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

No. BHE/PW/PUR/HZI-STG/473

FOR

Collection of materials from BHEL/Client's stores/storage yard, Handling at Stores/ Storage Yard, Transportation to site of work including via pre-assembly yard, Erection, Testing, Assistance for Commissioning, Final Painting & Handing Over of Condenser, Steam Turbine, Generator, Static Equipments, Pumps & Auxiliaries including TG Integral Piping, ESV to Turbine & Gland Steam Piping etc. for 1x80 MW unit-3 STG set

at

CHANDERIYA LEAD ZINC SMELTER CAPTIVE POWER PLANT

HINDUSTAN ZINC LIMITED

CHANDERIYA

CHITTORGARH

RAJASTHAN

PART - I

(TECHNICAL BID SPECIFICATION, NOTICE INVITING TENDER and GCC)

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

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LEGEND:

$: PLACED BEFORE 'GENERAL CONDITIONS OF CONTRACT' IN BOTH HARD AND SOFT COPY DOCUMENTS.

#: ATTACHED AT THE END OF HARD COPY OF TENDER SPECS. PART-I (TECHNICAL BID) AND AS A SEPARATE FILE TITLED 'WEB_NIT_GCC' AS SOFT COPY HOSTED IN WEB PAGE.

@: ISSUED AS SEPARATE BOOKLET IN HARD COPY AS PART-II (PRICE BID) AND AS SEPARATE FILE TITLED 'PRICE_BID' AS SOFT COPY HOSTED IN WEB PAGE.

Bharat Heavy Electricals Limited

(A Government of India Undertaking)
Power Sector - Western Region
Shreemohini Complex
345-Kingsway, Nagpur-440001

TENDER SPECIFICATION No. BHE/PW/PUR/HZI-STG/473

Name of Work: Collection of materials from BHEL/Client's stores/storage yard, Handling at Stores/ Storage Yard, Transportation to site of work including via pre-assembly yard, Erection, Testing, Assistance for Commissioning, Final Painting & Handing Over of Condenser, Steam Turbine, Generator, Static Equipments, Pumps & Auxiliaries including TG Integral Piping, ESV to Turbine & Gland Steam Piping etc. at 1x80 MW unit-3 STG set

at

CHANDERIYA LEAD ZINC SMELTER CAPTIVE POWER PLANT
OF
HINDUSTAN ZINC LIMITED
CHANDERIYA
CHITTORGARH
RAJASTHAN

EARNEST MONEY DEPOSIT: Please see Special Conditions of Contract.

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

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

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.
BIDDER SHALL NOTE THAT THEIR OFFER WILL BE CONSIDERED SUBJECT TO THE APPROVAL OF BHEL'S CUSTOMER.

For Bharat Heavy Electricals Limited

DGM (Purchase)
Place: Nagpur
Date :

Procedure for Submission of Sealed Tenders

The bidders must submit their tenders as required in two parts in separate sealed covers prominently super-scribed 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".

These two separate covers-I and II (part-I and part-II) shall together be enclosed in a third envelope (cover-III) along with requisite EMD as indicated earlier and this sealed cover shall be super-scribed and submitted to Head (Purchase) at the above mentioned address before the due date as indicated.

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

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

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

Contractor should have sound financial stability.

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

All information as called for in various appendices and clauses of tender specification, should be furnished. Please refer the checklist. The details so furnished by bidder should be complete in all respects and as per formats specified in tender specification.

Clarification on tender specification if any, may be obtained by the bidder at least seven days before the Last Date of tender submission.

Offers must be submitted without any deviation, after seeking clarification, if any.

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

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

PROJECT INFORMATION

BHEL's Client M/s Hindustan Zinc Limited (HZL) is setting up their Third unit, 1x80 MW Capacity Pulverized Coal Fired Captive Power Plant as part of extension of their existing 2x77 MW capacity Pulverized Coal Fired Captive Power Plant at Chanderiya Lead Zinc Smelting Plant. M/s TCE Consulting Engineers Ltd, Bangalore is the consultant for the project.

