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

No. - BHE/PW/PUR/PARST-STG2/520

FOR

RECEIPT OF MATERIALS FROM BHEL/CUSTOMER STORES/STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION BETWEEN STORES AND SITE OF WORK, ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER), CONDENSER, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE SYSTEM EQUIPMENT/TANKS/VESSELS, PIPING, DEAERATOR WITH ASSOCIATED PLATFORM, HP-LP BYPASS SYSTEM, POWER CYCLE PUMPS, CW PUMPS, ACW PUMPS & ASSOCIATED AUXILIARIES WITH COOLING WATER SYSTEM & ACW SYSTEM PIPING, R.E. JOINTS & B.F. VALVES ETC. OF 250 MW UNIT # 2

AT

PARAS THERMAL POWER PLANT EXPANSION PROJECT

MAHARASHTRA STATE POWER GENERATION COMPANY LIMITED

PARAS

DISTRICT AKOLA, MAHARASHTRA

PART I

TECHNICAL BID SPECIFICATION

AND

NOTICE INVITING TENDER, REVERSE AUCTION PROCEDURE & GCC

BOOK NO.:

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

C O N T E N T S

SN	DESCRIPTION	SECTION/ APPENDIX No.	No. Of Pages
	ERECTED BY THE CONTRACTOR		
26.	LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.	APPENDIX-II	11
27.	WEIGHT DETAILS	APPENDIX-III	1
28.	LIST OF T&P TO BE MADE AVAILABLE BY BHEL	APPENDIX-IV	1
29.	MAJOR T&P & MMD TO BE DEPLOYED BY THE CONTRACTOR	APPENDIX-V	2
30.	ANALYSIS OF UNIT RATES QUOTED	APPENDIX-VI	1
31.	MONTHWISE MANPOWER DEPLOYMENT PLAN BY THE CONTRACTOR	APPENDIX-VII	1
32.	MONTHWISE CONTRACTOR'S T&P DEPLOYMENT PLAN	APPENDIX-VIII	1
33.	DETAILS OF CONCURRENT COMMITMENT	APPENDIX-IX	1
34.	DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS.	APPENDIX-X	1
35.	RATE SCHEDULE (PRICE BID: PART-II)		@

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+RA+GCC-520".**

@: Issued as separate hard copy booklet 'Tender Specifications Part-II (Price Bid)'. Hosted in BHEL web page (www.bhel.com) as file titled **"PRICE BID-520"**

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-520"**

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

FOR

RECEIPT OF MATERIALS FROM BHEL/CUSTOMER STORES/STORAGE YARD, HANDLING AT STORES/STORAGE YARD, SITE OF WORK, TRANSPORTATION BETWEEN STORES AND SITE OF WORK, ERECTION, TESTING, ASSISTANCE FOR COMMISSIONING AND HANDING OVER OF STEAM TURBINE, TURBO-GENERATOR (INCLUDING ITS RECEIPT AND UNLOADING FROM WAGON/ TRAILER), CONDENSER, TG INTEGRAL PIPING, EXTERNAL/ REGENERATIVE SYSTEM EQUIPMENT/TANKS/ VESSELS, PIPING, DEAERATOR WITH ASSOCIATED PLATFORM, HP-LP BYPASS SYSTEM, POWER CYCLE PUMPS, CW PUMPS, ACW PUMPS & ASSOCIATED AUXILIARIES WITH COOLING WATER SYSTEM & ACW SYSTEM PIPING, R.E. JOINTS & B.F. VALVES ETC. OF 250 MW UNIT # 2

AT

PARAS THERMAL POWER PLANT EXPANSION PROJECT

MAHARASHTRA STATE ELECTRICITY BOARD

PARAS

DISTT. AKOLA, MAHARASHTRA

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

LAST DATE AND TIME FOR
RECEIPT OF OFFERS

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

M/s. ……

……

PLEASE NOTE :

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

For Bharat Heavy Electricals Limited

Dy. GEN 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:

1. CONTRACTOR SHOULD HAVE ADEQUATE RESOURCES INCLUDING MAJOR T&P AT HIS DISPOSAL FOR THIS JOB.

2. CONTRACTOR SHOULD HAVE SOUND FINANCIAL STABILITY.

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

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

5. THE TENDERER, SHALL OBTAIN CLARIFICATION ON TENDER IF ANY, BEFORE SUBMITTING THEIR OFFER.

6. OFFERS MUST BE SUBMITTED WITHOUT ANY DEVIATION.

7. OFFERS RECEIVED WITH ANY DEVIATION OR WITHOUT RELEVANT INFORMATION AS DESCRIBED ABOVE ARE LIABLE TO BE REJECTED. PRICE BIDS RECEIVED IN THE FORM OTHER THAN SPECIFIED IN PART-II (PRICE BID) ARE LIABLE TO BE REJECTED.

PROJECT INFORMATION

The owner M/s Maharashtra State Electricity Board is setting up Paras Thermal Power Station ExpansionProject of 2 x 250 MW Units at Paras, District Akola, Maharashtra. Unit 1 of 250 MW has been commssioned. This tender is for Unit 2 of 250MW. The Expansion project site is adjacent to existing TPS & about 2 kms from Paras Village.

1. Project. : Paras Thermal Power Station Extn.
2. Project location : Paras, Dist- Akola State- Maharashtra
3.a) Elevation above mean sea level : 282.40 Metres
b) Barometric pressure **:** 735 mm of Hg

4. Transport facilities

a) Nearest Railway Station/Gauge : Paras Railway Station located on Bhusaval Nagpur section of Central Railway Broad Guage. Power Station is 2Km away from Paras Railway Station.

b) Name of Railways : Central Railways.

c**) Access to site**

By Road : The site is connected by all weather tar road to National Highway No-6 which is 6Km from plant site. Site is approachable from Akola city.

By Railway : Bhusaval- Nagpur Section of central railway route (BG).

5. Climatic Conditions

a) Temperature

Dry bulb temp. : 44 degrees centigrade (Maximum)
: 12 degrees centigrade (Minimum)

Wet bulb temp. : 27 degrees centigrade (Maximum)
22 degrees centigrade (Minimum)

b) Relative humidity : 96% (Max.)
: 22% (Min)

c) Air Quality : Dusty.

d) Rainfall : 800 mm (Max.)

e) Seismic zone : II

f) Wind speed : 39m/sec.

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)				
1	Name of the Bidder with Postal Address for Correspondence			
2	Name of Contact Person with Telephone & Fax No.	Mr./Ms Tel No. Fax No.		
3	Nature of the firm	PROPRIETARY / PARTNERSHIP / LIMITED CO.		
4	Details of EMD Please Indicate whether ➢ One Time EMD or, ➢ Only for this Tender	DD No. …….. DD Date……. Name of Bank……... Amount: Rs…….		
5	Validity of Offer (BHEL's Requirement: 180 days from Due Date)	Validity _____ days		
6	Mobilization Time (Please refer Section-11 of SCC)	Mobilization Time _____		
7	Whether any conditions stipulated?	**Yes** (vide Document reference:		**No**
		Bidder to note that tender with conditions unacceptable to BHEL shall be rejected.		
8	Bidder has visited the project site and acquainted with the site conditions		Yes	No
9	Details of concurrent jobs are furnished (**Appendix-IX)**		Yes	No
10	Headquarters organization is furnished		Yes	No
11	Proposed site organization is furnished		Yes	No
12	Names and particulars of directors/partners are furnished		Yes	No
13	Financial status of the firm (**Annexure 'A' of GCC**) is furnished		Yes	No
14	**Profit & Loss Account** for preceding three years is furnished		Yes	No
15	**Latest Certificate by Bidder's Banker for Overdraft & BG Limits** is Furnished (Certificate shall not be older than six months from the Last Date for offer submission)		Yes	No

Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			
16	Latest copy of **IT Return** along with copy of **PAN Card** are Furnished	Yes	No
17	Month-wise **Manpower Deployment Plan** (**Appendix–VII**) is furnished	Yes	No
18	**Analysis of Unit Rates** quoted (**Appendix-VI**) is furnished	Yes	No
19	**Month-wise deployment plan for major T&P** (**Appendix-VIII**) is furnished	Yes	No
20	Whether all the pages of the Tender Specification documents are read, understood and signed	Yes	No
21	**Power of Attorney** enclosed in favour of person making offer	Yes	No
22	Bidder has familiarized himself with all Relevant Local Laws & Local Conditions	Yes	No
23	Safety Requirement of this work in a Running plant Premises has been understood.	Yes	No
24	Erection and Commissioning programme furnished	Yes	No
25	**List of similar Jobs completed** in last seven years is furnished (**Appendix-X**)	Yes	No
26	Whether **copies of detailed Work Orders (with BOQ)** and **Completion Certificates** in support of above furnished	Yes	No
27	Generator Stator Lifting and placement Programme.	Yes	No
28	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
29	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No
Check List (Vide Para 1.3 Of Section-I of General Conditions Of Contract)			

Note : strike off yes or no, as applicable

Date :

Signature of bidder with Seal

DECLARATION BY BIDDER'S AUTHORIZED SIGNATORY

I, …….. HEREBY CERTIFY THAT ALL THE INFORMATION AND DATA FURNISHED BY ME WITH REGARD TO THE TENDER SPECIFICATION NO**. BHE/PW/PUR/PARST-STG2/520** ARE TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I HAVE GONE THROUGH THE SPECIFICATIONS, CONDITIONS AND STIPULATIONS IN DETAIL AND AGREE TO COMPLY WITH THE REQUIREMENTS AND INTENT OF THE SPECIFICATION. I FURTHER CERTIFY THAT I AM DULY AUTHORIZED REPRESENTATIVE OF THE UNDER-MENTIONED TENDERER AND A VALID POWER OF ATTORNEY TO THIS EFFECT IS ALSO ENCLOSED.

AUTHORISED REPRESENTATIVE'S SIGNATURE WITH
NAME AND ADDRESS

DATE:

TENDERER'S NAME AND ADDRESS

CERTIFICATE OF NO DEVIATION

TENDER SPECIFICATION NO.

BHE/PW/PUR/PARST-STG2/520

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

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

SIGNATURE OF THE TENDERER

DATE:

SECTION-3
OFFER OF THE BIDDER

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

DEAR SIR,

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. **BHE/PW/PUR/PARST-STG2/520** FOR 250 MW, UNIT# 2 AT **NEW PARAS THERMAL POWER PROJECT,** MAHARASHTRA STATE ELECTRICITY BOARD, PARAS, DIST.-AKOLA, MAHARASHTRA ISSUED BY BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR-WESTERN REGION, NAGPUR, IN ACCORDANCE WITH THE TERMS AND CONDITIONS THEREOF.

I/WE HAVE CAREFULLY PERUSED THE FOLLOWING DOCUMENTS CONNECTED WITH THE ABOVE WORK AND AGREE TO ABIDE BY THE SAME.

1. INSTRUCTIONS TO TENDERERS
2. GENERAL CONDITIONS OF CONTRACT
3. SPECIAL CONDITIONS OF CONTRACT
4. OTHER SECTIONS, APPENDICES, SCHEDULES AND DRAWINGS.

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

OR,

WE HAVE ALREADY DEPOSITED ONE TIME EMD OF Rs. 2,00,000/- (RUPEES TWO LACS ONLY), DETAILS OF WHICH ARE FURNISHED IN THE CHECK LIST.

I/WE FURTHER AGREE TO EXECUTE ALL THE WORKS REFERRED TO IN THE SAID DOCUMENTS UPON THE TERMS AND CONDITIONS CONTAINED OR REFERRED TO THEREIN AND AS DETAILED IN THE APPENDICES ANNEXED THERETO.

PLACE: SIGNATURE OF BIDDER:
DATE: ADDRESS:

WITNESSES WITH THEIR ADDRESS

	SIGNATURE	NAME	ADDRESS
1.			
2.			

SECTION- 4

SPECIAL CONDITIONS OF CONTRACT

4.0 SCOPE OF WORK

The scope of work under the specification covers receipt of materials from BHEL/customer stores/storage yard, handling at stores/storage yard, site of work, transportation to site of work, erection, testing, commissioning and handing over of steam turbine, turbo-generator (including its receipt and unloading from wagon/trailer), Condenser, TG integral piping, External/ Regenerative system equipments/tanks/ vessels and piping, De-aerator with associated platform, HP/LP Bypass system, Power cycle pumps, CW pumps and ACW pumps & associated auxiliaries with cooling water system & ACW system piping, R.E. joints & B.F. valves etc. and PEM packages of 250 mw, unit# 2 at **Paras Thermal Power Plant Expansion Project,** Maharashtra State Electricity Board, Paras, Dist.- Akola, Maharashtra.

4.0.1
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.

4.0.2
The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Bidder and his personnel shall co-operate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.0.3
All the work shall be carried out as per the instructions of BHEL engineer. BHEL engineers decision regarding the correctness of the work and method of working shall be final and binding on the Bidder.

4.0.4
The Bidder shall at his cost perform any services, tests etc, although not specified but nevertheless required for the completion of work.

4.0.5
Contractor shall erect all the equipments as per sequence prescribed by BHEL at site. The sequence of erection, methodology will be decided by the BHEL engineers depending upon the availability of material, work fronts etc. No claims for extra payment from the Contractor will be entertained on the grounds of deviation from the methods and sequence of erection adopted in erection of similar TG sets or for any reasons whatsoever.
4.0.6
All the necessary certificates and licenses required to carryout this work are to be arranged by the Contractor expeditiously at his cost.

4.0.7
The work to be carried out under the scope of these specifications covers the complete work of loading at stores/storage yard, handling, transporting, unloading at erection site, pre-assembly, erection, alignment, hot alignment, bolting, fastening, welding, radiography, levelling, cold pulling, adjusting, Non-destructive testing, Post weld heat treatment, hydraulic test, chemical cleaning, passivation, steam blowing, oil flushing, water flushing, air flushing, pre-commissioning tests, trial run of auxiliaries covered under these specifications, commissioning and all other activities till handing over of the unit. The work shall conform to dimensions and tolerances specified in the various drawings, documents etc. that will be provided during the course of installation. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost failing which the work will be got done by BHEL at the cost and risk of the contractor.

4.0.8
The terminal points as decided by BHEL shall be final and binding on the Contractor.

4.0.9
The indicative schedule of weight of major equipments given in relevant appendices are meant for providing a general idea to the Contractor about the magnitude of the work involved.

4.0.10
During the course of execution of this work, certain rework/ modification/ rectification/ repairs/ fabrication etc. will be necessary on account of feed back from various thermal power stations on units already commissioned and/or units under erection and commissioning and also on account of design discrepancies and manufacturing defects and site operation/maintenance requirements. Contractor shall carryout such rework/ modification/rectification/fabrication/repairs etc., promptly and expeditiously. Daily log sheets indicating the details of work carried out, man hours, consumables used etc, shall be maintained by the Contractor and got signed by BHEL engineer every day. Claims of contractor, if any, for such works will be dealt as per clauses of Section-13, Special Conditions of Contract.

4.0.11
All tools and tackles, fixtures, equipments, materials, manpower, supervisors/ engineers, consumables etc. required for this scope of work shall be provided by the Contractor. All expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause.

4.0.12
The contractor shall make adequate security arrangements including employment of security personnel and ensure protection from theft, fire, pilferage, damage and loss of materials/equipments issued to him for the work. Special care will have to be taken to guard against pilferage / theft of copper tubing, brass fittings, brass valves and other costly materials.

4.0.13
All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipments without the specific permission of the engineer.

4.0.14
Contractor shall ensure proper housekeeping and remove all scrap materials periodically from various work area covered in the scope and deposit the same at the place earmarked for this purpose. In case of contractor's failure to do the same, BHEL reserves the right to remove scrap at contractor's cost and risk.

4.0.15
Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.

4.0.16
Contractor shall mobilise sufficient quantity of sleepers for stacking of materials in his custody.

4.0.17
The Contractor's scope of work is further described in the following clauses:

4.1 COLLECTIONS AND RETURN OF EQUIPMENTS, MATERIALS & CONSUMABLES

4.1.1
Contractor shall take delivery of the components, equipments, lubricants, chemicals, special consumables, steel etc from the storage yard/stores/sheds of BHEL/ client. The Contractor should note that the transport of equipments to erection site, assembly yards etc should be done by the prescribed route, without disturbing the other works and contractors and in the most professional manner. Special equipments such as laboratory equipments, measuring and controls equipments, special electrodes, valves, shims, packing materials for joints and seals, lubricants, actuators etc, shall be stored, when taken over by the Contractor, in appropriate manner as per BHEL's instructions.

4.1.2
The contractor shall return all parts, materials, consumables etc. remaining extra over the normal requirement with proper identification tags to BHEL stores. In case of any misuse or use over actual requirement, BHEL reserves the right to recover the cost of parts/materials used in excess or misused, with departmental charges.

4.1.3
Transportation of lube oil, Chemicals, Gas cylinders etc. from stores, is included in the scope of this contract. The contractor shall have to return all the empty and excess drums to the customer/BHEL stores. Similarly, transport of chemicals for various pre-commissioning activities/ processes mentioned in clauses herein from BHEL/customer's stores and charging of chemicals into the system for carrying out various pre-commissioning activities and processes mentioned herein and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of contractor. After completion of oil flushing operation, the used oil shall be filled in empty drums and which in turn shall be returned to BHEL/customer's stores.

4.2 PREPARATION OF FOUNDATION

4.2.1
Buildings, foundations and other necessary civil works for supporting structures, equipments etc, will be provided by the 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, within the agreed price/item rates, shall arrange all manpower; T&P, formwork and shuttering materials, all Quick-setting-Non-shrink-Free-flow special grout mix of required specification. 'Conbextra GP1' or equivalent and 'Conbextra GP2' or equivalent approved brands of such Grout Mix shall be used for Static Equipments and Rotating Machines respectively.

