.

(ii) At site

Pre-treatment:

Derusting of all mechanical damages, according standard Sa 2^{1}/2 to ISO 8501-1: 1988. Touch-up with coating system according to manufacturer's recommendations.

(c) **Insulated Parts, continuously exposed to condensing water or parts exposed to temperatures**

For parts that are provided with insulation on site.

(i) **Insulated parts, exposed to condensing water**

At works

Surface Preparations:

Blasting according standard Sa 2^{1}/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 µm shall be used.

ISSUE R0

Prime coat:

Inorganic ethyl zinc silicate, dry film thickness 75µm.

(ii) **Insulated parts exposed to temperatures**

Parts, exposed to temperatures upto <400^{0}C at works

Surface Preparation:

Blasting according to standard Sa 2^1/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 µm shall be used.

Parts, exposed to temperatures above 400^{0}C at works (Steam pipes, pressure tubes and parts for the HRSG, such as heating surfaces, heaters and super heaters reheaters, etc.)

Surface preparation:

Blasting according standard Sa 2^1/2 to ISO 8501-1: 1988.

Temporary primer:

Varnish.

(d) **Intermittent exposure due to condensing water / chemicals (Indoors)**

(i) At works

Surface Preparation:

Blasting according to standard Sa 2^1/2 to ISO 8501-1: 1988. Depending on production flow, a weldable, inorganic ethyl zinc silicate shop primer, dry film thickness 15-25 µm may be used.

Prime Coat:

Two layers of zinc phosphate epoxy primer total dry film thickness greater than or equal to 75 µm.

(ii) At site

Pretreatment:

Derusting of all mechanical damages, according standard Sa 3 to ISO 8501-1: 1988, touch-up with 2 pack high build epoxy with volume solid content of more than 85%, 75 µm.

ISSUE R0

Intermediate Coat:

2 pack high build epoxy, dry film thickness 80 µm.

Finish coat:

2 pack epoxy according to colour appearance, dry film thickness of 50 µm.

Total system dry film thickness 205 µm.

When exposed to weathering, weather resistance finish coat shall be applied.

(e) **Water exposure**

Surfaces permanently or predominantly in contact with water.

(i) At site / works

Pretreatment:

Removal of all welding pearls.

Blasting according standard Sa 3 to ISO 8501-1: 1988.

Coat:

4 coats 2 pack coal-tar-epoxy, dry film thickness 125 µm each.

Total system dry film thickness 500 µm.

Touch-up after erection as required.

13.7.6 **Buried / underground piping system**

(a) Where pipelines are buried, underground protection shall be provided for the piping system as indicated in any one of the methods given below:

(i) Coal tar primer, coal tar enamel, inner wrap of fibre glass, final outer wrap of enamel impregnated fibre glass. Total thickness of coating shall not be less than 4.0 mm.

(ii) With anti-corrosive tape of minimum 4 mm thick conforming to IS-10221 and AWWA C 203-93.

ISSUE R0

(b) Pipe surfaces shall be cleaned by shot or sand blasting before application.

(c) Tests to be carried out after application

(i) Bond / Adhesion test

(ii) Holiday test

13.8 **INTERNAL COATINGS**

13.8.1 **Tanks (Internal Surfaces) as specified in relevant sections of specification**

Industrial, deionised, demineralised and potable water upto 60^0C pH range: 4.5 – 9.5.

Blasting according to ISO 8501-1: 1988, grade Sa $2^1/2$.

Prime coat:

Two layers of zinc phosphate epoxy primer total DFT greater than or equal to 75 µm.

Pretreatment:

Derusting of all mechanical damages, according to standard Sa 3 to ISO 8501-1:1998, touch up with 2 pack high build epoxy with volume solid content of more than 85%, 75 µm.

Intermediate coat:

2 pack high build epoxy, dry film thickness 80 µm.

Finish coats:

2 pack solvent free epoxy paint dry film thickness 150 µm per coat.

In case of service or potable water tanks, the coating material selected shall not taint the water.

QA / QC procedure, including pinhole inspection, for shall be submitted for approval by Employer / Employer's Representative.

ISSUE R0

13.8.2 **Rubber Lining of Pipes, Valves and Tanks as specified in relevant sections.**

(a) At works

Pretreatment:

Blasting according standard $2^{1}/2$ to ISO 8501-1 : 1988.