The Project is located near Chittorgarh town, 120 km from Udaipur, Rajasthan. The nearest railway station is Chanderiya on the Broad Gauge line at a distance of 10 km from the project. Nearest airport is Udaipur.

Geographical position of the project premises is at 24^0 50' N Latitude and 74^0 40' E Longitude. Elevation of the site is about 392.50 M above mean sea level.

The climatic conditions of the project are as under.

Ambient Air Temperature : 44.3 C maximum, 0.2 C minimum
Relative Humidity : 78% maximum, 31.5% minimum, 54.5% average
Annual Rainfall : 852mm
Maximum Wind Speed at 10M height : 47M/sec

The information furnished above are indicative and the bidders are requested to visit the site in order to get themselves acquainted with the prevailing conditions and situations before preparing their offer. **No claims on account of non-familiarity with the site conditions, working conditions etc. shall be entertained at any point of time.**

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 1) One Time EMD or, 2) 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** (as per appendix- VI) are furnished		Yes	No
10	Headquarters organisation is furnished		Yes	No
11	Proposed site organisation is furnished		Yes	No
12	Names and particulars of Directors /Partners are furnished		Yes	No
13	Financial status of the company **(Annexure 'A' of GCC)** is furnished		Yes	No
14	**Audited Profit & Loss Account** for preceding three years authenticated by Bidder's Chartered Accountants is furnished		Yes	No

CHECK LIST (vide Para 1.3 of section-I of General Conditions of Contract)			
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
16	Month-wise **Manpower deployment plan (Appendix–III)** is furnished	Yes	No
17	Month -wise deployment plan for **major T&Ps (Appendix -IV)** furnished	Yes	No
18	Whether all the pages of the **Tender Specifications** documents are **read, understood and signed**	Yes	No
19	**Power of Attorney** enclosed in favour of person making offer.	Yes	No
20	Bidder has familiarized himself with all Relevant local laws & Local Conditions.	Yes	No
21	Safety Requirement of this work in a Running plant premises has been understood.	Yes	No
22	Erection and Commissioning Programme furnished.	Yes	No
23	**List of Jobs completed** (**Appendix-IX**) in last seven years is furnished	Yes	No
24	Copy of **IT Return** of last three financial years along with copy of **PAN Card** are Furnished	Yes	No
25	**Analysis of Unit Rates** (**Appendix-V**) quoted is furnished	Yes	No
26	Whether **copies of detailed Work Orders (with Scope and BOQ)** and **Completion Certificates** in support of above furnished	Yes	No
27	Whether contractor has left any job unfinished? If so, give reasons.	Yes	No
28	Whether any client has terminated the contractor's work before completion? If so, furnish reasons for the same	Yes	No

NOTE : STRIKE OFF YES OR NO, AS APPLICABLE

Date : signature of bidder

DECLARATION BY BIDDER'S AUTHORISED SIGNATORY

I, hereby certify that all the information and data furnished by me with regard to this tender specification No. BHE/PW/PUR/HZI-STG/473 are true and complete to the best of my knowledge. I have gone through the specification, conditions and stipulations in detail and agree to comply with the requirements and intent of the specification. I further certify that I am duly authorised representative of the under-mentioned bidder and a valid power of attorney to this effect is also enclosed.

Authorised representative's signature

Name and address

Seal of the bidder

CERTIFICATE OF NO-DEVIATION

Tender Specification No.BHE/PW/PUR/HZI-STG/473

I/WE, M/s ……

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

Signature of the bidder

Date:

Section-3

OFFER OF BIDDER

TO,
HEAD (PURCHASE)
BHARAT HEAVY ELECTRICALS LIMITED,
POWER SECTOR - WESTERN REGION
345-KINGSWAY, NAGPUR-440001

DEAR SIR,

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. BHEL/PW/PUR/HZI-STG/473 ISSUED BY BHARAT HEAVY ELECTRICALS LIMITED, POWER SECTOR-WESTERN REGION, NAGPUR, IN ACCORDANCE WITH THE TERMS AND CONDITIONS THEREOF.