4.2.3.1
The Quick-setting-Non-shrink-Free-flow special grout mix shall be purchased only from the BHEL approved vendors; names of some such presently approved vendors are as under**. Contractor shall obtain updated approved vendor list from BHEL before procurement action.**

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

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

4.2.4
BHEL will provide only shims and packer plates (either machined or plain), which are received from BHEL's manufacturing plants and go as permanent part of the equipment. Additional packer plates and shims if required will have to be prepared by the contractor

out of steel plates, steel sheets to meet site requirements. Necessary steel plates for this purpose will be provided by BHEL free of cost.

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

4.2.6
Packer plates shall not only be blue matched with foundations but also inter-packer contact surfaces, contact surfaces between packer and pedestals, contact surface between packer and foundation frame etc. shall also be blue matched and required percentage contact shall be achieved by chipping and scrapping as per engineer's instructions.

4.3 EQUIPMENTS INSTALLATION – COMMON REQUIREMENTS

4.3.1
Filling of lubricants for steam turbine, turbo-generator and other rotating auxiliaries for purpose of oil flushing, initial fill up and subsequent topping up during various stages of work.

4.3.2
All works such as cleaning, levelling, 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.

4.3.3
Cleaning, servicing, lubrication of actuators, pumps, headers, governing system, ESV & IV, control valves, LP bypass & HP Bypass valves, Cold Re-heat Non Return Valve, B.F. Valves with power cylinders and other valves, tanks, vessels etc. during erection and commissioning stages is in the scope of work. However, gaskets/packing/lubricants for replacement will be provided by BHEL free of cost.

4.3.4
All equipment 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.

4.3.5
Trial run of all motors including checking direction of rotation in uncoupled condition, check alignment and re-couple the motor to driven equipment.

4.3.6
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.

4.3.13
All racks or assembled units like Governing Rack, LP Bypass Rack & HP Bypass system, Cold Re-heat 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.

4.4 PIPING INSTALLATION

4.4.1
The scope of work in piping system (air, Gas, Water, Oil, Steam, Control fluid 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 TG Integral piping, External/Regenerating System and other piping 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.** Indicative list of schemes of piping and their approximate weights are provided **vide Appendix-II.**

4.4.2
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.

4.4.3
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.

4.4.4
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 have 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.

4.4.5

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.

4.4.6
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 pipelines, fresh edge preparation and welding with stress relieving wherever applicable.
(5) Fabrication / making of bends for pipes and tubes of diameter upto 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.

4.5 CONDENSER INSTALLATION

4.5.1
The condenser will be despatched in loose parts mainly comprising of bottom plates, dome valves, front and rear water chamber, front and rear water boxes, side walls, hot well, spring elements, support plates, air extraction pipes, baffles, stiffening rods and pipes etc. The condenser is to be assembled at site in position by welding the different parts. Condenser tubing and tube expansion (roller expansion) is to be done at site by the contractor, after taking due care to clean all the tube holes. After final alignment and levelling of turbine exhaust and condenser, the same has to be welded to the exhaust

position of LP exhaust as per the sequential welding procedure. Condenser Tube material is Stainless Steel.

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

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.

4.5.5

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.

4.5.6

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

4.6 GENERATOR INSTALLATION

4.6.1 GENERATOR STATOR

The Generator Stator, weighing 218 Metric Tonnes (approx.), will be delivered to site on a special wagon. Scope of contractor shall be keeping liaison and follow up with Railway Authorities at Railway siding, Customer for shunter, receipt, unloading, handling and placement on foundation. For any demurrage Charges by Railway/customer on account of delay in Handling, Unloading from Railway Wagon after arrival of wagon at Railway siding shall be the responsibility of Contractor.

4.6.2

The Generator Stator shall be lifted and placed by the contractor with the help of Two numbers of Customer EOT Crane (Each of Capacity 130 MT) in tandem operation and Lifting Beam in TG hall building. The Lifting beam/ slings and EOT cranes will be provided by BHEL/Customer free of hire charges. Contractor shall have to collect the Lifting Beam/Slings from BHEL/Customer stores/storage yard, transport to site of work, assemble and provide necessary assistance to make EOT Cranes tandem operation through for safe lifting of stator and return the lifting beam/slings to BHEL/Customer storage yard/stores as per BHEL Engineers instruction after completion of work.

4.7 HANDLING OF HEAVIER EQUIPMENTS

Heavy and voluminous Equipments/consignments like HP Turbine module (wt. about 57 MT), IP Turbine module (wt. About 59 MT), LP Rotor (wt. About 57 MT), LP turbine (Inner outer & Inner Inner) Lower half casing (Wt about 31 MT), , LP turbine (Inner outer) Upper half casing (Wt about 22 MT), Generator rotor (wt. About 48 MT), Generator Exciter (Wt.

About 23 MT), HP Heaters (wt. About 30 MT & 40 MT), Deaerator/FST Sections (each wt. About 18 MT) etc. along with other Equipments shall be handled carefully. Contractor shall have to arrange his own Tools & Tackles including suitable capacity lifting Crane, Trailer and any other arrangement required to handle right from collection of materials from BHEL/Customer store yards/stores, transportation to site of works and erection & their placement on respective elevation/foundation. BHEL Shall not provide any T&P other than Customer's 130/30 MT capacity EOT Crane in TG hall for erection of TG equipments.

4.8 DEAERATOR INSTALLATION

4.8.1
BHEL shall not provide any cranes or Tools & Tackles for lifting & placement of De-aerator and Feed Storage Tank components. All necessary arrangements for transportation from stores/storage yard, lifting, placement to required elevation/foundation, alignment, fit up, welding etc. shall be made by contractor.

4.8.2
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.

4.9 HYDROSTATIC TESTING, PRESERVATION AND OTHER TESTS

4.9.1
Contractor shall carry out the following tests required to complete the erection and commissioning of the TG Set:

(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.

4.9.2
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.

4.9.3
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.

4.9.4
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**.** Required valves, fasteners, blank flanges, blanks or steel for blank flanges will be provided by contractor. 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.

4.9.5
Hydro test of piping may have to be repeated several times to meet technical and statutory requirements before application of insulation.

4.9.6
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.

4.10 PRE-COMMISSIONING TESTS, COMMISSIONING AND POST COMMISSIONING

4.10.1
Commissioning of the TG equipments with associated Aux. and other Equipments with auxiliaries shall involve the following tests and activities of the equipments erected :

(a) Trial run of feed pumps, CEP, CW Pumps, ACW Pumps etc. and other various rotating machineries / pumps as per tender specification.
(b) Trial run of motors/ drives for various auxiliaries.
(c) Hydraulic Test, Chemical Cleaning, Oil flushing of lube oil system, Fire Retardant Fluid/Control fluid (Governing oil system), Seal oil System, Air cleaning/blowing of pipelines, closed systems, Tanks and Vessels.
(d) Flushing of all pipelines by air/oil/water/Chemicals/steam as the case may be.
(e) Servicing of all valves, Hydraulic Power cylinders, ESV, HP & LP Bypass valves, CRHNRV, Butter Fly Valves (Hydraulic/Electrical/manually operated), and fittings.
(f) Manual/mechanical cleaning of Oil tanks, Deaerator, FST, Suction Strainers / Filter elements of CEP, BFP, Booster Pump, CW Pumps, ACW Pumps and other various equipments and tanks erected by the contractor. This may have to be repeated several times during the commissioning process.
(g) Chemical cleaning of piping systems, Deaerator and FST as per requirement. Contractor shall carry out disassembly and reassembly of vulnerable components like deaerator spray nozzles, gauges, instruments etc. as instructed by BHEL during this process.
(h) Putting turbine on barring gear.
(i) Rolling and synchronisation.
(j) Full load operation.
(k) Trial operation

The above activities/tests/trial runs may have to be repeated till satisfactory results are obtained and also to meet the technical and statutory requirements.

4.10.2

Contractor shall lay temporary pipelines with fittings and accessories etc. as instructed by BHEL engineer for the purpose of pre-commissioning and commissioning activities like Hydraulic testing, chemical cleaning, oil flushing, steam blowing etc. of piping and other equipments as part of the scope of work. Temporary installations shall be dismantled by contractor and returned to BHEL stores as specified elsewhere in this T.S.

4.10.3

The contractor shall provide necessary assistance to facilitate/enable electrical and instrumentation testing and commissioning of equipments under this scope of work, to BHEL and their Testing & Commissioning agency.

4.10.4

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

4.10.5

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

4.10.6

Cleaning of Lube oil tank, **Fire Retardant Fluid (Control Fluid-Governing oil system**), Dirty oil Tank, Clean Oil tank, Oil unloading Vessels, DMCW Tank, Filtered water tank by sand blasting or other methods as per instructions of BHEL engineer before and after oil flushing is responsibility of contractor.

4.10.7

Lp Bypass system comprising of skid filters,tank,coolers, pipe etc. is a high pressure system.

4.10.8

The contractor shall associate for initial and subsequent fillings of gas in generator gas system as and when required till unit is handed over to Customer.

4.10.9

The contractor shall carry out air tightness test on generator gas cooling system to the satisfaction of BHEL engineer.

4.10.10

Replacing/changing mechanical/other seals of equipment, pumps etc. during commissioning stage is within the scope of work.

4.10.11

During the stages of commissioning, and till Unit is handed over, if any part of TG and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor. Contractor's claim if any, for such repair/rectification/rework/ replacement etc. for reasons not attributable to the contractor,

will be governed by clauses 13.1 to 13.8 of the specification. The parts to be replaced shall however, be provided by BHEL free of cost.

4.10.12
During this period, though BHEL's and customer's engineers will also be associated in the work, the contractor's responsibility will be to make available resources in his scope till such time the commissioned units are taken over by the customer.

4.10.13
In case any malfunctioning and/or defects are found during tests, trial run such as loose component, undue noise or vibration, strain on connected equipment etc., The contractor shall immediately attend to these defects/ malfunctions and take necessary corrective measures. If any readjustment or realignment is necessary, same shall be done as per BHEL engineer's instruction.

4.10.14
The pre-commissioning activities will start prior to Lube oil, Governing Control oil flushing, Seal Oil of the TG and various trials, commissioning operations shall continue till the TG is handed over to customer. Simultaneous commissioning checks, activities will be in progress in various areas like trial run of various equipment, checking of equipment erected, making ready for trial runs, filling up of lubricants, chemicals etc. All these works need specialised gangs including electricians, Instrument Technicians, Fitters, in each area to render assistance to BHEL commissioning staff. Contractor shall earmark separate manpower for various commissioning activities. This manpower shall not be disturbed or diverted. The mobilisation of these commissioning gangs shall be sufficient so that planned commissioning activities are taken up in time and also completed as per schedule and the work is to be undertaken round the clock if required.

4.10.15
Contractor shall cut open works if needed as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over, without any extra payment.

4.10.16
After the start of commercial operation of machine, commissioning activities will continue. It shall be the responsibility of contractor to provide following manpower along with supervisor as part of commissioning assistance for a period of three months.

1)	Supervisor	2 Nos.
2)	Pipe fitter/Millwright fitter	2 Nos.
3)	welder	2 Nos.
4)	Rigger	2 Nos.
5)	Electrician/instrument technician	1 No. each
6)	unskilled worker	6 Nos.

4.10.17
The above figures shows only minimum required over and above labour required for completing pending erection and commissioning works and clearing of punch lists. Contractor has to provide number of personnel and other resources as per work demand.

4.10.18
It shall be specifically noted that above employees of the contractor may have to work round the clock along with BHEL commissioning engineers.

4.10.19
During commissioning, opening of valves, changing of gaskets, checking, realigning of rotating and other equipment, attending to leakages in piping, tanks etc. and adjustments of erected equipment may arise. Valves shall be serviced and lubricated to the satisfaction of BHEL engineer during the erection and commissioning as per BHEL engineer's instructions.

4.10.20
It is the responsibility of the contractor to provide for necessary resources till the completion of work under these specifications, even in case erection, testing and commissioning of the TG and other equipments are delayed due to reasons not attributable to the contractor.

4.11 WELDING AND HEAT TREATMENT

4.11.1
Removal of welding slag and burrs by hand files, with brushes and/or flexible grinders will be carried out simultaneously.

4.11.2
On all steam, oil, instrument, gas, air piping etc. both TIG welding and subsequent arc welding or total TIG welding process is to be adopted as instructed by BHEL engineer.

4.11.3
All weld joints on piping shall be ground / filed / dressed on completion of welding and before NDE as per instructions BHEL engineer.

4.11.4

The Contractor shall procure all electrodes and filler wires in addition to those supplied by BHEL free of cost. The selection and use of electrodes will be as per the standards and specifications of BHEL.

4.11.5
Contractor should purchase the electrodes as per the recommendations of BHEL engineer, welding manual, welding schedule and other relevant documents. The electrodes shall be purchased only from BHEL approved manufacturers.

4.11.6
The purchase of electrodes shall be accompanied by proper test certificate and these certificates should be submitted regularly for the scrutiny of BHEL engineer.

4.11.7
All electrodes shall be stored in a clean dry area. The storage room shall be of permanent nature and damp proof, and the room shall be exclusively meant for storage of welding electrodes and filler wires. Excepting for a vent in the top, it is not preferred to have any other opening like windows or ventilators. The temperature inside the room has to be kept in the range of $8\text{-}10^0$ c above atmospheric temperature and humidity should be less than 50&. This is to be accomplished by using electric heaters or infrared lamps. The storage room must be provided with hygrometer and thermometer. Temperature and humidity are to be monitored regularly. 15-20 holders, welding cables, connecting cables to equipments and other welding accessories including temporary electrical connection from construction power point to individual equipment like winches, hoisting equipment, welding

generators, transformers, heat treatment equipment and other construction equipment shall be arranged by contractor.

4.11.8
All racks and other items used for storage of electrodes shall be of steel and not of wood.

4.11.9
All electrodes soon after purchase shall be offered for inspection to the BHEL engineer. Contractor shall be strictly prohibited from using electrodes not inspected/approved by BHEL engineer.

4.11.10
All welding consumables shall be issued to the welders only by authorised person who is controlled by contractor's welding engineer. The necessary baking requirements are to be ensured by Contractor's welding engineer.

4.11.11
All welders shall be tested and approved by BHEL engineer/customer before they are actually engaged on work though they may possess the requisite certificate. BHEL reserves the right to reject any welder without assigning any reasons. Statutory requirements like IBR approval for welders are to be complied with before starting of the work. If required, the welders may have to undergo Procedure Qualification test also. The decision of BHEL Engineer will be final in this regard.

4.11.12
All charges for testing of contractor's welders including destructive and non-destructive tests conducted by BHEL at site shall have to be borne by the contractor. However for initial testing of welders the test will be provided by BHEL. However, If deployed welders fails in initial testing due to lack of experience OR frequent testing of new welders, due to non-availability/non-deployment of earlier qualified/tested welders, it shall be the responsibility of Contractor to provide necessary test plates at his cost for above testing.

4.11.13
BHEL engineer is entitled to stop any welder from his work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by him, which, in the opinion of BHEL engineers, will adversely affect the quality of welding though the welder has earlier passed the tests prescribed. The fact that the welders have passed the test, does not relieve the contractor from his contractual obligations to check the performance of the welders. Contractor shall submit a monthly performance record of all welders.

4.11.14
All welded joints shall be subject to acceptance by BHEL engineer whose decision will be final and binding.

4.11.15
Pre-heating and stress relieving before and after welding are part of erection work and shall be performed by the contractor in accordance with instructions of BHEL engineer. Contractor has to arrange for the recorders along with accessories and suitable technicians for heat treatment purpose. The temperature recorders and thermocouples shall be duly calibrated. During preheat and stress relieving operations the temperature shall be measured as per the instructions of BHEL engineers by thermocouples and recorded graphs for the heat treatment works carried out shall be the property of BHEL.

4.11.16
For the purpose of stress relieving, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations are as per the standards of BHEL. Thermocouples have to be attached using battery operated portable thermocouple attachment unit and not by manual arc welding. Contractor shall arrange sufficient number of thermocouple attachment units.

4.11.17
Wherever necessary, contractor should provide temperature indicator/temperature recorder as required by BHEL engineer for measuring preheat temperature for welding or for controlling temperature of metal for hot correction etc. Decision of BHEL engineer on method and of checking preheat temperature or controlling temperature for hot correction and welding shall be final and binding on contractor.

4.11.18
Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The contractor shall make all necessary arrangements including labour required for the same as per directions of BHEL.

4.11.19
Heat treatment requirements shall be as per the Welding Schedules of BHEL

4.11.20
For weld joints of heavy structural items like beams, I-sections, if heat treatment is required, the same shall be carried out as part of the work.

4.11.21
Checking effectiveness of stress relieving by hardness tests (either by Poldi Hardness Tester or other approved test methods as per BHEL engineer's instruction) including necessary testing equipments is within the scope of the work/specification.

4.11.22
TIG welding process is to be used for all root pass welds in pipes. Subsequent welding after root pass can be carried out by manual metal arc welding with basic coated electrodes. For the pipe of thickness less than 6mm, the entire welding has to be carried out by TIG welding. However, BHEL site engineer will have the option of changing the method adopted. For manual arc welding shall be done as per weaving technique and the width of weaving shall not exceed 1.5 times of the dia of the electrodes.

4.11.23
Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensions and with respect to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage shall depend on piping system as specified by BHEL engineer.