Rubber lining:

Hard-rubber 5mm for DM water applications, thickness greater than or equal to 3 mm for others. In case of failure of rubber lining for both pipes and vessels, the rubber lining shall be replaced by COROCOAT

13.9 **Painting for Electrical Items**

13.9.1 All the steel work shall be thoroughly cleaned of rust, scale, oil, grease, dirt and swarf by pickling, emulsion cleaning, etc. The sheet steel shall be phosphated / oven dried and then painted with two coats of zinc rich primer paint. After application of the primer, two coats of finishing synthetic enamel paint shall be applied. The colour of the finishing coats inside shall be glossy white and exterior of the treated sheet steel shall be shade 631 of IS-5 / RAL 7032 for all switchboard/MCC/ Distribution boards, control panels, etc.

13.9.2 All electrical equipment shall be given tropical and fungicidal treatment and outdoor equipment shall be provided with rain hood to prevent entry of rain water into the equipment.

13.9.3 Painting and galvanising requirements of switchyard structures are covered in Civil section D4 in Volume - III.

13.10 **Suggested Colour Codes for Painting**

Sl. No.	Item / Service	Colour	IS–5	Colour (Band)	IS - 5
13.10.1	Structures, platforms, galleries, ladders and handrails.	Dark Admirability Grey	632	-	-
13.10.2	Boiler casing, ducting	Nut Brown	413	-	-
13.10.3	Crane				
(a)	Crane structure	Golden Yellow	356	Black	-
(b)	Trolley and hook	Crimson	540	-	-

ISSUE R0

13.10.4	Pump motors, compressors	Light Grey	631	-	-
13.10.5	Tanks (without insulation and cladding)				
(a)	Outdoor	Aluminium	-	-	-
(b)	Indoor	Light Grey	631	-	-
13.10.6	Vessels and all other proprietary equipment (without insulation and cladding)	Light Grey	631	-	-
13.10.7	Switchgear	Light Grey	631	-	-
13.10.8	Control and relay panels	Light Grey	631/ 7078 of IS1650	-	-
13.10.9	Turbines	Light Grey	631	-	-
13.10.10	Generators and exciter	Light Grey	631	-	-
13.10.11	Transformers	Aluminium	-	-	-
13.10.12	Machinery guards	Signal red	537	-	-
13.10.13	Piping (Without insulation and cladding)				
(a)	**Water System**				
(I)	Boiler feed	Sea Green	217	-	-
(ii)	Condensate	Sea Green	217	Light Brown	410
(iii)	DM Water	Sea Green	217	Light Orange	557
(iv)	Soft Water	Sea Green	217	French Blue	166
(v)	Bearing cooling water	Sea Green	217	French Blue	166
(vi)	Potable and filtered water	Sea Green	217	French Blue	166
(vii)	Service and clarified water	Sea Green	217	French Blue	166
(viii)	Cooling water	Sea Green	217	French Blue	166
(ix)	Raw water	Sea Green	217	White	

(b)	**Air system**				
(i)	Station air	Sky Blue	101	-	-
(ii)	Control air	Sky Blue	101	White	-
(c)	**Oil system**				
(i)	Light oil (HSD)	Light Brown	410	French blue	166
(ii)	Lubricating oil	Light Brown	410	Light grey	631
(iii)	Transformer oil	Light Brown	410	Light Orange	557
(d)	**Gas system**				
(i)	Fuel gas (Regassified LNG)	Canary Yellow			
(ii)	Carbon dioxide	Canary Yellow	309	Light grey	631
(iii)	Hydrogen	Canary Yellow	309	Signal red	537
(e)	**Fire Services**	Fire red	536	-	-
(f)	**Effluent pipes**	Black	-	-	-
(g)	**Vacuum pipes**	Sky Blue	101	Black	-
(h)	**Drainage**	Black	-	-	-

NOTES

1. This colour code basically refers to IS: 2379 for piping with necessary modifications.

2. Where band colour is specified, same shall be provided at 10 metre intervals on long uninterrupted lines and also adjacent to valves and junctions.

ISSUE R0

APPENDIX-VII

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 OPERATORS												
11	TRUCK/TRAILER DRIVERS												
12	STORE KEEPERS												
13	ELECTRICIANS												
14	SEMISKILLED/ UNSKILLED WORKERS												
	MONTH WISE TOTAL												

SIGNATURE OF TENDERER

DATE:

APPENDIX–VIII

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-IX
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-X

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–XI

DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SL. NO.	FULL POSTAL ADDRESS OF CLIENT & NAME OF OFFICER IN CHARGE	DESCRIP-TION OF WORK	VALUE OF CONTRACT	DATE OF AWARD OF WORK	DATE OF COMMENCEMENT OF WORK	TIME SCHEDULE (MONTHS)	DATE OF ACTUAL COMPLETION 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.