I/WE HEREBY OFFER TO CARRY OUT THE WORK DETAILED IN TENDER SPECIFICATION NO. BHE/PW/PUR/KLT-BLE/380 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 LISTED 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 REQUISITE EARNEST MONEY DEPOSIT, DETAILS OF EMD PAYMENT ARE FURNISHED IN THE CHECK LIST.

EMD SHALL BE REFUNDED SHOULD OUR OFFER NOT BE ACCEPTED / EMD **NEED NOT BE REFUNDED AND THE AMOUNT MAY BE TREATED AS "ONE TIME EMD" FOR ERECTION AND COMMISSIONING TENDERS OF BHEL-PSWR, NAGPUR**. SHOULD OUR OFFER BE ACCEPTED, I/WE FURTHER AGREE TO DEPOSIT SECURITY DEPOSIT FOR THE WORK AS PROVIDED FOR IN THE TENDER SPECIFICATION WITHIN THE STIPULATED TIME AS MAY BE INDICATED BY BHEL, POWER SECTOR-WESTERN REGION, NAGPUR.

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

PLACE: SIGNATURE OF BIDDER:

DATE : ADDRESS

WITNESSES WITH THEIR ADDRESS:

	SIGNATURE	NAME	ADDRESS
1.			
2.			

SECTION- 4

Special Conditions of Contract

4.0 Scope of Work

The scope of work under the tender specification covers Collection of materials from BHEL/Client's stores/storage yard, Handling at Stores/ Storage Yard, Transportation to site of work including via pre-assembly yard, Erection, Testing, Assistance for Commissioning, Final Painting & Handing Over of Condenser, Steam Turbine, Generator, Static Equipments, Pumps & Auxiliaries including TG Integral Piping, ESV to Turbine & Gland Steam Piping etc. 1x80 MW unit-3 STG set at Chanderiya Lead Zinc Smelter Captive Power Plant, Hindustan Zinc Ltd., Dist. - Chittorgarh, Rajasthan.

The scope of work under this Tender Specification is further detailed as follows.

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

(i) Collection & Loading of materials from BHEL / Customer Stores / Storage Yard.

(ii) Checking/verification of materials at the taking of receipt and generating report pending materials list .

(iii) Transportation to pre-assembly area and upto & including site of work.

(iv) Pre-assembly/assembly, pre-erection checks as per requirement.

(v) Erection, Alignment, Testing, Commissioning of equipments / systems with associated auxiliaries and stage inspection by Statutory Authorities like Boiler Inspector, Factory Inspector, Electrical Inspectorate etc. covered under this tender specification. All the necessary tests including supply of testing / measuring equipments & instruments shall be carried out as per requirement under this scope of tender specification.

(vi) Chipping/ Blue-Matching of civil foundation, grouting of equipments/ auxiliaries / panels with Portland and Non-shrink ready-mix grouting cement as per drawing/standard engineering practice for similar equipments and instruction of BHEL engineer at site. Contractor shall arrange all the grout materials of BHEL-approved brand within the quoted price.

(vii) Pre-assembly, Stage inspection as per requirement of BHEL / Customer / IBR and other Statutory Authorities, Erection, Alignment, Heat treatment, Stress relieving, welding, Radiography & other NDT tests, Flushing/Chemical cleaning, Hydraulic testing, Steam blowing of piping including impulse piping.

(viii) Erection, cold setting and hot setting of piping supports & hangers.

(ix) Fabrication & Erection of foundation frames of electrical equipments supplied as part of Mechanical scope like pumps-motors etc. and approach platform of valves.

(x) Erection of Electrical motorised & control valves

(xi) Erection, Pre-commissioning & commissioning checks/tests and commissioning including trial run operation of applicable equipments and auxiliaries.