4.11.24
Joint fit up will be a stage for inspection.

4.11.25
All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

4.12 RADIOGRAPHY

4.12.1

Radiographic inspection of welds shall be arranged by the contractor including all consumables like isotope camera, x-ray film, chemicals etc. Scaffolding and approaches for taking radiographs.

The contractor shall provide the necessary skilled technician and labourers for taking the radiographs. While taking radiographs, the contractor has to use proper penetrameter/ image quality indicators as instructed by the BHEL engineer. All the processed and accepted films will be the property of BHEL. In this regard, the contractor has to adhere to the safety rules/regulations laid by BARC authorities from time to time. It may please be noted that invariably the radiographic work will be carried after the normal working hours.

4.12.2

Contractor shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance/rejection of the joints will be final and binding on the contractor.

4.12.3

Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if defect persists after first repair, as per radiograph, carrying out repairs and radiography shall be repeated till joint is made acceptable in case, the joint is not repairable, the same shall have to be cut and repaired at contractor's cost. Decision of BHEL engineer in all these matters is final and binding on the contractor.

4.12.4

100% radiography of weld joints of certain piping have to be carried out as per BHEL standards/drawings/specification.

4.12.5

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. Necessary trained personnel shall be deployed for this purpose.

4.13 ACID CLEANING / ALKALI FLUSHING / STEAM BLOWING / OIL FLUSHING ETC.

4.13.1

Contractor shall lay temporary pipelines with fittings and accessories and also erect/commission pumps after servicing as per requirements, tanks and other installations, as a system as instructed by BHEL for the purpose of chemical cleaning, steam blowing, steam washing, steam flushing, water flushing, water washing, oil flushing etc. of piping and other equipments which are within the scope of work and also systems in which equipments and piping erected by contractor form a part of the scope of work.

It shall be specifically noted by the contractor that all pipes for above works shall be supplied in random length and in loose condition. Contractor has to assemble and erect

them as per schemes / drawings provided by BHEL. Further, flanges bend etc. for completing the scheme shall be machined/ fabricated by the contractor at his own cost. However, plates / steel etc. for the same will be provided by BHEL free of charges.

4.13.2
After the chemical cleaning has been successfully completed, dismantling of all temporary installations as instructed by BHEL is within the scope of work under this specification. The dismantled materials shall be dressed and returned to BHEL as stated elsewhere in this tender spec.

4.13.3
Preservation of the cleaned surfaces will be the responsibility of contractor under the guidance of BHEL engineer.

4.13.4
Hydraulic test of temporary piping is to be carried out as per the instructions of BHEL Engineer. Carrying out repairs, if any, is in the scope of work/specification.

4.13.5
For chemical cleaning of the piping system, contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected is in the scope of contractor or not. Decision of BHEL Engineer in this regard will be final and binding on the contractor.

4.13.6
During the initial stages of work, trenches for draining water may not be available after alkali flushing or mass flushing for discharging and emptying. Necessary low point drains and temporary piping for this will have to be provided by contractor from materials provided by BHEL.

4.13.7
Laying effluent discharge line from mixing tank (for acid cleaning or any other chemical cleaning process) as per the instructions of BHEL engineer and dismantling, servicing for preservation and handing over the same to BHEL stores after completion of the job is within the scope of work/specification.

4.13.8
Radiographic examination of weld joints on temporary pipes as required by the Engineer In-charge should be carried out.

4.13.9
Contractor shall also carry out the repairs or attend leaks etc., in the temporary piping and equipments for the above operations / activities while carrying out the above activities / operations.

4.13.10
For chemical cleaning of system which consist of equipment/piping erected by the contractor and also equipment/piping erected by other contractors of BHEL/customer's contractor has to arrange for workers and supervisory staff as required supplementing/complimenting the labour and supervisory staff mobilised by other agencies for chemical cleaning of the portion of equipment erected by them in the system. Decisions on the strength of gangs and supervisory staff for deployment of labour and

allocation of work for them at site, by BHEL engineer is final and binding on the contractor.

4.13.11
Contractors quoted rate shall be inclusive of fabrication, cost of consumables, erection, dismantling of temporary piping and servicing of the equipments and valves and handing over to BHEL.

4.13.12
After acid cleaning/pickling of lubricating system(including oil piping of lube oil system, Control Fluid system, Seal oil system, 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 rotating machineries, cooler etc. before and after oil flushing is the responsibility of the contractor.

4.13.13
For full welding of structures, tanks and piping etc., only welding generators shall be used. The use of welding transformers will be subject to the approval of BHEL Engineer.

4.13.14
Erection and commissioning of connecting piping – permanent and temporary for oil purification equipments and all operations for cleaning, oil flushing, dismantling of temporary piping during pre and post-commissioning of equipment up to full load.

4.14 ELECTRICAL AND INSTRUMENTATION

4.14.1
Contractor shall mount all flow indicators, centrifugal/speed switches of motors, accumulators, pressure regulators, etc which are received loose and which are to be erected/mounted at site on air lines, water lines, oil lines, FRF System, steam lines, auxiliaries and firemen floor and other operating floors on boiler/power house and other equipments. These are to be mounted during erection for finalising routing/position etc. They are to be dismantled after completion of erection work and handed over to BHEL for calibration. After calibration, these instruments shall be remounted by the contractor in their respective positions just before commissioning.

4.14.2
Certain instrumentation like, pressure gauges, power cylinders, flow meters, valve actuators, flow indicators, etc are received in assembled condition as integral part of equipments. Contractor shall dismantle such equipment at an appropriate stage under the instruction of BHEL and hand them over to BHEL for calibration and storage. Contractor shall re-erect them in position just before commissioning of the equipment.

4.14.3
Seal welding of Thermowells, plugs before Hydro test of equipments and piping systems is also within the scope of this work/specification. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld Thermowells after Hydro test/steam blowing of lines.

4.14.4
Providing necessary engineer/supervisors/technicians/electricians as required by BHEL engineer for drying out the LT/HT motors is within the scope of the work. Job includes testing the motor for finding out PI & IR values and making necessary cabling connection for heating for dry out from the nearest source of supply and maintaining and controlling

the temperature till the IR and PI values are achieved as per standards. However, BHEL will provide necessary motorised insulation testers for this purpose. The contractor shall provide necessary power cables and other tools and consumables for the above works free of charges. Before undertaking dry out/trial run of HT motors, the end shields and covers shall be opened on both the ends of the motor for inspection, cleaning and greasing of bearings.

4.14.5
Welding of all Thermowells, draft, pressure and temperature instrumentation points, and all other instrumentation points on piping, and auxiliaries is within the scope of this work.

4.14.6
All the HT Motors shall be preserved with space heaters on, and provided with proper cover till the commissioning of the motors.

4.14.7
Mount instrumentation on turbine, generator and exciter and auxiliaries which are integral part and main equipments and render necessary services for their commissioning.

4.15 GENERAL

4.15.1
During the course of erection, platforms and floor grills are to be cut at certain places to route steam, oil, water and air piping, cable trays, etc or for accommodating erection, rigging etc, the cutting of platforms and grills should be minimum and as approved by BHEL engineer. After completion of work, the platform/grills cut shall be made good neatly as instructed by BHEL engineer.

4.15.2
Erection and welding of stainless steel fittings including supply of necessary stainless steel welding electrodes is within the scope of the work/specification.

4.15.3 No temporary supports should be welded on to the piping.

4.15.4
Contractor shall carry out preservation painting on all items taken from stores. The preservation painting has to be carried out on material taken from stores and also on material erected wherever the shop painting has given away. Periodical inspection shall be made as per the instructions of BHEL engineer and the portion of items or the complete items needing painting shall be carried out to the satisfaction of BHEL engineer. The contractor shall provide this facility till the commissioning and handing over of the equipment to the customer. The contractor shall also carry out preservative and touch up painting on equipments covered under this specification stored at stores/storage yard.

4.15.5
Adjustment of spring hangers for piping shall be done by the contractor during initial erection. After initial commissioning trials, it is possible that the spring hangers have to be adjusted repeatedly till the correct spring compression is achieved. Contractor shall do the same to the satisfaction of BHEL engineer. The marking of cold and hot positions on the hangers shall be done by the contractor.

4.15.6
The contractor shall return to BHEL the excess materials left over after completion of work, materials issued for temporary pipelines for HT, chemical cleaning, flushing, blowing etc. and materials issued on returnable basis in neatly dressed condition. Necessary grinding, edge cutting (square facing), edge preparation (vee), painting etc. to the condition similar to the one at the time of issue shall be in scope of work.

4.16 PG TEST TAPPING POINTS

Installation and welding of Instrument Tapping Points for taking Performance Guarantee (PG) Test measurements shall be in the regular scope of the contractor's work for the equipments covered under this tender specification. The scope will be limited to all the tapping points for which materials are available and their locations identified within the regular contract period and extensions thereof.

4.16.1
All packing and forwarding material shall be returned as soon as the material is unpacked. The location for storage of such materials shall be as indicated by BHEL Engineer.

4.16.2
All Measuring and Monitoring Devices (MMD) used for the work in scope of these tender specifications shall be calibrated by the accredited agencies that are approved by BHEL or calibration tractability is established up to National Physical Laboratory.

4.16.3
Contractor shall furnish the consumption details of chemicals, lubricants, TIG welding filler wire, welding electrodes and other consumables on monthly basis.

4.17 SPECIFIC INCLUSIONS

4.17.1
All terminal connections for equipment & piping covered in this specification.

4.17.2
Impulse/pneumatic piping between customer's battery limit and equipments.

4.17.3
Auxiliary Cooling water/Cooling Water Piping between battery limits of customer and equipments covered under the tender specification like **SWAS, BFP system (Booster Pump Coolers, Lube oil Coolers, Motor air Coolers, Working oil coolers, Stuffing Box, Seal water Cooers), Condensate Extraction Pumps, Generator Hydrogen Coolers, Exciter Air Coolers, Seal Oil Coolers, Turbine oil coolers, Control Fluid (FRF) Coolers, Condenser Vacuum Pumps etc.**

4.17.4
Servicing and assembly of control valves/regulating valves, fixing of filter elements/strainers & steam blowing & blanking devices in LP bypass, M.S. Strainer, HRH Strainer & and blanking of LP bypass, ESV & IV System, for hydro test, steam blowing etc is the part of scope of work.

4.17.5
Erection, commissioning and testing of HP Bypass system valves and Cold Re-heat Non-return valve with respective oil system and accessories are included under the scope of tender specification. Erection HP Bypass valve and CRH NRV shall involve installation of

valves on temporary supports to provide reference/connection of HP Bypass and CRH Critical piping which will be erected by other agency, dismantle the valves/ remove valve internals & fix steam blowing devices (as advised by BHEL Engineer at site) to make Steam blowing connection and install the valves permanently/re-fix the internals on permanent supports for final connection. Oil system shall require erection of tanks, Motors, Power Cylinder, oil piping, oil flushing of system etc. till final commissioning and handing of system. All above are under the scope of contractor. BHEL shall provide oil for flushing and initial fill, topping up free of charges. Contractor shall collect the oil barrels from BHEL stores/storage yard and return the empty container/left over oils to BHEL stores after completion of work.

4.17.6

FIRE RETARDANT FLUID (Control Fluid) SYSTEM, which was earlier being specially used in 500 MW STG Sets and is of Stainless Steel materials, will also be a part of this job. The system comprises of Tanks, Piping with fittings, Filter, Coolers, Pumps & Motors etc. as per scope mentioned in Appendix-I. Contractor shall take specific note of above.

4.17.7

It may be specifically noted that it should not be construed or claimed by the contractor that with the technical specification and "exclusions and/or inclusions" detailed in this tender specification, BHEL has covered the entire scope of work and/or the details thereof to be executed by the contractor.

4.17.8

Complete control fluid system of both HP and LP Bypass System is included in this specification. Associated assistance for commissioning like lube oil flushing, filling and topping up of lube oil etc shall be part of the work.

4.17.9

Assembly and Installation of Strainer Elements of MS and HRH system is within the scope of work. Cleaning of these strainer elements during trial operation of machine is also covered under this scope.

4.17.10

Erection and welding of Impulse piping from various equipments & piping tapping point to root valve.

4.17.11

Chipping of foundation, placement, erection, alignment, commissioning, grouting, mounting of equipment mount instruments, panels and other fittings of BHEL (PEM bought out items) supplied Packages like CW Pumps, ACW Pumps, Condenser On load Cleaning System, Plate Heat Exchangers, condensate Polishing Unit etc. & other packages are in scope of the work. Erection and commissioning of these Equipments/Pumps & Packages will be required to complete to meet the commissioning schedule/ milestone activities of other areas like Boiler, DM water treatment plant, Ash Handling Plant, Service water requirement, fuel oil handling plant etc. Contractor shall plan and complete erection & commissioning of these equipments on priority as per decision of BHEL Engineer/customer requirement. Details of such systems are furnished in Appendix-I.

4.17.12 WELDS FIT-UP AND WELD JOINT PROTECTIVE PAINT, COMPONENT PRESERVATIVE PAINTING ETC.

1) All protective paints for the protection of weld joint fit-ups, application of primers on finished weld joints are in the scope of contractor.

2) Two coats of steam washable paints shall be applied on steam side of LP turbine and condenser components, as advised by BHEL. The steam washable paints, primer and thinner will be supplied by BHEL free. However, arrangements for surface preparation and paint application like sand/shot-blasting, consumables like surface cleaning agents, paint brush, brush cleanser, labour and necessary tools and plants are in the scope of contractor.

3) All site weld joints falling in steam side shall be painted with two coats of steam washable paint.

4) The water boxes shall be sandblasted to remove all traces of primer applied at the works. Thereafter two coats of Epoxide priming paint followed by two/three coats of high build black coal tar epoxy (e.g., "Apcodur CP684" of Asian Paints **or equivalent from any other BHEL/MSEB approved manufacturer**). Contractor shall submit manufacturer's batch test certificate / test certificate from BHEL/MSEB approved laboratory for the primers and paints. Prior approval of BHEL for each and every batch of the primer & paints shall be mandatory. In order to achieve a desired minimum paint dry film thickness (DFT) as specified in BHEL drawing, number of coats may be applied and method of application shall be as recommended by the paint manufacturer. **Required paints & primers and other consumables for above works shall be arranged by Contractor.**

5) All water side surfaces of water chambers including tube plate shall be thoroughly surface prepared and painted. Required primer & paints and other consumables for condenser water box and tube plates shall be provided by Contractor.

6) After the successful completion of hydraulic testing, the interior surfaces of the water boxes, main tube plates shall be painted with suitable anticorrosive paints as per special procedures laid down by BHEL. Required necessary paints along with primers and other consumables shall be arranged by Contractor.

7) Prior to hydraulic testing of water side of condenser, interior surfaces of water boxes shall be painted.

8) After completion of tubing and tube side hydro test, all water side surfaces of water chambers including tube plate shall be painted.

9) Preservation of all components/equipments during various stages of erection, commissioning till handing over is in the contractor's scope. All prescribed methods of surface cleaning prior to application of preservative paint shall be followed by the contractor. **Contractor has to arrange all primer and paints, and other consumables like wire brush, painting brush required for this work.**

10) Condenser internal components/parts/surfaces have to be surface protected with steam washable paint as per BHEL standards.

4.18 EXCLUSIONS

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

A) All cable connections, except those specified as scope of work.
B) Measuring instruments, monitoring, relaying, protection and signalling equipments other than those supplied with the equipments by / on behalf of BHEL and which have been indicated as scope of work.
C) Erection, testing and commissioning of electrical panels and starting resistors for dc JOP and dc Eco pumps, CW pump, ACW pump, oil purification unit panels of lube oil system.
D) Erection, testing and commissioning of electrical panels and starting resistors of seal oil, gas systems.
E) Electrical testing of motors, turbo-generator. However erection these will be under the scope of this tender specification.
F) Impulse piping and fittings from the tapping points of various equipment root valves other than those specified as scope of work.
G) Copper tubing work.
H) Civil works to the extent not specifically provided for in this tender.
I) Thermal insulation of Turbine, ESV, IV, CRHNRV, HP & LP Bypass valves, integral piping and external piping/regenerating piping system.
J) Supply of materials for temporary piping (pipe, valve, structural steel etc.) required for hydraulic test, chemical cleaning, flushing or steam/air blowing of the pipelines.

K) Supply of chemicals and lube oil for pre-commissioning and commissioning activities.
L) Final painting.

SECTION-5

SPECIAL CONDITIONS OF CONTRACT

5.0 OBLIGATIONS OF THE CONTRACTOR (TOOLS, TACKLES, CONSUMABLES ETC.)

5.1 ACCOMMODATION FOR THE LABOUR / OTHER EMPLOYEES

BHEL/CLIENT WILL NOT PROVIDE ANY SPACE FOR LABPOUR COLONY. CONTRACTOR SHALL MAKE HIS OWN ARRANGEMENTS FOR ACCOMMODATION WITH NECESSARY FACILITIES ETC. FOR HIS WORKMEN AND THE STAFF OUT SIDE THE PROJECT PREMISES. ALSO, THE CONTRACTOR HAS TO MAKE HIS OWN ARRANGEMENT FOR TRANSPORTATION OF HIS WORKMEN AND OTHER EMPLOYEES. 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 (IN ADDITION TO THOSE 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 FOR MATERIAL HANDLING AT BHEL/CLIENT'S STORES/STORAGE YARD. BHEL'S CRANE WILL NOT BE AVAILABLE FOR THIS PURPOSE. PLEASE REFER RELEVENT **APPENDIX** FOR THE LIST OF T&P BEING PROVIDED BY BHEL FREEE OF CHARGES ON SHARING BASIS.

5.2.2
Contractor has to provide spanners of all sizes for carrying out the complete erection / commissioning works. No spanners will be provided by BHEL to the contractor.

5.2.3
Contractor has to arrange slings of all sizes for completing the works covered under these specifications except the special slings for Generator Stator Lifting/Handling, which will be provided by BHEL free of charges on returnable basis.

5.2.4
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.

5.2.5
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.

5.2.6
Complete set of hydraulic jacks of 50 tonnes and 100 tonnes capacity shall be arranged by the contractor for use during erection and commissioning of Turbine. Also, hydraulic jacks of 100 tonnes and 63 tonnes capacity along with long high pressure hoses of suitable length for Generator erection and alignment shall be arranged by the contractor. These jacks shall of internationally reputed make, highly reliable and maintained in excellent working condition. They shall be tested for safe working before deploying in actual work. These jacks shall not be permitted for use anywhere other than Steam-Turbine / Generator area.

5.2.7
All jack bolts that are required during erection for carrying out roll-check etc. will have to be arranged by the contractor. No jack bolts will be provided by BHEL.

5.2.8
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.

5.2.9
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.

5.2.10
The T&P to be arranged by the contractor shall be in proper working condition and their operation shall not lead to unsafe condition. Contractor shall obtain prior approval of BHEL for all the T&P before deploying in actual work. The movement of cranes, and other equipment should be such that no damage / breakage occurs to foundations, other equipments, material, property and men. All arrangements for the movement of the T&P etc shall be the contractor's responsibility. The necessary test certificates for Equipments to be submitted.

5.2.11

Normally, use of welding generators only is permitted for welding. The use of welding transformers will be subject to specific and prior approval of BHEL Engineer.

5.2.12
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. All calibration shall be traceable to national or international standards.

5.3 CONSUMABLES

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

TG Special Consumables like Hylomar / Golden Hermetite / Stag-B / Molykote/ Anabond compounds / Rubber fixing compounds etc. will have to be arranged by the contractor.

5.3.2
All consumables to be used for the work shall have prior approval of 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

BHEL will provide paint & primer for only the specified areas herein, all other requirements are in contractor's scope.

5.4 WELDING ELECTRODES, FILLER WIRES FOR TIG WELDING AND GASES

5.4.1
All welding consumables including filler wires (excepting filler wires required for External/Regenerative System Piping under SN H.2 of Appendix-I) is in the contractors scope. Filler wire so issued by BHEL shall not be used for any other pipelines other than specified herein.

5.4.2
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.

5.4.3
The contractor shall provide all consumables required for carrying out the work covered under this scope of work including TIG wires for welding of piping joints.

5.4.4

Gases like Argon, Oxygen, Acetylene etc. that are required for erection related activities shall be arranged by the contractor at his cost.

5.4.5
Nitrogen gas it required for preservation during chemical cleaning process of piping system, will be arranged by BHEL free of charges. Contractor shall arrange necessary connector, Nipple, Regulator, Header and piping for usage of such Gas from Cylinders.

5.5 FIELD OFFICE

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

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

5.6 AREA LIGHTING

5.6.1
Contractor shall arrange adequate floodlights, hand lamps and area lighting. Contractor shall use his own materials like cables, fuses, switchboards etc.

5.7 CONSTRUCTION POWER & WATER

5.7.1
Construction power (three phase, 415v / 440v, 200 amps, 4-wire) will be provided at one point near the site free of charge. However all taxes, duties, levies, charges etc, as applicable, shall also be born by the contractor. Accordingly, required energy meter, 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 shall be arranged by the contractor. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, if any, prior to these being put to use or as may be specified, shall be the responsibility of the contractor.

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

5.7.3
The Customer will provide water for Construction purpose at a single point free of charge. However, Taxes, Duties, Levies, charges if any shall be borne by the contractor. All arrangements for further distribution beyond this point have to be made by contractor.

5.7.4
In case of non-availability of customer supplied power, it is the responsibility of the contractor to make alternative arrangements. Contractor shall be adequately equipped to arrange standby diesel welding generators in the event of construction power failure. Essential welding jobs shall not be stopped on account of main construction power failure.

5.7.5
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. Contractor shall take suitable insurance policy for such accidental loss/ damages.

5.7.6
Contractor shall be well equipped with Back-up Power Supply arrangement like Diesel Generating set and Diesel operated welding machine etc. to tackle situations arising due to failure of construction 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.

5.8 RESPONSIBILITIES WITH REGARD TO LABOUR EMPLOYMENT ETC.

5.8.1
Refer clause 2.8 of General Conditions of Contract in this regard.

5.8.2
Contractor shall also comply with the requirements of local authorities/ project authorities calling for police verification of antecedents of the workmen, staff etc.

5.8.3
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.

5.8.4
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.

5.8.5
Contractor shall provide at different elevation suitable arrangement for urinal and drinking water facility with necessary plumbing & disposal arrangements including construction of septic tank. These installations shall be maintained in hygienic condition at all times.

5.8.6
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 thereby shall be recovered from the contractor.

5.9 TAXES, DUTIES, LEVIES

REFER TO CLAUSE 2.8.4 OF GENERAL CONDITIONS OF CONTRACT. Notwithstanding anything contained therein, the following provisions shall be applicable for this contract.

5.9.1
The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

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

5.9.2 **SERVICE TAX & CESS ON SERVICE TAX**

Service Tax and Cess on it are excluded from contractor's scope; therefore contractor's price/rates shall be exclusive of Service Tax and Cess on Service Tax. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax from BHEL and deposit the same with the concerned tax authorities, the amount will be paid by BHEL. Contractor shall submit to BHEL documentary evidence of Service Tax registration at the time of invoicing and remittance record of such tax immediately after depositing the tax with concerned authorities, failing which BHEL will not release the Service Tax amount for the next bill onwards. 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 used for providing the output service and service tax paid on input services can be taken credit of against the service tax payable on output service. However BHEL may opt for availing the abatement provision in which case cenvat credit may not be available on input duty.

5.9.3 VAT/WCT

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

5.9.4 Modalities of Tax Incidence on BHEL

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

5.9.5 New Taxes/Levies

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

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

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

5.10.0 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.

5.11.0 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.

SECTION-6

SPECIAL CONDITIONS OF CONTRACT

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

6.1

The contractor shall deploy all the skilled/semiskilled/ unskilled labour including highly skilled workmen etc. These workmen should have previous experience on similar job. They shall hold valid certificates wherever necessary. BHEL reserves the right to insist on removal of any employee of the contractor at any time if he is found to be unsuitable and the contractor shall forthwith remove him. Contractor should furnish a tentative deployment plan of his manpower as required vide appendix-vi. Also the actual deployment will be so as to satisfy the erection and commissioning targets set by BHEL.

6.2

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

6.3

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

6.4

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

6.5

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

6.6

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

6.7 SITE ORGANISATION

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

- Overall Planning, Monitoring & Control
- Materials Management
- Condenser & Auxiliaries.
- Turbine & Auxiliaries.
- Generator & Auxiliaries.
- Pumps & Auxiliaries.
- Piping.
- Quality Control and Quality Assurance
- Safety, Fire & Security
- Industrial Relations and fulfilment 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 TEST MATERIALS (PLATES & PIPES)

BHEL will provide suitable plates and pipes free of cost only for site test of welders including IBR welders before their deployment. However, all destructive and non-destructive examinations of test blanks / pieces shall be in the scope of contractor. Responsibilities with regard to deployment of IBR welders and meeting the stipulations shall be the responsibility of contractor.

7.2 FILLER WIRE FOR TIG WELDING

BHEL will issue TIG welding filler wires free of cost for External /Regenerative System Piping (listed under SN H.2 of Appendix-I herein). For all other pipelines, Contractor shall arrange the filler at his cost.

7.3 EQUIPMENTS – TOOLS & PLANTS

BHEL will make available only those T&P that are listed in **Appendix-IV** free of charge. The contractor shall arrange other required T&P. Further details are as under:

7.3.1

BHEL will make available on shareable basis, free of hire charges, services of equipments & T&P indicated in Appendix**-IV**. As most of the equipments will be in the custody of BHEL and have to be shared among other contractors, the requirements shall be indicated to BHEL sufficiently in advance and finalise allotment of the same. It may be noted that the contractor has to deploy all necessary tools & plants to suit the activity schedules given by BHEL/ Customer. T&P being supplied by BHEL are only to supplement the resources deployed by the contractor.

7.3.2

EOT crane of customer will be provided free of charge for activities of handling & erection within TG Hall.

EOT crane in TG hall will be issued on need basis and is to be shared with other contractors. Qualified & Experienced operators are to be provided by the contractor on full time basis. Carrying out routine maintenance / servicing , providing manpower, tool & tackles for any repair / rectification of the cranes is also in the scope of the contractor. The quoted rates shall be inclusive of the above.

7.4 OTHER T&P

7.4.1

The responsibilities of contractor defined above for BHEL cranes shall also be applicable, mutates-mutandis, in respect of other tool & plants provided by BHEL.

7.4.2

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

7.4.3

BHEL engineer will inspect all the tools and plants issued to contractor periodically. In case contractor fails to make good, the damages caused, BHEL will do the same at contractor's cost. The tools and tackles will be issued only to persons nominated by the contractor.

7.4.4

Required temporary structural steel, pipes & fittings, valves for conducting hydraulic test, chemical cleaning / steam blowing / oil flushing / acid cleaning etc shall be provided by BHEL on returnable basis.

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

7.5.1

All lubricants and chemicals required for testing, chemical cleaning, acid cleaning, oil/chemical/gas flushing required for testing, pre-commissioning & commissioning upto trial operation of equipments/unit will be provided by BHEL. Carbon dioxide and Hydrogen gas for purging and filling in Turbo-generator will also be supplied by BHEL free of cost. Contractor shall arrange for taking delivery and loading of all such consumables from BHEL/ Customer Stores/ yard, transportation to site of work and unloading thereon, filling in the system and return the used lube oil, balance quantity of consumables etc, to BHEL stores duly reconciled for quantity.

SECTION-8

SPECIAL CONDITIONS OF CONTRACT

8.0 INSPECTION / QUALITY ASSURANCE / QUALITY CONTROL/ STATUTORY INSPECTION

8.1

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

8.2

Preparation of quality assurance log sheets and protocols with customer's 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 customer/BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of installation, generally as per the requirement of customer/BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

8.3

A daily 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/centring/levelling readings and inspection details of various equipments etc.

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

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

Record of heat treatments performed shall be maintained as prescribed by BHEL. Similarly, performance report of all welders shall be furnished for scrutiny of BHEL Engineer.

8.4

In the course of erection, it may become necessary to carry repeated checks of the work with instruments recently calibrated, re-calibrated. Such instruments whenever necessary, will be provided by BHEL, on returnable basis, on specific authorisation by BHEL Engineer.

8.5

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

8.6

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.

8.7 STAGE INSPECTION BY FES / QA ENGINEERS

8.7.1

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

8.7.2

Any modifications suggested by BHEL FES and QA Engineers team shall be carried out. Claims of contractor, if any, shall be dealt as per clause 13.1 to 13.8, provided such modifications have not arisen for reasons attributable to the contractor.

8.8 STATUTORY INSPECTION.

8.8.1

The scope includes getting the approvals from the statutory authorities (like Boiler Inspector, Electrical Inspector and Labour officers). This includes arranging for inspection visits of Boiler Inspector periodically as per BHEL Engineer's instructions, submitting documents, radiographs etc. and following up the matter with them.

8.8.2

All fees connected with the contractors for testing his welders/men/workers and testing, inspection, calibrating of his instruments and equipments, shall be paid by the contractor. It shall be contractor's responsibility to obtain approval of statutory authorities, wherever applicable, for the conducting of any work, which comes under the purview of these authorities. Any cost arising from this shall be contractor's account. Contractor shall pay all other fees (fees for visits, inspection fees, hydraulic test fees, light up inspection fees, registration fees etc.). **I**n case these inspections have to be repeated due to default / fault of the contractor and fees have to be paid again, the contractor shall have to bear the charges. These would be deducted from his bills.

8.9

BHEL, Power Sector–Western Region (PSWR) has already been accredited with ISO 9002 certification and as such this work is subject to various audits to meet ISO 9002 requirements. One particular aspect, which needs special mention, is about arrangement of calibration of instruments by the contractor. Contractor shall ensure deployment of reliable and calibrated MMD (instrument measuring and test equipment). The MMD shall have test / calibration certificates from authorised / government approved / accredited agencies traceable to national / international standards. Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer within the contract price. The contractor will also have alternate arrangements for such MMD so that work does not suffer when the particular equipment / instrument is sent for calibration. Also if any MMD 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 MMD and retake the readings at contractor's cost.

Section-9

Special Conditions of Contract

Safety, Occupational Health and Environmental Management

Introduction:-

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

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

9.0 Responsibility Of The Contractor In Respect Of Safety Of Men, Equipment, Material And Environment.

9.1 The Contractor Shall

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

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

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

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

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

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

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

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

9.2 SPECIAL CONDITIONS

9.2.1 Safety

9.2.1.1 Safety Plan

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

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

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

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

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

9.2.1.4 All tools, tackles, lifting appliances, material handling equipment, scaffolds, cradles, cages, safety nets, ladders, equipment, etc used by the contractor shall be of safe design and construction. These shall be tested and certificate of fitness obtained before putting them to use and from time to time as instructed by authorised BHEL official who shall have the right to ban the use of any item found to be unsafe

9.2.1.5 All electrical equipment, connections and wiring for construction power, its distribution and use shall conform to the requirements of Indian Electricity Act and Rules. Only electricians licensed by the appropriate statutory authority shall be employed by the contractor to carryout all types of electrical works. All electrical appliances including portable electric tools used by the contractor shall have safe plugging system to source of power and be appropriately earthed.

9.2.1.6 The contractor shall not use any hand lamp energised by electric power with supply voltage of more than 24 volts. For work in confined spaces, lighting shall be arranged with power source of not more than 24 volts.

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

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

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

9.2.1.10 Temporary arrangements made at Site for lifting , platforms, 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 authorised by a responsible supervisor and alternative precautions have been taken

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

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

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

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

9.2.1.17 All wastes generated at Site shall be segregated and collected in a designated place so as to prevent spillage/ contamination/ scattering at Site, until the waste is lifted for disposal to designated disposal area as advised by BHEL official.

9.2.1.18 The contractor shall arrange at his cost (wherever not specified) appropriate illumination at all work spots for safe working when natural day light is not adequate for clear visibility.

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

9.2.1.20 The contractor shall display at strategic places and in adequate numbers the following in fluorescent markings

- Emergency telephone numbers
- Exit, Walkways
- Safe working load charts for wire ropes, slings, D shackles etc
- Warning signs

9.2.1.21 The contractor shall be held responsible for any violation of statutory regulations (local, state or central) and BHEL instructions that may endanger safety of men, equipment, material and environment in his scope of work or other contractors or agencies. Cost of damage, if any, to life and property arising out of such violation of statutory regulations and BHEL instructions shall be borne by the contractor.

9.2.1.22 In case of a fatal or disabling injury/accident to any person at construction sites due to lapses by the contractor, the victim and/or his/her dependents shall be compensated by the contractor as per statutory requirements. However, if considered necessary, BHEL shall have the right to impose appropriate financial penalty on the contractor and recover the same from payments due to the contractor for suitably compensating the victim and/or his/her dependents. Before imposing any such penalty, appropriate enquiry shall be held by BHEL giving opportunity to the contractor to present his case.

9.2.1.23 In case of any damage to property due to lapses by the contractor, BHEL shall have the right to recover cost of such damages from payments due to the contractor after holding an appropriate enquiry.

9.2.1.24 In case of any delay in the completion of a job due to mishaps attributable to lapses by the contractor, BHEL shall have the right to recover cost of such delay from payments due to the contractor after notifying the contractor suitably and giving him opportunity to present his case.

9.2.1.25 If the contractor fails to improve the standards of safety in its operation to the satisfaction of BHEL after being given a reasonable opportunity to do so, and/or if the contractor fails to take appropriate safety precautions or to provide necessary safety devices and equipment or to carry out instructions regarding safety issued by the authorised BHEL official, BHEL shall have the right to take corrective steps at the risk and cost of the contractor after giving a notice of not less than seven days indicating the steps that would be taken by BHEL.

9.2.1.26 **Emergency Response**

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

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

9.2.2 OCCUPATIONAL HEALTH

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

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

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

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

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

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

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

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

9.2.2.8 Adequate arrangements shall be made to provide safe drinking water

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

- Noise induced hearing loss

- Lung Function test
- Ergonomic Test
- Eye Test for Welders, Grinders, Drivers etc

9.2.3.0 HYGIENE and HOUSEKEEPING

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

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

9.2.3.3 BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors 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 minimisation. The contractors shall implement the objectives for continual improvement of environmental performance. BHEL shall regularly audit environmental impacts and their improvements.