(xii) Trial operation of TG set, Final painting, providing assistance during Stability run, Completion of PG test related works of the equipments and handing over of the unit to BHEL's client.

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

4.1.2
The intent of specification is to provide erection services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for proper and efficient erection and commissioning of the plant shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

4.1.3
The terminal points decided by BHEL shall be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.

4.1.4
The work shall be executed under the conditions, where customer is already having their existing plant in operation. The contractor and his personnel shall co-operate with personnel of customer's & other contractor's, co-ordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

4.1.5
Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL. This will be decided by the BHEL engineer depending upon the technical requirements, availability of materials and fronts. No claims for extra payment from the contractor will be entertained on the ground of deviation from the methods adopted in erection of similar sets elsewhere.

4.1.6
The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely completion of the work. The contractor must deploy adequate quantity of tools, construction aids, equipment etc. He must also deploy adequate number of trained, qualified and experienced supervisory staff and skilled personnel.

4.1.7

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

4.1.8
All tools, tackles, fixtures, equipments, materials handling and transportation except those specifically to be provided by BHEL, manpower, supervisors/engineers, consumables etc, required for this scope of work shall be provided by the contractor. These tools & plant, equipments, men & material shall remain at site throughout the duration of contract and extension thereof, if any. Diversion/removal of these shall be done only on the approval of BHEL. For further details refer sections-5,6 & 7.

4.1.9
During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc, will be necessary on account of feed back from various power station units already commissioned and/ or units under erection and commissioning and also on account of design discrepancies or manufacturing defects and site operation/ maintenance requirements. This will also include modifications/ re-works suggested by FES/ other inspection group(s). Contractor shall carry out such rework/ modification/ rectification/ fabrication/repair etc, promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc Shall be maintained by the contractor. Claim of contractor if any, for such works will be governed by clauses 13.1 to 13.8.

4.1.10
All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments/ components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting up etc, as may be applicable in such erection works and which are treated incidental to the erection works and necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work.

4.1.11
As this plant is an extension of the existing plant, any interconnection, hook-up, required with 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.

4.1.12
Excepting those specifically shown as BHEL scope, the contractor shall provide all fixtures, concrete block supports, wooden sleepers, steel structures required for jigs & fixtures, temporary supports, anchors for load and guide pulleys etc, required for the work.

4.1.13
The contractor shall take delivery of the components, equipments, chemicals, lubricants, gases etc from the BHEL's/client's stores/ storage area after getting the approval of BHEL engineer on standard indent forms to be specified by BHEL. Complete and detailed account of the equipments erected as well as the progress shall be submitted to the BHEL engineer as directed.

4.1.14
Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by contractor most expeditiously. No claim for extra payment for such work will be entertained.

4.2 Preparation of Foundations and Grouting of Equipments

4.2.1
Building foundations and other necessary civil works for supporting structures, equipments etc Will be provided by BHEL's client. The dimensional accuracy, axes, elevation, levels etc, with reference to benchmarks of foundations and anchor bolt pits have to be checked and logged. Adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments as per BHEL engineer's instructions, should be done by the contractor as part of the work. Dressing and chipping of foundations to the extent of 25mm for achieving proper levels is within the scope of work.

4.2.2
All minor foundations and anchor points/arrangements required for installing erection equipments and winches etc are in the scope of contractor.

4.2.3
Contractor shall carry out scrapping and blue matching of embedded plates/ packers of rotating equipments. Chipping and the bedding of concrete surfaces, fine dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of this work. Scrapping, chipping and matching shall be done so as to achieve prescribed percentage of contact.

4.2.4
BHEL will provide free of cost only the shims and packer plates (either machined or plain) which go as permanent part of the equipment. Certain packer plates and shims over and above the quantity received as a part of supplies from manufacturing units of BHEL, will have to be cut out from steel plates/steel sheets at site to meet site requirement. Contractor shall cut and prepare and finish the packers and shims by suitably. However, machining of the packers wherever necessary, will be arranged by BHEL.