9.2.4.2 WASTE MANAGEMENT

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

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

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

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

9.2.4.3.5 Acid and alkali cleaning wastes shall be neutralised 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 AUDIT REVIEW AND INSPECTION

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

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

- Compliance with procedures and systems
- Availability, condition and use of 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 Co-ordinator shall visit and inspect work sites daily. All unsafe acts, unsafe conditions that have imminent potential for causing harm/injury/damage will be immediately corrected. He shall maintain a daily logbook giving details of unsafe acts or conditions observed and the corrective action taken and recommendations for preventing recurrence. Adequacy of corrective actions will be verified

The contractor shall take remedial measures as per the findings of each inspection

Besides the above, the contractor shall be required to carry out the following inspections

Sl no	Equipment	Scope of inspection	Inspection by	Schedule

Sl no	Equipment	Scope of inspection	Inspection by	Schedule
1	Hand tools	To identify unsafe/defective tool	User	Daily
2	Power tools	To identify unsafe/defective tool	User	Daily
3	Fire Extinguishers	To check pressure and any defect	User / Safety Coordinator	Daily Every month
4	Lifting equipment/tacles	To check for defects and efficacy of brakes	User Third party	Daily Every Year
5	PPE	To check for defects	User	Daily

9.7 **NON COMPLIANCE**:-

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

SNo.	Violation of Safety Norm	Fine (Rs.)
01	Not Wearing Safety Helmet	50/-
02.	Not wearing Safety Belt	100/-
03.	Grinding Without Goggles	50/-
04.	Not using 24 V Supply For Internal Work	500/-
05.	Electrical Plugs Not used for hand Machine	100/-
06.	Not Slinging property	200/-
07.	Using Damaged Sling	200/-
08.	Lifting Cylinders Without Cage	500/-
09.	Not Using Proper Welding Cable With Lot of Joints And Not Insulated Property.	200/-
10.	Not Removing Small Scrap From Platforms	200/-
11.	Gas Cutting Without Taking Proper Precaution or Not Using Sheet Below Gas Cutting	200/-
12.	Not Maintaining Electric Winches Which are Operated Dangerously	500/-
13.	Improper Earthing Of Electrical T&P	500/-
14.	Accident Resulting in Partial Loss in Earning Capacity	25,000/- per victim
15.	Fatal Accident/Accidents Resulting in total loss in Earning Capacity	1,00,000/- per victim

Any other non-conformity noticed not listed above will also be fined as deemed fit by BHEL. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected above will be utilised for giving award to the employees who could avoid accident by following safety rules. Also the amount will be spent for purchasing the safety appliances and supporting the safety activity at site.

9.8 **CITATION:**-If safety record of the contractor in execution of the awarded job is to the satisfaction of safety department of BHEL, issue of an appropriate

certificate to recognise the safety performance of the contractor may be considered by BHEL after completion of the job

9.9 Memorandum of Understanding

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

Memorandum of Understanding

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

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

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

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

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

Name :

Place & Date:

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

IS No	YEAR	Amd upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY

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

IS No	YEAR	Amd upto	DESCRIPTION
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 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 No	YEAR	Amd upto	DESCRIPTION
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS – FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF

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

SECTION-10

SPECIAL CONDITIONS OF CONTRACT

10.0 DRAWINGS AND DOCUMENTS

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

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

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

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

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

10.6 In case of any conflict between general instructions to tenderers, general conditions of contract contained in sections 1 & 2 respectively and special conditions of contract contained in sections 4 to 15 and appendices, provisions contained in special conditions of contract in sections 4 to 15 and appendices shall prevail.

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

10.8 Bank Guarantees to be furnished by the contractor towards Security Deposit and Performance Guarantee (last 5% payment against workmanship warranty/defect liability) shall have a claim period of six months over and above the validity period required for the respective cases.

SECTION-11
SPECIAL CONDITIONS OF CONTRACT

TIME SCHEDULE, MOBILIZATION, PROGRESS MONITORING, OVERRUN, VARIATION ETC.

11.1 TIME SCHEDULE & MOBILIZATION

11.1.1
The contractor shall make initial mobilization within **three weeks** from issue of telegraphic (fax) L.O.I. and shall subsequently augment the resources in such a manner that the entire work is completed to achieve the following **tentative** milestone schedule:

ACTIVITY	TENTATIVE DATE	SCHEDULE OF COMPLETION (#)
Start of Erection	Feb 2008	Zero Date
Turbine Box up	Dec 08	10th month
Completion of Oil Flushing completion	Jan 09	11th month
Barring Gear	Feb 09	12th month
Rolling & Synchronisation	March 09	13th month
Completion of Full Load Trial Operation	may 09	15th month
Completion of all Facilities	June 09	16th month

- INDICATES THE NUMBER OF MONTHS FROM THE START OF CONTRACT PERIOD.

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 accordance with BHEL's requirement.

11.1.3 Start of Regular Contract Period and Duration.

The regular Contract Period for completion of entire work shall be **16 (Sixteen) months** from the start of erection. Erection by the Contractor of the first major equipment, as identified by BHEL site-in-charge, on its permanent location/ foundation shall be reckoned as the start of Contract Period. Small components like packer plates, insert plates, etc. will not be considered for this purpose.

However the contractor shall have to mobilize his resources earlier than the start of contract period for preparatory work like taking over and chipping of foundations, blue matching and grouting of packer plates etc.

The contractor shall complete all the work in the scope of this contract within the contract period.

11.1.3.1 Grace Period

Grace period of **3 (Three) months** beyond the Contract Period is provided for this contract. However, all milestone events as per actual requirement of project schedule shall have to be achieved by the contractor without taking recourse to the Grace Period.

11.2 Progress Monitoring, Contract Extension and Over Run

11.2.1 Progress Monitoring

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

11.2.2 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 Clause 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:

11.2.2.1

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

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

11.2.2.2 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.

11.2.2.3 Erection / Commissioning programme not achieved due to any other reasons not attributable to the contractor.

11.3 Contract Extension

11.3.1

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

11.3.2

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 11.2.2 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.

11.3.3
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.

11.4 Overrun Compensation

If the contract is extended beyond the contract (Regular plus Grace Periods) including grace) period for any reason other than those attributable to the contractor or force majeure conditions, the contractor will be compensated by payment of overrun charges at the rate of **Rs. 50,000/- (Rupees fifty thousand only) per month.** Overrun compensation will be paid for the extension attributable to BHEL only. No overrun compensation will be payable for the extension on account of reasons attributable to contractor and / or force majeure conditions.

11.5 Price Variation

Agreed item rates shall remain firm throughout the Contract Period including Grace Period and extended period thereof. No price variation/adjustment shall be applicable for this contract and clause No.2.15 of General Conditions of Contract shall not be applicable.

11.6 Contract Variations

11.6.1 Variation In Weight

Weight of various equipments, quantities of various items of work covered under these specifications, & indicated in relevant Appendices for TG equipments & associated Aux including TG integral piping and PEM packages, is tentative and likely to vary. For any upward or downward variation in the quantities & weight for lump sum rate for these TG equipments & associated Aux including TG integral piping and PEM packages, the price accepted shall remain unchanged and be applicable without any variation.

However for External piping/Regenerating piping system the accepted item rate shall remain firm for any upward or downward variation in quantities up to plus/minus 30%. Applicable rates for quantities beyond these limits for the External piping/Regenerating piping system will be mutually discussed and decided.

11.7 Interest Bearing Recoverable Advance

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

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

11.8 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

For Erection, Testing and Commissioning of 1x500 MW STG with auxiliaries and integral piping, payments shall be made as follows on basis of percentage of agreed lumpsum value as per rate schedule. The following break up is only for the purpose of regular stage payment and should not be construed as price for individual item and also it does not constitute total scope of work. The total scope of work is as detailed in this tender document and shall be completed by contractor without making any reference to the following break up.

12.1 Stages Of Progressive Pro-Rata Payments

(A) FOR Sl. No. 01 OF RATE SCHEDULE – TG Set and auxiliaries (Including TG Integral piping)

Sl. No.	Description	%
1.0	**CONDENSER**	
1.1	Preparation of foundation	1.0
1.2	Placement, alignment, assembly and welding of bottom plate segments, hot well, NDT and spring elements placement	2.0
1.3	Assembly and positioning of water chamber, water boxes, side plates, bottom plates, welding and NDT	2.0
1.4	Assembly, alignment and welding & NDT of tube support plates and internals like baffle plates, air evacuation pipes etc.	3.0
1.5	Assembly, welding & NDT of dome walls and dome stiffeners, extraction piping and steam throw device etc.	2.5
1.6	Insertion, expansion, end milling of condenser tubes	4.0
1.7	Hydro test of steam and water side	2.0
1.8	Welding of condenser neck joint and NDT& completion of balance works	2.0
1.9	Assembly & Erection of Condenser R.E. Joints. Condenser Cooling water B.F. Valves and connecting pipes with related aux items like Power Cylinders, fittings etc.	1.5
	Total (Condenser)	**20%**

Sl. No.	Description	%
2.0	**TURBINE**	
2.1	Placement, alignment and grouting of base plates of LPC and bearing pedestals	1.5
2.2	Placement and alignment of LP outer casing bottom portion and centre guide keys	1.0
2.3	Placement of LP rotor and alignment with inner casing and checking of blade clearance	1.5
2.4	Assembly, alignment & welding of LP Outer Casing upper half	1.0
2.5	Placement of IP Turbine, lowering of IP Rotor on bearings and checking of clearances, coupling etc.	1.0
2.6	Placement of HP Turbine, lowering of HP Rotor on bearings and checking of clearances, coupling etc.	1.0
2.7	Boxing up of LP inner-inner & inner- outer and roll check	1.0
2.9	Alignment of all Rotors including reaming, honing and fixing of coupling bolts	2.0
2.10	Assembly of regulation system	1.0
2.11	Installation of ESV, IV, HP & LPBP Valves, CRH NRV, MS Strainers (internals), HRH strainers (internals)	2.0
2.12	Erection, alignment and welding of cross around piping	2.0
2.13	Final box-up of LP turbine	1.0
2.14	Completion of Turbo-visory works	1.0
2.15	Final boxing up of Pedestals after Oil Flushing completion	1.0
	Total (TURBINE)	**18%**

Sl. No.	Description	%
3.0	**TURBO GENERATOR**	
3.1	Preparation of foundation, levelling, matching and grouting of foundation plates	1.0
3.2	Unloading of stator from Railway wagon, shifting and placing of stator on foundation.	2.0
3.3	Levelling, centering and alignment of Stator	1.0
3.4	Testing of Hydrogen Coolers and insertion	1.0
3.5	Rotor Insertion and lowering on bearings.	1.0
3.6	Checking the run out, alignment of Generator Rotor, LP Turbine Rotor, Exciter rotor and grouting.	1.0
3.7	Reaming, Honing of coupling holes and fixing of coupling bolts of LP-Gen and Gen.-Exciter Rotors.	1.0
3.8	Boxing up of Generator and assembly of Hydrogen Seals	1.5
3.9	Erection of Excitation equipments & Alignment of Gen.-Exciter Rotors including Swing check and completion of balance works.	1.5
3.10	Final gas tightness test of Stator with complete system	1.0
	Total (TURBO GENERATOR)	**12%**

Sl. No.	Description	%
4.0	**PUMPS AND AUXILIARIES**	
4.1	**Erection/Testing of Boiler Feed Pumps.** **Erection / Testing of Motor Driven BFP- 2Nos.** (A) Foundation chipping, blue matching of foundation and levelling, centering of grillage/foundation frame and bolt grouting. (B) Placement of feed pump, booster pump, motor, hydraulic coupling and preliminary alignment. (C) Grouting of grillage/ foundation and final alignment of BFP, BP, Motor and HC (D) Erection of lube Oil piping, working oil coolers & other balance piping like mechanical seal water coolers with piping etc, Erection of panel/racks and oil flushing of oil piping.	3.0
4.2	Erection & Testing of Condensate Extraction Pumps- 2Nos.	2.0
4.3	Erection & Testing of C. W. Pumps & Aux like Butter Fly valves with power cylinders, Bellows, Vent & drain valves, Connecting pipe between C.P. Pumps & BF Valves and other related fittings etc.	3.0
4.4	Erection & Testing of A. C. W. Pumps & Butter Fly valves with electrical drives, Bellows, Vent & drain valves, Connecting pipe between A.C.W. Pumps & BF Valves and other related fittings etc.	1.5
4.5	Erection and Testing of Lube oil pumps, oil centrifuge, Main oil tank, Coolers, Duplex Filter and other related equipments / Items including with fittings etc.	1.5
4.6	Erection and testing of Vacuum Pumps	1.0
4.7	Erection and Testing of Seal oil and Gas System units / racks / equipments.	1.0
4.8	Erection and Testing of Control Fluid tank, C.F. Coolers, C.F. Pumps, Purification unit etc.	1.5
4.9	Erection of HP & LP heaters with standpipes and fittings.	1.5
4.10	Erection of Gland Steam Condenser, Drain cooler with fittings.	0.5
4.11	Erection of De-aerator, Feed Storage Tank and associated approach platform with ladders etc.	3.0
4.12	Erection of Tanks & Vessels like HP & LP Flash Tanks, Flash Vessel, DMCW Tank, Filtered Water tank with fittings.	2.0
4.13	Erection & commissioning of Condenser on load tube-cleaning	0.5

Sl. No.	Description	%
	package with fittings.	
4.14	Erection & commissioning of LP Chemical dosing package with fittings.	0.5
4.15	Erection & commissioning of PEM supplied central Lube oil pumps, Portable oil Purifier, Clean oil tank, Dirty oil tank and Oil unloading vessel with piping and fittings.	1.0
4.16	Erection of Misc. / other Auxiliaries	1.5
	Total (PUMPS AND AUXILIARIES)	**25%**
5.0	**INTEGRAL PIPING**	
5.1	Lube. Oil and Jacking Oil Piping	2.5
5.2	Control Fluid (Fire Retardant Fluid) Piping for ESV's, IV's, LPBP Valves, CRHNRV's etc.	1.5
5.3	HP Bypass valves oil system with aux., Nitrogen filling system, Piping and fittings (as per PGMAs 22-100, 22-101, 22-600, 22-601, 22-701, 22-889, 22-988 etc.)	1.0
5.4	Seal Steam Piping	2.0
5.5	Turbine Drainage Piping	2.0
5.6	Condensate Spray Piping	1.5
5.7	Generator Seal Oil Piping	2.0
5.8	Generator Gas Piping	1.0
5.9	Miscellaneous and Other Piping	1.5
	Total (INTEGRAL PIPING)	**15%**
6.0	**ASSISTANCE FOR COMMISSIONING**	
6.1	Oil Flushing of lube oil, seal oil and Control fluid system	1.0
6.2	Commissioning of Boiler Feed Pumps	1.5
6.3	Commissioning of C.W. and A.C.W. Pumps.	1.0
6.4	Commissioning of Condensate Extraction Pumps.	1.0
6.5	Commissioning of Condenser Vacuum Pumps.	0.5
6.6	Turbine on Barring Gear	1.0

Sl. No.	Description	%
6.7	Steam rolling and over-speed test	1.0
6.8	Synchronisation	1.0
6.9	Completion of Trial Operation	1.0
6.10	Completion of All Facilities	1.0
	Total (Assistance for Commissioning)	**10%**

(B) FOR Sl. No. 02 OF RATE SCHEDULE:- External/Re-generating piping (Carbon Steel & Alloy Steel) with valves, supports and fittings (Excluding TG Integral Piping).

Sl. No.	Part of Activity Completed	Percentage Of Accepted Item Rates (C.S. & A.S.)
A	Transport to work site & Erection / Placement in position	35%
B	Alignment, Fit-up & Welding	40%
C	NDT	5%
D	Post weld Heat Treatment	5%
E	Hydraulic Test of Pipeline	5%
F	Chemical Cleaning of Pipeline	2%
G	Steam Blowing of pipeline	3%
H	Synchronization	2%
I	Trial Operation Completion	2%
J	Completion of All Facilities	1%
	Total	100%

12.2

Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter.
The 5% thus remaining shall be on account of workmanship guarantee of work executed. The same will be released after completion of the guarantee period of 12 months from the date of completion of entire work as certified by BHEL. However, this amount may be released earlier on receipt and acceptance of bank guarantee of equal amount in prescribed format and the BG shall be kept valid till completion of such guarantee period and an additional six months claim period.

12.3 PAYMENT FOR WORK COMPLETED

12.3.1

The contractor should submit his on account bills with all the details required by BHEL on 26th of every month covering progress of work in all respects and areas up to 24th day of the same month.

12.3.2

On receipt of the bill, joint measurement and checking of the work done will be carried out by the concerned BHEL engineer as per clause 2.6 of General Conditions of the Contract and break-up given vide clause 12.0. It shall be final and binding on the contractor.

12.3.3

The payment for running bills will normally be released in around 30 days of submission of running bill that shall contain measurement sheets, protocols, log sheets, inspection records, etc. complete in all respects. Contractor shall make his own arrangement for making payment of impending labour wages and other dues in the meanwhile.

SECTION-13

SPECIAL CONDITIONS OF CONTRACT

EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION

13.1
If extra works (requiring up to 100 man-hours) for modification, rework, revamping, in brief, any work done to change the state existing to a stage desired and also fabrication, all or any, needed due to any change in or deviation from the drawings and design of equipment, operation / maintenance requirements, mismatching, transit damages and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, are done, no extra charges will be paid. The Tenderers are requested to take this aspect into account and the quoted rate should include all such contingencies.

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

13.3
However, BHEL may consider for payment as extra on man-day basis, for such of those activities detailed in clause 13.1 which require more than 100 man-hours 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.

13.4
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.

13.5
Such extra works arising out of transit, storage and erection damages, payment, if found due, will be regulated as per section-14.

13.6
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.

13.7
BHEL may, at their absolute discretion, consider for payment, as extra on man-day basis as found by them as justifiable for such of those works specified in clause no. 13.1 which require major modification / repair / rework / rectification etc. It may also be noted that only those works which are identified as major and warrant extra payment and certified as

such by BHEL site engineer, accepted by the designers, and / or competent authority of BHEL will be considered for extra payment.

13.8

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

MAN HOUR RATE FOR ELIGIBLE EXTRA WORKS

Average man-hour rate including overtime if any, and other site expenses and incidentals, including supervision, consumables, tools and tackles, will be Rs. 40/- (Rupees forty only) per man-hour.

No payment will be made, if an item of work lasts less than 100 man-hours.

SECTION-14
SPECIAL CONDITIONS OF CONTRACT
INSURANCE

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 repeated and continued instances of negligence/failure attributable to the contractor, the expenses incurred on account of repair/ replacement of such components including BHEL's overhead expenses as applicable (presently @ 30%) in excess of the amount realized from the underwriters, if any, shall be recovered from the contractor. Recovery will be limited to Normal Deductible Franchise (DF)/Excess as per applicable Insurance (TAC) tariff guidelines for every incidence of loss/damage. However, in case the underwriters citing reasons of wilful negligence/ damage/loss attributable to the contractor summarily reject such insurance claim, the total cost of repair/ replacement with BHEL overhead expenses shall be recovered from the contractor.

14.3.1 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 tenderer has to bear any expenses /consequences over and above the amount that may be reimbursed to BHEL by such coverage of third party liability insurance taken by BHEL.

Such additional liability will be to cover and indemnify BHEL and its customer of all liabilities which may come up and cause harm/damage to other contractors/customer/BHEL properties/personnel or all or anybody rendering service to BHEL/customer or is connected with BHEL/ customer's work in any manner whatsoever. The tenderer'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

15.1 EARNEST MONEY DEPOSIT:

EARNEST MONEY DEPOSIT FOR THIS TENDER WILL BE Rs. 2,00,000/- (RUPEES TWO LACS ONLY).

ONE TIME EMD WILL ALSO BE Rs. 2 LACS.

EMD SHALL BE DEPOSITED IN CASH (AS PERMISSIBLE UNDER INCOME TAX ACT), PAY ORDER OR DEMAND DRAFT (PAYABLE AT NAGPUR IN FAVOUR OF 'BHARAT HEAVY ELECTRICALS LIMITED') ONLY. **NO OTHER FORM OF EMD REMITTENCE SHALL BE ACCEPTABLE TO BHEL.**

15.1.1 EMD BY THE TENDERER WILL BE FORFEITED AS PER TENDER DOCUMENTS IF

I) AFTER OPENING THE TENDER, THE TENDERER REVOKES HIS TENDER WITHIN THE VALIDITY PERIOD OR INCREASES HIS EARLIER QUOTED RATES.

II) THE TENDERER DOES NOT COMMENCE THE WORK WITHIN THE PERIOD AS PER LOI / CONTRACT. IN CASE THE LOI / CONTRACT IS SILENT IN THIS REGARD THEN WITHIN 15 DAYS AFTER AWARD OF CONTRACT.

15.1.2 EMD SHALL NOT CARRY ANY INTEREST.

15.2 SECURITY DEPOSIT

15.2.1 SECURITY DEPOSIT SHOULD BE COLLECTED FROM THE SUCCESSFUL TENDERER. THE RATE OF SECURITY DEPOSIT WILL BE AS BELOW:

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

THE SECURITY DEPOSIT SHALL BE REMITTED <u>BEFORE START OF THE WORK</u> BY THE CONTRACTOR IN THE MANNER SPECIFIED AS FOLLOWS.

15.2.2 SECURITY DEPOSIT MAY BE FURNISHED IN ANY ONE OF THE FOLLOWING FORMS

I) CASH (AS PERMISSIBLE UNDER THE INCOME TAX ACT)

II) PAY ORDER, DEMAND DRAFT IN FAVOUR OF BHEL.

III) LOCAL CHEQUES OF SCHEDULED BANKS, SUBJECT TO REALIZATION.

IV) SECURITIES AVAILABLE FROM POST OFFICES SUCH AS NATIONAL SAVINGS CERTIFICATES, KISAN VIKAS PATRAS ETC.

(CERTIFICATES SHOULD BE HELD IN THE NAME OF CONTRACTOR FURNISHING THE SECURITY AND DULY PLEDGED IN FAVOUR OF BHEL AND DISCHARGED ON THE BACK).

V) BANK GUARANTEE FROM SCHEDULED BANKS / PUBLIC FINANCIAL INSTITUTIONS AS DEFINED IN THE COMPANIES ACT SUBJECT TO A MAXIMUM OF 50% OF THE TOTAL SECURITY DEPOSIT VALUE. THE BALANCE 50% HAS TO BE REMITTED EITHER BY CASH OR IN THE OTHER FORM OF SECURITY. THE BANK GUARANTEE FORMAT SHOULD HAVE THE APPROVAL OF BHEL.

VI) FIXED DEPOSIT RECEIPT ISSUED BY SCHEDULED BANKS / PUBLIC FINANCIAL INSTITUTIONS AS DEFINED IN THE COMPANIES ACT. THE FDR SHOULD BE IN THE NAME OF THE CONTRACTOR, A/C BHEL, DULY DISCHARGED ON THE BACK.

VII) SECURITY DEPOSIT CAN ALSO BE RECOVERED AT THE RATE OF 10% FROM THE RUNNING BILLS. HOWEVER IN SUCH CASES AT LEAST 50% OF THE SECURITY DEPOSIT SHOULD BE REMITTED (BY BANK GUARANTEE OR DEMAND DRAFT) BEFORE START OF THE WORK AND THE BALANCE 50% MAY BE RECOVERED FROM THE RUNNING BILLS.

VIII) EMD OF THE SUCCESSFUL TENDERER, EXCEPTING THOSE WHO HAVE REMITTED ONE TIME EMD, SHALL BE CONVERTED AND ADJUSTED AGAINST THE SECURITY DEPOSIT.

IX) THE SECURITY DEPOSIT SHALL NOT CARRY ANY INTEREST.

NOTE: ACCEPTANCE OF SECURITY DEPOSIT AGAINST SL. NO. (IV) AND (VI) ABOVE WILL BE SUBJECT TO HYPOTHECATION OR ENDORSEMENT ON THE DOCUMENTS IN FAVOUR OF BHEL. HOWEVER, BHEL WILL NOT BE LIABLE OR RESPONSIBLE IN ANY MANNER FOR THE COLLECTION OF INTEREST OR RENEWAL OF THE DOCUMENTS OR IN ANY OTHER MATTER CONNECTED THEREWITH.

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

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

A) STEAM TURBINE

1. Steam Turbine consists of 3 cylinders (HP/IP/LP) including the following :

   a. Sole / Base Plates & Foundation Holding Bolts.

   b. Bearing Pedestals.

   c. ESV & CV, IV & CV, LPBP Valves with Servomotors & Suspensions, LP BP water injection valves, HP & LP Bypass valves with Oil System equipments and oil piping.

   d. Steam Strainer Housing & Strainer Elements for Main Steam & Re-heat Steam Lines.

   e. Hydraulic Turning Gear.

   f. Electro – Hydraulic Governing System backed up with Hydro mechanical system.

   g. Governing Racks, LP By pass racks and solenoid & Test valve racks.

   h. Cross around Piping between IP & LP casing.

   i. Blanking Device / Fixtures for ESVs, IVs, LPBP, CRH NRV etc., for hydraulic testing and steam blowing.

   j. Extraction Steam pipeline from LP turbine to condenser dome wall.

1. Lube Oil system consists of piping, Oil tanks, injector assy., Oil Centrifuge, AOP, JOP and EOP with starter panels, Leak & Dirty Oil Tank with pumps, Duplex filter and oil vapour fans, Central Lube. Oil System and other auxiliaries.

2. Control Fluid System consists of piping, tanks, pumps, motor, Oil Centrifuge, heaters, filters, vapour exhausters etc.

3. Suitable interconnection of the existing unit no 1 system with Lub oil system of unit 2.

B. TURBO-GENERATOR :

1. Hydrogen cooled main Generator consists of the following.

   a. Stator

   b. Rotor

   c. End Shields & Bearing

   d. Brush-less Exciter

   e. Seal Oil System

   f. H2 cooling system

   g. H_2 /Co2/N2 Gas system

   h. Other Accessories.

C. HEAT EXCHANGERS.

1. Condenser, mainly comprising of the following parts.

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

a. Bottom Plate
b. Turbine end & Generator end Side Plates.
c. Dome walls
d. Front & Rear water chambers with tube plates
e. Support plates.
f. Hot Well
g. Spring Elements and supports
h. Steam Throw Device
i. Air Extraction Pipe and Baffle.
j. Stiffening Pipes, Rods & Slabs
k. Instruments & Fittings, loose parts etc.
l. Condenser tubes (Stainless Steel)
m. R.E. Joints. (4 Nos., 2 Nos. each for inlet assy-weight 9.3 MT per piece & outlet assy- weight 8.5 MT per piece)
n. Butter fly valves (4 Nos. Each size NB-1800 & weight 9388 Kg.)

2. Gland Steam Condenser with attachments & fittings.
3. LP Heaters 1, 2 & 3 with attachments and fittings
4. HP Heater 5 & 6 with attachments and fittings.
5. Drain Cooler with fittings.
6. De-aerator & Feed Storage Tanks (in Three Section) with attachments, fittings and platform.
7. Turbine Oil Coolers
8. Seal Oil Coolers.
9. Hydrogen Coolers.
10. Exciter Air Coolers.
11. Control Fluid Coolers.

D. PUMPS & MOTORS.

1. Boiler Feed Pumps – Two sets : Each Comprises of:
    a. Boiler feed pump with tubing.
    b. Booster pump with base plates & tubing.
    c. Hydraulic coupling.
    d. BFP Motor.
    e. BFP Base plate.
    f. Hydraulic coupling stool.
    g. Lube oil cooler for Hydraulic Coupling.

h. Working oil cooler for H.C.

i. Hydraulic coupling pipes & Accessories.

j. Re-circulation valves.

k. Suction Strainers for BFP.

l. Local gauge racks for BFP.

m. Lube Oil Cooling system, Seal water cooling system and other accessories for pumps.

2. Condensate Extraction Pumps- Two sets :each comprises of

a) Condensate Extraction Pump assembly.

b) Foundation frame.

c) Canister.

d) Basket type suction strainer.

e) Local gauge rack.

f) CEP Motor.

3. C.W. Pumps- 3 sets: Each comprises of :

Bell mouth, Casing, Impeller, Elements-I, Element-II, Element-III, Element-IV, Discharge Elbow, Spool Piece, Suspension, Motor Stool, FDW pump-2 Nos., Shaft, Thrust Bearing, Fasteners, C/Flanges, Motor, Hydraulically operated Butterfly Valves (size NB-1600 mm, weight 7296 Kg each)

E. BOUGHT OUT ITEMS (BHEL HARDWAR Scope)

1. Turbine Integral Piping (along with Hangers & Supports, Valves and fittings) Consisting of :

b. Lube Oil Piping.

c. Control Fluid (Fire Retardant Fluid) Piping.

d. Seal Oil Piping.

e. Gland Seal Piping

f. Equipment Drains & Vent

g. Cross Around Piping.

h. Gas & Air System Piping.

i. Condensate Spray Piping

j. Turbine Water Drainage Piping

k. Other Misc. system Piping etc.,

2. Condenser Air Evacuation Vacuum Pumps-2 sets

3. H2 Cylinders-120 Nos.

4. Co2 Cylinders –63 Nos.

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

5. N2 Cylinders-5 Nos.
6. Vapour Exhausters-2 sets
7. Motorised temperature Control Valve with actuator – 1 set.
8. Refrigeration Gas Drier- 2 sets.
9. Lifting Beam and slings for Generator Stator – 1 set
10. Welded Austenitic S.S. Tubes Gr.304 for Condenser – lot
11. Air Exhauster with motor for GSC Air Exhauster – 2 sets
12. Lifting Beam – 1 set
13. Jacking oil pump with Motor- 1set.
14. Aux. oil pump & Emergency oil Pump with Motor- 1 set each.
15. Duplex filers for Lube oil & Jacking oil pump with Motor – set for each.
16. Butter fly valves – 1 lot.
17. Three way temperature Control valves – 1 set.
18. Double three way valve –1 set.
19. NRV with Al. flap – 1 set.
20. Pressure limit valve – 1 set.
21. Oil purification unit (Oil centrifuge) - 3 sets
22. Oil Vapour Exhauster – 2 sets.
23. Lead Diaphragm – 1 set.
24. Spay Nozzles – lot.
25. Dirt Catcher – 1 set.
26. Dampers – lot.
27. Variable Load Spring Cages – lot.
28. Flexible Bends – lot.
29. Vacuum Breaker Valve Assy. Along with solenoid valve- 1 set.
30. Turbine oil & Control fluid - lot
31. Dry Air preservation system.—1 set
32. Flow Nozzle for PG Test - lot
32. Through Port Gate Valves-lot
33. Spring Loaded NRV'- lot
34. Control Fluid Pumps – 2 sets.
35. C.F. Vapour Exhausters – 2 sets
36. Control Fluid Purification Unit – 1 set
37. Control Fluid Tank (S.S.) – 1 set

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

38. On Line Control Fluid Heater – 1 set
39. Bypass Stop Valve & Control Valve with EHA – set.
40. Gear Pump (Lube oil Re-circulation) – 1 set.
41. Gear Pump (Control Fluid Re-circulation - 2sets.
42. Hydraulic Accumulators with filling & Gauge device- 1 set.
43. Seal Steam & Leakage Steam Control Valve with Actuator- 1 set.
44. Seal Oil Vapour Exhauster.

F- Other Bought-Out (PEM) Packages/items to erected/ commissioned under this scope of work.

1. ME Bellows.
2. Steam traps.
3. Air Release valves
4. ACW Pumps with RE Joints & Butter fly valves-3 Sets (Total weight 40MT)
5. **Condenser On Load Tube Cleaning System(2 sets –total weight 18.0 MT)**: Each comprising of Ball Separator, Ball vessel, V-piece, Worm gear (Ball Separator), Ball valves (manual, Ball Valves (actuator oper.) , Ball re-circulating pump, Injection Pipe, DP flushing Pump, Solenoid Valves, Actuator(Ball separator), Motor (Ball re-circulator), Actuator(Ball valves) etc.
6. Portable oil Lube oil Purifier.
7. Chemical Dosing system (LP)
8. Lube oil pumps – 3 sets (Total weight 1.0 MT)
9. Control valves.
10. Flow Elements
11. Interconnection of existing regenerative system for unit 1 with CPU of unit 2.

G- Flash Tanks & Vessels

Sl.NO	DESCRIPTION	PACKAGE SIZE	WT.IN KG
1.	HP Drain Flash Tank – 1 No.	2600X3000X3950	4600
2.	LP Drain Flash Tank - 1 No.	2950X2200X2700	3400
3.	Flash Vessel – 1 No.	1400x1300x2300	1180
4.	Clean Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

Sl.NO	DESCRIPTION	PACKAGE SIZE	WT.IN KG
5.	Dirty Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000
6.	Oil unloading Tank with fittings/ attachment – 1 No.	2000X1000X500	650
7.	DM CW System Tank with fittings/ attachment – 1 No.	2000x2000x2500	2800
8.	Filtered Water Tank with fittings/ attachment – 1 No.	4000x4000x3500	10800
		Total Weight	45430

H- List of piping Schemes applicable:

1. TG Integral Piping:

a) Seal Steam piping.
b) Condensate Spray piping.
c) Lube oil piping (Lube oil, Jacking oil).
d) Control/ Governing fluid (Fire Retardant Fluid) piping.
e) Turbine drainage piping
f) Cooling water piping.
g) Seal oil system piping.
h) Generator Gas system piping.
i) LP turbine extractions to condenser.

2. External /Regenerative System Piping:

a) Extraction Steam to LP Heater-1 (PGMA-80-330)
b) Extraction Steam to LP Heater-2 (PGMA-80-331)
c) Extraction Steam to LP Heater-3 (PGMA-80-332)
d) Extraction Steam to HP Heater-1 (PGMA-80-336)
e) Extraction Steam to HP Heater-2 (PGMA-80-337)
f) Lube oil piping system (PGMA 80-673)
g) HRH From interceptor valve to Turbine (PGMA 80-311)
h) LPBP Valve upstream & Down Stream (PGMA 80-312)
i) HPBP Valve to CRH piping (PGMA 80-321)

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

j) Unlisted SV Exhausts –TG Scope (PGMA 80-375)

k) HP Heater Vents – TG Scope (PGMA 80-381)

l) LP Heater Vents (PGMA 80-382)

m)Vent from Unlisted PPG/Equipment to Condenser (PGMA 80-385)

n) Condensate Pump vents (PGMA 80-387)

o) Condensate Air Evacuation Piping (PGMA 80-388)

p) Turbine Washing Steam (PGMA 80-398)

q) Condensate Suction (PGMA 80-400)

r) CD from Pump to LPH-1/DC inlet TEE & Recir. (PGMA 80-401)

s) CD from LPH-1/DC inlet TEE to TG TP (PGMA 80-402)

t) Condensate For sealing of Vacuum (PGMA 80- 407)

u) Condensate Dump from Header (PGMS 80-408)

v) Condensate / Make up to Condenser (PGMA 80-411)

w) Unlisted Condensate (PGMA 80-413)

x) Condenser Drain (PGMA 80-440)

y) Gland Steam Cooler Drains (PGMA 80-442)

z) LP Heater-1 to Condenser (PGMA 80-443)

aa) LP Heater-1 to Condenser (PGMA 80-443)

bb) LP Heater-2/3/4/5 Drains & Drip Pump Incl. (PGMA 80-444)

cc) HP Heater Drains (PGMA 80-447)

dd) TG Cycle piping Drains & Vents (PGMA 80-449)

ee) TG Aux. Cooling water piping (PGMA 80-463)

ff) Sub-delivery valves for Light up (PGMA 80-901 part)

gg) H&S for Hydro test (PGMA 80-920 part)

hh) H & S for Light up – Non Steam lines (PGMA 80-922 part)

ii) H & S for Steam Blowing (PGMA 80-923 part)

jj) H & S for Synchronisation- Steam Lines (PGMA 80-924) part

kk) H & S for Steam Blowing –Non Steam lines (PGMA 80-925) part

ll) Other valves /NRVs & QCNRVs as supplied for TG equipments and applicable scope of piping under this tender specification.