4.2.5
Complete grouting of structural columns, equipments, rotating machines including their drives, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable for entire scope(TG equipments and associated TG Aux. etc.) of equipments with Aux and system included under these tender specifications, is included in the scope of contractor. Arranging all labour, building materials including cement, ordinary port land as well as quick setting – free flow - non-shrink grout mix (e.g. Conbextra GP-1/GP-2, as per instruction of BHEL Engineer/ Drawings requirement of Static and Rotary Equipments with Aux.), form work, shuttering, and

any other requirements is in the scope of contractor. Contractor shall obtain approval of BHEL for cement (ordinary as-well-as quick setting – free flow- non-shrink grout mix) prior to procurement and use. Cleaning of foundation surfaces, pocket holes and 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, are within the scope of this specification/work.

4.2.6
The Quick-setting-Non-shrink-Free-flow special grout mix purchased by Contractor shall be from the latest BHEL approved vendor only. Following is the list of approved vendors as on date.

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.

The list of approved vendors is subject to updation / addition / deletion from time to time by BHEL. 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. Contractor shall consult BHEL engineer before deciding upon the vendor for the above.

4.3 **Welding, Heat-Treatment, Radiography and Other Non-Destructive Testing**

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

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

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

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

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

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

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

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

H) Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the contractor in accordance with BHEL engineer's instructions. Normally the electric resistance heating method will be adopted. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, all heating elements, thermocouples and attachment units, graph sheets, thermal chalks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

J) All the recorded graphs for heat treatment works shall be the property of BHEL and shall be handed over to BHEL site in-charge when demanded.

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

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

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

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

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

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

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

R) **Socket Welding** :

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The bidder shall take notice of this while quoting as no extra claim on this account will be entertained at a later date. The socket welding on HP parts/ HP piping shall be done by the IBR qualified welders. In case the contract provides for payment/ recovery on account of variation in the quantity of butt weld joints elsewhere in the specifications, the socket welds will not be taken into account on either side while computing variation in number of butt weld joints. Modification work, involving socket weld joints will be paid on the basis of extra man-day rate only. Contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

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

T) Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

The portion of work coming under IBR purview (e.g. Welding, heat treatment of HP joints) has to be executed as per the latest version of Indian Boiler Regulation and amendments thereof. BHEL will furnish IBR documents for piping & fittings and further approvals of IBR/ Statutory Authorities for pre-assembly & erection and other works shall be taken by contractor.

4.4 Condenser Installation

4.4.1

The Spring type loading, Surface Condenser will be despatched in dismantled condition, comprising of Condenser Shell, Hotwell, Dome, Tubes, Connecting Piece, Foundation Springs, Stand Pipe, Surge Pipe, Air Extraction Pipe, Water Boxes and other foundation parts etc. Further works like placement on foundation, assembly, tube insertion/expansion, welding/NDT, erection & Commissioning tests etc shall be carried at site by Contractor by using his own required Tool & Tackles and handling

equipments. **Condenser shell weighing about 44 MT** is to be handled at site including taking delivery from BHEL/Customer Stores/storage yard, Loading on trailer, transportation to site of work, unloading at site, shifting/lifting, positioning & placement on foundation in TG hall shall be carried out by contractor using his own required suitable capacity crane and suitable Transport arrangements.
Contractor shall submit his plan for handling and erection of Condenser along with Technical Bid.

4.4.2
Materials of Condenser tube for condensing zone and A.C. zone of condenser are Al. Brass, SB111 (Alloy No.C68700) and Stainless Steel respectively. Contractor shall arrange all required T&P like tube expander with cutting & expanding tools. Blast cleaning and painting of steam space, Water Space and external surface of condenser as required shall be carried out by contractor as part of scope of work including supply of paints & primers as [per drawing requirement and instruction BHEL Site In-charge. Painting of Steam Space & Water Space shall be carried with Steam Washable Paints & Coal Tar Epoxy paints.