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 system in all respects.

APPENDIX – I

LIST OF EQUIPMENTS / COMPONENTS TO BE ERECTED BY THE CONTRACTOR

2. Any other systems / components which are the integral to equipment supplied by the manufacturing unit also to be erected and commissioned by the contractor within the quoted / accepted rate / lump sum value.

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
A.	**STEAM TURBINE:**		
1.	HP TURBINE	5060x3100x2900	56100
2.	HP INLET ASSY.	450X450X200	45
3.	HP EXHAUST ASSY.	1625X1335X675	1190
4.	HPT RELATED PARTS	1000X1000X500	190
5.	FRONT BEARING PEDESTAL	2950X2600X1600	12280
6.	PARTS OF FRONT BEARING	1800X1700X1000	600
7.	PARTS OF FRONT BEARING PEDESTAL	SUITABLE PACKAGE	115
8.	VALVE SUPPORT FOR HP OVERHAUL	1000X1000X400	800
9.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3800X2500X1200	6864
10.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3800X2100X900	1800
11.	COMPENENTS OF ASSY. FIXTURE FOR HPT	3300X2100X1210	3352
12.	COMPENENTS OF ASSY. FIXTURE FOR HPT	5010X4000X120	3356
13.	HYDRAULIC TURNING GEAR	1400X1400X1200	1000
14.	STEAM BLOWING & TEST DEVICE	2900X2100X1140	3160
15.	GLAND STEAM VALVE WITH ACT.	1750X1400X850	500
16.	ESV & CV CASING WITH VALVES	2850X2600X1900	2X8515
17.	ESV SERVO MOTOR WITH L.S.V MTG.	2100X1350X1250	2X1662
18.	LIMIT SWITCH MTG. TEST VALVES	2100X1350X1250	2X1900
19.	CONTROL VALVES SERVO MOTORS	2000X1500X1500	2X1900
20.	IP TURBINE	5750x3800x4070	58175
21.	I.P. TURBINE PARTS	700X700X500	285
22.	I.P. INLET PIPE ASSY	3700X2200X1900	7130
23.	INSPECTION SHAFT FOR IPC	3300X700X700	775
24.	HP-IP BEARING PEDESTAL ASSY.	4080X2005X2126	13275
25.	HP-IP BEARING PEDESTAL PARTS	1000X600X600	388
26.	HP-IP BEARING PEDESTAL PARTS	500X200X150	38
27.	AUX. OF IP TURBINE	1050X480X550	390
28.	AUX. OF IP TURBINE	1100X500X650	2X204
29.	SUSPENSION OF VALVE (IV)	3500X1500X700	2X2700
30.	ASSY DEVICE FOR VALVES	920X1000X450	213
31.	I.P. CONTROL VALVE SERVOMOTORS	2000X1300X1350	2X1880
32.	IV & CV CASING WITH VALVES	3790x3450x2565	2X18696
33.	FRAME FOR SUSPENSION (IV)	SUITABLE PACKAGE	2X765
34.	LOOSE ITEMS OF FRAME FOR SUSPENSION	600X450X250	300
35.	SOLE PLATE PEDESTAL ASSY.	3400X1200X800	2510
36.	BASE PLATE ASSEMBLY	4500X1400X1200	4500
37.	BASE PLATE ASSEMBLY	2300X1250X600	2560
38.	BASE PLATE LP CASING	2300X2075X981	2680
39.	LP ROTOR	6200x3010x2920	56572
40.	LP OUTER CASING PARTS	7060X1480X2760	2X8085

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
41.	LPC OUTER CASING PARTS	4570X3230X980	2X2500
42.	COMPONENTS OF LP CASING UPPER PART	3500X300X300	495
43.	LP OUTER CASING PATRS	3450 X 1000X1100	900
44.	ASSEMBLY DEVICES	900X700X550	180
45.	AUX. OF LP TURBINE	3000X1300X1000	2100
46.	AUX. OF LP TURBINE	2000X1000X1825	2X1142
47.	LP JOINT COVERING	2300X1800X940	1235
48.	ASSY. TOOLS	1900X1000X890	500
49.	CAP (SPRING SUPPORT)	825X500X400	2X400
50.	CAP (COMPEN.ASSY)	3240X1740X1340	2X3500
51.	CAP (OBLIQUE REDUCER ASSY)	1400X1400X1200	800
52.	CAP (MIDDLE BEND ASSY)	1550X1550X1300	670
53.	CAP (COMPLEN. ASSY)	3240X1740X1340	3512
54.	CAP (MAN-HOLE ASSY)	1500X1600X1100	2X750
55.	CAP (MITRE BEND ASSY)	1550X1550X1300	2X670
56.	CAP (PIPE ASSY)	2000X1100X1200	645
57.	CAP (MITRE BEND ASSY)	1550X1550X1300	670
58.	LONGITUDINAL GIRDER (LEFT & RIGHT)	6800X1820X1570	2X15182
59.	LP FRONT WALL (TS & GS)	6820X3750X910	2X10053
60.	LP SHAFT SEALING FRONT	1800X1700X740	2X2260
61.	LP SHAFT SEAL COMPENSATOR ASSY (TS)	1440X1420X520	2X1456
62.	LP CASING ASSY (FATRENERS)	1800X1700X740	2653
63.	LP CASING ASSY (PARTS)	3760X2060X860	4900
64.	LP CASING ASSY (PARTS)	450X450X250	4900
65.	EXTRACTION PIPE LINE (LPC)	1600X1000X750	520
66.	EXTRACTION PIPE LINE (LPC)	3100X1350X750	670
67.	EXTRACTION PIPE LINE (LPC)	2400X1350X850	1004
68.	EXTRACTION PIPE LINE (LPC)	3300X1100X700	2X725
69.	EXTRACTION PIPE LINE (LPC)	2700X1200X750	585
70.	EXTRACTION PIPE LINE (LPC)	1100X850X850	315
71.	EXTRACTION PIPE LINE (LPC)	2700X1750X1100	730
72.	EXTRACTION PIPE LINE (LPC)	1550X1450X900	538
73.	EXTRACTION PIPE LINE (LPC)	2000X600X600	345
74.	EXTRACTION PIPE LINE (LPC)	2600X2000X1400	1330
75.	INNER GUIDE PLATE OF DIFFUSER (TS & GS)	2600X2400X1000	2X2134
76.	DIFFUSER (TS & GS)	4880X1730X2340	2X3640
77.	LP- GEN. PEDESTAL ASSY	3220X2285X2075	10200
78.	IP- LP PEDESTAL ASSY	3700X1860X2100	14600
79.	LP INNER OUTER CASING (U/H)	6720X3150X2325	21750
80.	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2325	30907
81.	LP INNER CASING ASSY (FASTENERS)	1800X1700X740	1760
82.	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000	11722
83.	STEAM INLET PIPE (LPT)	2700X1300X900	840

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
84.	BEARING PEDESTAL PARTS	1000X700X700	850
85.	STUD HEATING DEVICE & BREACHNUT HEATING DEVICE	1500X1200X250	315
86.	CRH NRV WITH SERVOMOTOR	3100X3040X2410	5860
87.	STEAM BLOWING DEVICE CRH NRV	2000X1000X500	973
88.	GOVERNING CONTROL RACK ASSY	4700X1900X3300	4000
89.	LPBY PASS VALVE SUSPENSION	2900X1200X300	1000
90.	OIL FLUSHING & PRESSURE TEST DEVICE	750X400X550	130
91.	MAIN OIL TANK & NOZZLE ARGMNT.ASSY.	5180 x 3120 x 2650	9100
92.	MAIN OIL TANK & NOZZLE ARGMNT.ASSY.	3600 x 1100 x 800	550
93.	INJECTION FOR SUCTION PIPE NB300	3300X1750X1200	999
94.	INJECTION FOR SUCTION PIPE NB350	3300X800X800	588
95.	OIL STRIPPER	600X600X850	2X133
96.	OIL STRINERS	2050X1200X1410	568
97.	VARIABLE ORIFICES THROTTLE VALVE	1000X500X250	115
98.	LEAKAGE OIL TANK	1000X1000X3000	515
99.	WASTE OIL TANK	1000X1000X3000	515
100.	OIL STRAINERS	2050X1200X1410	470
101.	CHANGE OVER VALVE	500X400X200	49
102.	ATT. SOLENOID VALVES	600X300X300	90
103.	TURBINE INTRUMENT RACKS	2750X1000X800	858
104.	TURBINE INTRUMENT RACKS	2300X750X750	765
105.	HOUSING FOR MS STRINER	1700X1025X900	3000
106.	HOUSING FOR MS STRINER	1725X1025X730	3000
107.	STEAM STRINER ASSY DEVICE	SUITABLE PACKAGE	652
108.	OPEN HOUSING FOR HRH STEM STRINER	2200X1450X1100	2X3500
109.	MAIN STEAM STRAINER	1100X700X350	2X374
110.	HRH STRAINER	1600X1450X750	2X485
111.	STEAM STRAINER HOUSING BLANKING DEVICE ARRNMT.	1800X1650X1140	2945
112.	COMPENSATOR	600X600X900	50
B:	**GENERATOR :**		
15.	FOUNDATION ITEMS OF GEN.	3380X760X840	4345
16.	FOUNDATION ITEMS OF GEN.	2240X940X1220	2880
17.	STATOR	7520x4200x4770	218000
18.	ROTOR	10550x1560x1660	47742
19.	END SHIELD LOWER HALF (TE)	3800x1155x2100	6000
20.	END SHIELD LOWER HALF (EE)	3800x1155x2100	6000
21.	END SHIELD UPPER HALF (EE)	3800x1155x2100	5600
22.	END SHIELD UPPER HALF (TE)	3800x1155x2100	5600
23.	H.V. BUSHING	2000x950x600	950
24.	LOOSE ITEMS OF WOUND STATOR	1500X1200X1000	1000
25.	GENERATOR ACCESSORIES	2140X1240X1040	1546
26.	TERMINAL BUSHING BOX	1100X835X950	4075

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
27.	GAS BAFFLE RING, INSERT COVER ETC	3700X3500X1340	4364
28.	BEARING SHELLS	1100X835X950	953
29.	SEAL RINGS	600x600 x200	73
30.	DEVICE FOR ROTOR INSERTION	2240X940X1220	1036
31.	ERECTION DEVICES	2550X1180X1140	997
32.	ERTECTION ROPES	1800X1450X200	210
33.	DRY AIR BLOWER	1350X1250X800	190
34.	TERMINAL CONNECTORS	1840X660X400	506
35.	BRUSHLESS EXCITER SET	5670x2390x2870	22386
36.	EXCITER FRONT COVER	4310X2950X2950	4122
37.	RR. WHEEL COVER & SEALING WALL DE FOR EXCITER	1800X1600X1600	970
38.	EXCITER REAR COVER	4330 X 3050 X 2950	3909
39.	EXCITER BED PLATE ACCESSORIES	5500 X 1050 X 800	3212
40.	EXCITER ACCESSORIES	2400X1100X1400	642
41.	SEAL OIL STORAGE TANK	3500X1300X1280	1460
42.	H2 DISTRIBUTER	3480X1540X440	1150
43.	CO2 DISTRIBUTER	2770X1240X440	247
44.	SEAL OIL UNIT-I	3550X2900X3700	9160
45.	SEAL OIL UNIT-II	3610X2040X1850	3263
46.	COOLER RACK ASSY FOR EXCITER	3000X1800X1100	1551
47.	GAS UNIT	2550X1790X2560	1150
48.	LIQUID DETECTOR RACK	1700X900X1800	450
49.	LOOSE VALVES	2000X1000X1000	959
50.	LOOSE INSTRUMENTS	1000X1000X500	80
51.	CO2 VAPURISER	1520X640X840	225
52.	GEN. PIPING	6650 X1250 X1200	5374
53.	GEN. PIPING	6150X1500X1200	3368
54.	GEN. PIPING	1900X1500X600	1752
55.	CONSUMABLES FOR FOUNDATION ITEMS	7520X4200X4770	15
56.	CONSUMABLES	500X600X300	45
57.	LOOSE ITEMS	1000X600X400	30
58.	LOOSE ITEMS	1000X800X400	90
C:	**HEAT EXCHANGERS** **I) CONDENSER**		
1.	HOTWELL	11200x 1900x1200	6913
2.	BOTTOM PLATE	7150x3450x625	2x6793
3.	BOTTOM PLATE	7150x3850x625	8296
4.	MIDDLE BOTTOM	1900x700x300	271
5.	CONDENSER SUPPRT	1750X1000X1250	4X3450
6.	CONDENSER SUPPRT	1600X950X950	4660
7.	WATER CHAMBER (LHS)	5224X3610X360	2X6150
8.	WATER CHAMBER (RHS)	5224X3610X360	2X6150
9.	FRONT WATER BOX (G.S.)	5950X3610X2485	15867
10.	FRONT WATER BOX (T.S.)	5950X3610X2485	15867
11.	REAR WATER BOX (GEN. SIDE)	4760X3610X2025	9576
12.	REAR WATER BOX (TUR. SIDE)	4760X3610X2025	9576

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
13.	SIDE WALL (TUR. SIDE)	5246X2480X16	1105
14.	SIDE WALL (TUR. SIDE)	5246X2480X16	3X1645
15.	SIDE WALL (TUR. SIDE)	5246X1670X16	1080
16.	SIDE WALL (TUR. SIDE)	1000X350X250	200
17.	SIDE WALL (TUR. SIDE)	1000X200X150	550
18.	SIDE WALL (GEN.END)	5248X1705X16	1105
19.	SIDE WALL (GEN.END)	5248X2480X16	3X1645
20.	SIDE WALL (GEN.END)	5248X1670X16	1080
21.	SIDE WALL (GEN.END)	1000X350X250	200
22.	SIDE WALL (GEN.END)	5850X200X150	550
23.	SHELL INTERNAL DETAILS	3650X850X625	4X4780
24.	SHELL INTERNAL DETAILS	1000X750X350	600
25.	SHELL INTERNAL DETAILS	3700X850X350	4600
26.	AIR EXTRACTION PIPING	5460X990X410	1200
27.	SHELL INTERNAL DETAILS	4700X3426X348	7X4100
28.	SHELL INTERNAL DETAILS	5500X940X630	7560
29.	SHELL INTERNAL DETAILS	4440X260X100	350
30.	SHELL INTERNAL DETAILS	3000X1500X500	4655
31.	LOWER DOME WALL (T.S)	11000X3950X910	8767
32.	LOWER DOME WALL (T.S)	4000X800X100	700
33.	LOWER DOME WALL (T.S)	900X300X300	270
34.	LOWER DOME WALL (G.S)	11000X3950X910	7690
35.	LOWER DOME WALL (G.S)	4000X800X100	700
36.	DOME WALL (G.S)	900X300X300	270
37.	LOWER DOME WALL (F.W.B SIDE)	7502X4046X545	6012
38.	LOWER DOME WALL (F.W.B SIDE)	6238X934X1155	1444
39.	LOWER DOME WALL (F.W.B SIDE)	1325X1150X500	550
40.	LOWER DOME WALL (R.W.B SIDE)	7550X4000X1800	6727
41.	LOWER DOME WALL (R.W.B SIDE)	6236X1134X1160	1427
42.	LOWER DOME WALL (R.W.B SIDE) LOOSE ITEMS	1300X1065X305	215
43.	DOME INTERNAL STIFFENING	6016X200X200	4X726
44.	DOME INTERNAL STIFFENING	3400X200X200	2X382
45.	DOME INTERNAL STIFFENING	1760X1480X1230	4300
46.	DOME INTERNAL STIFFENING	2380X1310X1100	4295
47.	UPPER DOME WALL (T/GEN.SIDE.)	6800X460X310	2X1083
48.	UPPER DOME WALL (F/W/B.SIDE.)	5880X1930X380	3635
49.	UPPER DOME WALL LOOSE ITEMS	5400X350X32	475
50.	UPPER DOME WALL LOOSE ITEMS	670X250X450	410
51.	UPPER DOME WALL LOOSE ITEMS	5880X1930X448	3270
52.	WATER BOX REMOVAL DEVICE	2500X1000X750	2600
53.	WATER BOX REMOVAL DEVICE	2000X1500X500	2135
54.	FRAME	1840X840X230	2X650
55.	STEAM THROW DEVICE	1000X800X800	2X970
56.	CONDENSER LOOSE ITEMS	850X250X250	30

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

SN	DESCRIPTION	PACKAGE SIZE IN MM	GROSS WT. IN KG.
57.	CONDENSER LOOSE ITEMS	2900X956X406	380
58.	CONDENSER LOOSE ITEMS	1000X500X500	275
59.	CONDENSER LOOSE ITEMS	1000X800X800	1450
60.	CONDENSER LOOSE ITEMS	600X320X200	6
61.	CONDENSER LOOSE ITEMS	3300X250X200	200
62.	STAND PIPE No.1	2750X420X400	61
63.	CONDENSER STAND PIPE	3150X350X330	300
64.	STAND PIPE No.2	2750X420X390	62
65.	CONDENSER SPRING SUPPRTS-2X28 Nos.)	--	17545
66.	CONDENSER SS TUBES (OD 28.575 MMX 0.889 MM TH.-296 Nos. AND OD 28.575 MMX 0.7112 MM TH.-15368 Nos.)	SUITABLE BOXES	87000
C:	**HEAT EXCHANGERS ii) HEATERS & COOLERS**		
1.	HP HEATER 5	2250x2300x10500	30600
2.	HP HEATER 6	2250x2300x11850	39300
3.	LP HEATER 1	11520x1400x1550	11800
4.	LPH-1 SUPPORT	SUITABLE PACKAGE	2200
5.	LPH-1 SUPPORT STRUCTURE LOOSE	SUITABLE PACKAGE	1300
6.	LP HEATER 2	9600x1350x1735	9950
7.	LP HEATER 3	9600x1270x1835	9875
8.	DRAIN COOLER	4650x1000x1250	3500
9.	TURBINE OIL COOLERS –2 NOS.	4650x1650x1980	2x7600
10.	T O C LOOSE ITEMS	750X500X200	80
11.	T O C LOOSE ITEMS	800X600X600	60
12.	AIR COOLER	2700X850X550	892
13.	SEAL OIL STORAGE TANK	3500X1300X1280	1460
14.	HYDROGEN COOLERS - 4 NOS.	8150X830X700	4X2400
15.	HYDROGEN COOLER ITEMS	400X200X250	250
16.	EXCITER AIR COOLERS –2 NOS.	2700X850X550	2X892
17.	COOLER RACK ASSMBLY FOR EXCITER	3000X1800X1100	1551
18.	CONTROL FLUID COOLERS- 2 NOS.	2700X850X550	2X1500
19.	LOOSE ITEM CFC	6000X600X500	103
D:	**iii) FST & DEAERATOR**		
1.	FST – SECTION-I	8800X4000X4400	17200
2	FST SECTION-II	8300X4000X4400	17200
3.	FST SECTION-III	8700X4000X4400	17200
4.	DEAERATOR HEADER	9300X2400X2900	15000
5.	DEAERATOR LOOSE ITEMS STAND PIPE, SAFETY RELIEF VALVES, SPOOL PIECE ETC	LOT	1200
6.	DEAERATOR PLATFORM CARBON STEEL SCTRUCTURALS IN SECTIONS	LOT	9000

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

E- BFP Package details

Sl. No.	Description	Qty	Each Size in mm	Total wt. In Kg.
1.	Boiler feed pump with tubing	2	2600x2000x1800	2x7000
2.	Booster pump with base plate & tubing	2	2200x1900x3000	2x4600
3.	Hydraulic Coupling	2	3500x2500x3650	2x5000
4.	Motor tubing	2	1800x1900x1200	2x21000
5.	BFP Base plate	2	1800x1900x1200	2x2000
6.	Hydraulic Coupling stool	2	2000x250x500	2x230
7.	Lube oil Cooler for H.C.	2	2300x1300x500	2x850
8.	Working oil Cooler for H.C.	2	2900x1500x600	2x2100
9.	Hydraulic Coupling and accessories	2 sets	3500x1100x2800	2x1100
10.	Re-circulation Valve	2	1000x1000x2800	2x900
11.	Suction Strainer for BFP	2	1500x1500x1600	2x2500
12.	Local Gauge racks for BFP set	6	1100x900x2200	6x400
			Total wt.	**96960**

F- Details of Condensate Extraction Pumps.

SN	Description	Qty.	Each Size in mm	Total wt. (Kg.)
1.	Condensate Extraction Pump Assembly	2	6700x1700x1800	2x4150
2.	Foundation Frame	2	1600x1600x300	2x580
3.	Canister	2	4600x1200x1300	2x1920
4.	Basket type suction strainer at CEP suction	2	1600x1600x1700	2x1500

5.	Local Gauge Racks	4	1300x900x2000	4x300
6.	CEP Motor	2	2600x2600x2900	2x7000
			Total Wt.	**31510**

G- Cooling Water Pumps Package details

Sl. No.	**Description**	**Qty**	**Each Size in mm**	**Total wt. In Kg.**
1.	Bell Mount	3	2000x2000x1500	3x1600
2.	Pump Casing	3	2000x1000x1500	3x1600
3.	Impeller	3	1200x1200x1200	3x1200
4.	Element –I	3	1600x1600x1800	3x1000
5.	Element –II	3	2000x2000x1800	3x1500
6.	Element –III	3	2000x2000x1800	3x1500
7.	Element -IV	3	2000x2000x1800	3x1500
8.	Discharge Elbow	3	2500x2500x3000	3x4000
9.	Spool Piece	3	1200x1200x1500	3x800
10.	Suspension	3	3000x3000x1500	3x2500
11.	Motor Stool	3	1200x1200x1600	3x800
12.	FDW Pump	6	3000x3000x800	6x1200
13.	Shafts	3 sets	1000x1000x3500	3x2000
14.	Thrust Bearing	3	1000x1000x1000	3x1000
15.	Fasteners	3 sets	1000x1500x1500	3x1500
16.	C/Flanges	3	2000x2000x100	3x400
17.	Motor	3	3000x3000x4500	2x14000
			Total wt.	**75300**

H- R.E. Joints & Butterfly Valves packages:

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

Sl.NO	DESCRIPTION	Qty Nos.	PACKAGE SIZE	WT. IN KG.
1.	R. E. Joints- Inlet Assy.	2	5365x2800x3200	2x9300
2.	R. E. Joints- Outlet Assy.	2	2950x2800x3700	2x8500
3.	Hydraulically operative Butterfly valve (Type-1)	3	2000x2500x720	3x7296
4.	Hydraulically operative Butterfly valve (Type-2)	4	2200x2700x900	4x9388
5.	Electrically operative Butterfly valve (Type-3)	2	930x1160x405	2x1164
6.	Manually operative Butterfly valve (Type-4)	4	700x865x300	4x544
7.	Manually operative Butterfly valve (Type-5)	4	600x750x275	4x336
			Total weight	98798

I- TG-INTEGRAL PIPING

1.For Turbine (C.S. & A.S.) - 31.0 MT

2.For Turbine Fire Retardant Fluid (S.S.) - 15.0 MT

(Above FRF system has been first time introduced in 250 MW Set)

3. For Generator (CS & A.S.) for seal oil, Gas system etc. – 13.0 MT

J- Flash Tanks & Vessels

Sl. NO	DESCRIPTION	PACKAGE SIZE	WT. IN KG
1.	HP Drain Flash Tank – 1 No.	2600X3000X3950	4600
2.	LP Drain Flash Tank - 1 No.	2950X2200X2700	3400
3.	Flash Vessel – 1 No.	1400x1300x2300	1180
4.	Clean Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000
5.	Dirty Oil Tank with fittings/ attachment – 1 No.	5000X4500X3000	11000
6.	Oil unloading Tank with fittings/ attachment – 1 No.	2000X1000X500	650

7.	DM CW System Tank with fittings/ attachment – 1 No.	2000x2000x2500	2800
8.	Filtered Water Tank with fittings/ attachment – 1 No.	4000x4000x3500	10800
		Total Weight	45430

K- PEM Packages tentative weight: 60.00 MT

L- External / Re-generating Piping

Sl. No.	PGMA	DESCRIPTION	WT. IN KG	IBR
1	80-330	Extraction Steam to LP Heater-1	5900	I
2	80-331	Extraction Steam to LP Heater-2	3400	I
3	80-332	Extraction Steam to LP Heater-3	4600	I
4	80-336	Extraction Steam to HP Heater-1	2600	I
5	80-337	Extraction Steam to HP Heater-2	1600	I
6	80-673	Lube oil piping system	3500	N
7	80-311	HRH From interceptor valve to Turbine	11400	I
8	80-312	LPBP Valve upstream & Down Stream	28900	I
9	80-321	HPBP Valve to CRH piping	5200	I
10	80-375	Unlisted SV Exhausts –TG Scope	3500	N
11	80-381	HP Heater Vents – TG Scope	900	N
12	80-382	LP Heater Vents	1300	N
13	80-385	Vent from Unlisted PPG/Equipment to Condenser	2300	N
14	80-387	Condensate Pump vents	1100	N
15	80-388	Condensate Air Evacuation Piping	3200	N
16	80-398	Turbine Washing Steam	3700	I
17	80-400	Condensate Suction	3200	N
18	80-401	CD from Pump to LPH-1/DC inlet TEE & Recir.	10000	N

APPENDIX – II

LIST OF PACKAGES, ODC DETAILS, WEIGHTS ETC.,

19	80-402	CD from LPH-1/DC inlet TEE to TG TP	6300	N
20	80-407	Condensate For sealing of Vacuum	1300	N
21	80-408	Condensate Dump from Header	2200	N
22	80-411	Condensate / Make up to Condenser	2000	N
23	80-413	Unlisted Condensate	1100	N
24	80-440	Condenser Drains	200	N
25	80-442	Gland Steam Cooler Drains	300	N
26	80-443	LP Heater-1 to Condenser	1500	N
27	80-444	LP Heater-2/3/4/5 Drains & Drip Pump Incl.	3000	N
28	80-447	HP Heater Drains	9200	N
29	80-449	TG Cycle piping Drains & Vents	7300	N
30	80-463	TG Aux. Cooling water piping	86000	N
31	80-901	Sub-delivery valves for Light up	40	N
32	80-920	H&S for Hydro test	550	N
33	80-922	H & S for Light up – Non Steam lines	9000	N
34	80-923	H & S for Steam Blowing	11500	N
35	80-924	H & S for Synchronisation- Steam Lines	1500	N
36	80-925	H & S for Steam Blowing –Non Steam lines	1200	N
37	PG -22	HP Bypass valve with Oil system	39000	
38	80-913 80-918 80-919 and other valves under Job No. 7513	Root valves, Extraction line QCNRVs	76200	
		TOTAL WEIGHT	355690	

NOTE :

1. The list is tentative and has been given to enable the contractor to study the nature of work to be done in this contract. There may be variation in size,

weight etc. and no claim, whatsoever, will be entertained on account of this by BHEL.

2. Some of the packages may be sent in parts to suit the site condition / transportation, the same is to be assembled at site without any extra cost, likewise the package may be assembled together and send as a single assy. Contractor may have to dismantle and erect or, erect as single assembly as per the instruction of BHEL Engineers without any extra cost.

APPENDIX – III

WEIGHT SCHEDULE

Sl. No.	EQUIPMENT / PACKAGE	APPROX. WT. (in MT)
A.	STEAM TURBINE & AUX.	591.87
B.	TURBO GENERATOR & AUX.	377.68
C.	CONDENSER WITH AUX, RE JOINTS & BF VALVES	450.96
D.	HEATERS, DEAERATORS ETC. (HEAT EXCHANGERS)	219.30
E.	BOILER FEED PUMPS & AUX.	96.96
F.	CONDENSATE EXTRACTION PUMPS & AUX.	31.51
G.	CW PUMS & AXU.	97.19
H.	BOUGHT OUT ITEMS (BHEL Hardwar Scope)	325.00
I.	TANKS & VESSELS	45.43
J.	TG INTEGRAL PIPING	59.00
K.	EXTERNAL/RE-GENERATIVE PIPING SYSTEM	356.00
L.	BOUGHT OUT ITEMS (BHEL PEM Scope)	65.00
	TOTAL WT.	**2715.9**

Say 2716.00 MT

NOTE :

The weight indicated above is approximate and there may be a variation in weight of equipment / package. No claim, whatsoever, will be entertained by BHEL on account of variation in weight & quantities in respect of TG Equipments, TG Integral piping along with other equipments & PEM Supplied items.

However for External piping/Regenerating piping system the accepted item rate shall remain firm for any upward or downward variation in quantities up to plus/minus 30%. Applicable rates for quantities beyond these limits for the External piping/Regenerating piping system will be mutually discussed and decided.

APPENDIX – IV

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

SL.NO.	DESCRIPTION & CAPACITY OF T&P	QUANTITY	PURPOSE
01	EOT CRANE IN TG HALL 130T/30 MT CAPACITY	02 No	CUSTOMER EOT CRANE FOR HANDLING AND ERECTION WITHIN TG HALL.

NOTE:

1. ONLY ONE EOT CRANE WILL BE PROVIDED FOR TG ERECTION WORK IN TG HALL. HOWEVER FOR GENERATOR LIFTING FROM WAGON AND PLACEMENT ON FOUNDATION SECOND EOT CRANE WILL ALSO BE PROVIDED.

2. OPERATOR FOR EOT CRANE AND PORTAL CRANE WILL BE PROVIDED BY THE CONTRACTOR.

3. EOT CRANE WILL BE USED ON SHARING BAISIS BY OTHER AGENCIES WORKING WITHIN THE TG HALL UNDER THE INSTRUCTION OF BHEL. CONTRACTOR HAS TO PLAN HIS ACTIVITIES WELL IN ADVANCE AND INFORM BHEL ENGINEER IN CHARGE/ CONSTRUCTION MANAGER THE DATE OF ACTUAL USE.

APPENDIX –V

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

A: TOOL & PLANTS

SL.NO.	DESCRIPTION	QUANTITY
01.	CRANES (OF SUITABLE CAPACITY to be deployed from Condenser Erection start)	AS PER REQUIREMENT
02.	TRAILER WITH HORSE (SUITABLE CAPACITY)	-DO-
03.	TRACTOR TROLLEY (SUTABLE CAPACITY)	-DO-
04.	WELDING GENERATOR SETS (SUFFICIENT QUNTITY) (ELECTRIC AS WELL DIESEL)	-DO-
05.	3- PHASE COMPLETE SET UP FOR DRAWAL OF POWER	-DO-
06.	RADIOGRAPHY ARRANGEMENT INCLUDING THE SOURCE AND FILM VIEWER	-DO-
07.	TIG WELDING SETS (SUFFICIENT QUANTITY)	-DO-
08.	STRESS RELIEVING EQUIPMENTWITH TEMPERATURE RECORDERS	-DO-
09.	ELECRTRICAL BAKING OVEN – BIG	-DO-
10.	ELECTRODE BAKING OVEN-- PORTABLE	-DO-
11.	MIXER FOR GROUTING OF EQUIPMENT FOUNDATIONS	-DO-
12.	VACUUM CLEANER (INDUSTRIAL)	-DO-
13 .	PIPE CUTTING AND BEVELLING MACHINE	-DO-
14 .	PIPE BENDING M/C (ELECTRIC/ ELECTRO-HYDRAULIC-UPTO 4" SIZE)	-DO-
15 .	AIR COMPRESSOR 120 CFM	01 NO
16.	STEP DOWN TRANSFORMER, 230V/24V	AS PER REQUIREMENT
17.	CONDENSER TUBE EXPANDER SET	-DO-
18.	ELECTRICALLY OPERATED WINCHES 3T/5T CAP.	-DO-
19.	JACKING BOLTS / PRESSOUT BOLTS OF ALL SIZES (FOR ST. TURBINE ROLL CHECKS ETC.)	-DO-

20. HYDRAULIC JACKS OF VARIOUS CAPACITIES FOR ST. TURBINE AND GENERATOR :

- JACKS OF 100 T CAPACITY 04 NOS (WITH HAND OPERATED PUMPS)
- JACKS OF 50 T CAPACITY 04 NOS. (- DO -)
- GANG OPERATED JACKS CONSISTING OF THE FOLLOWING :
- JACKS OF 100 T CAPACITY 04 NOS (HAVING BROAD BASE ONE INCH

		LIFT)
-JACKS OF 63 T CAPACITY		04 NOS (WITH 4-6 INCH LIFT , FOR GEN. END SHIELDS)
-LONG HIGH PRESSURE HOSES		12 NOS.(FOR GENERATOR ALIGNMENT)

ABOVE JACKS FOR GENERATOR ALIGNMENT SHOULD HAVE SUITABLE COUPLING FOR JOINING THE TWO OR MORE HOSES TOGETHER TO GET DESIRED LENGTH OF HOSES, SHOULD HAVE HAND OPERATED PUMPS & ALSO SHOULD BE ABLE TO FIT WITH HYDRAULIC UNIT.

21 .TORQUE WRENCH	0 TO 200 N-M CAP.	01 NO.
22 .TORQE WRENCH	UPTO 2000 N-M CAP.	01 NO.
23 . SLINGS FOR LP TURBINE ROTOR		01 SET
24 . SLINGS FOR HP TURBINE MODULE		01 SET
25 . SLINGS FOR GENERATOR ROTOR		01 SET
26. BOLT STRETCHING DEVICE		AS PER REQUIREMENT
(FOR TURBINE & GENERATOR FDN. BOLTS)		
27. LONG FEELER GAUGE SET		AS PER REQUIREMENT
28. SPANNERS / EYE BOLTS (OF ALL SIZES)		AS PER REQUIREMENT

ANY OTHER MAJOR T&P REQUIRED FOR SATISFACTORY COMPLETION OF THE WORKS.

B: MEASURING AND MONITORING DEVISES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE.

NOTE :

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

APPENDIX –VI

FORMAT FOR ANALYSIS OF UNIT RATES

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		
TOTAL		100%	

SIGNATURE OF THE TENDERER

DATE:

APPENDIX –VII

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

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

*Please use additional sheets in same format for additional period.

SIGNATURE OF TENDERER

DATE:

APPENDIX –VIII

FORMAT FOR DEPLOYMENT PLAN FOR MAJOR TOOLS AND PLANTS

(Use additional sheets to list deployment plan for the entire contract period)

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

Date

Signature of Tenderer

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

DETAILS OF SIMILAR WORK DONE DURING THE LAST SEVEN YEARS

SN	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	ACTUAL COMPLETION TIME (MONTHS)	DATE OF ACTUAL COMPLETION OF WORK	REMARKS
1								
2								
3								
4								
5								

BIDDERS SHALL ENCLOSE COPIES OF DETAILED WORK ORDER (GIVING BILL OF QUANTITIES AND SCOPE OF WORK) AND COMPLETION CERTIFICATE IN SUPPORT OF THIS STATEMENT.

DATE SIGNATURE OF TENDERER WITH SEAL