4.5 Generator Installation

4.5.1
Generator Comprising of Stator, Rotor, Bearings, Exciter and Foundation parts along with accessories will be dispatched in dismantled condition. Further works like placement on foundation, assembly works and erection & commissioning tests as required shall be carried at site by Contractor by using his own required Tool & Tackles and handling equipments. Generator Stator will be unloaded within 200 Metres from respective unit TG hall building by existing material unloading agency of BHEL. Contractor shall carry out the further handling of Generator Stator at site including taking delivery from already unloaded area/storage yard, Loading on trailer, transportation/shifting to site of work, unloading at site/working area, shifting/lifting, positioning & placement on foundation which is at about 11 meter elevation in TG hall by contractor using his own required suitable capacity crane and suitable Transport arrangements.

4.5.2 Generator Stator Lifting

To facilitate the lifting and placement of Generator Stator (which is weighing about 100 MT), Certain columns/structure members of TG Building may have to be kept under hold. **Due to non-availability adequate capacity E.O.T. Crane in TG hall and space constrains, Generator Stator shall has to be lifted by Lift & Shift method (e.g. Portal Gantry Crane, Four Point Lifting System etc.). Contractor is advised to visit the site and shall arrange to deploy necessary equipment for this purpose.** Some of the renowned agencies available in the country who can carry out such kind of Heavy lifting job are as under.:

1. M/s. Fagioli PSE India Pvt. Ltd, 203,
   Krishna Bhavan, Govandi Station Road, Deonar,
   Mumbai-400088, Tel.No. 022-25564388, Fax No. 022-25562565).

2. M/s. Freight Wings (P) Ltd.,
309, Rex Chambers, Walchand Hirachand Marg.
Ballard Estate, Mumbai-400001, Tel. No.022-22631714/22619988.

3. M/s. Dorman Long Technology Ltd.
233, Bharat Industrial Estate, Lal Bahadur Shashtry Marg, Bhandup (West),
Mumbai-400078, Tel No. 022-25961960, Cell No. 09820192807.

4. M/s. Basu & Basu Engineers (Pvt.) Ltd.,
Kolkata, Tel. No. 033-24642967/24664069, Fax No. 033-24664621.

Contractor may contact above agencies or any other similar agency and have tie up for this lifting activity. Generator Stator shall be required to be lifted and put on foundation within one week time after availability of material and other essential inputs, and clear the holds for further civil & structural works. All above shall be the part of scope of work and progressive payment for same shall be made per **clause 12.2.7** of Section-12 of tender specification.

Lifting of Generator Stator by Jack and Sleeper method is <u>not permitted</u>.

4.6 Steam Turbine Installation

4.6.1
Steam Turbine comprising of Lower & Upper parts of outer Casings, Inner casings & Exhaust Hoods, Guide Blade carriers, Rotor assembly, Bearings and foundation parts etc will be dispatched in dismantled condition. Further assembly, erection, testing and commissioning works including handling at site, taking delivery from BHEL/Customer Stores/storage yard, Loading on trailer, transportation to site of work, unloading at site, shifting/lifting, positioning & placement on foundation in TG hall shall be carried out by contractor using his own required suitable capacity crane and suitable Transport arrangements. However Customer's 30 MT capacity EOT crane may be used in TG hall for erection of TG equipments subject to capacity, accessibility, approachability & availability. Gas type bolt heating device as supplied from manufacturing unit will be made available for works and required consumables/Gas shall be provided by Contractor.

4.6.2
For Main Steam Piping between the Turbine Emergency Stop Valves & Control valves of Turbine, the materials specifications is Alloy Steel **"X-20 (Cr Mo V 12.1 material)**" and there are about 20 Nos. of weld joints of this system having pipe size OD-170 mm and thickness 14.27 mm and weight about 3.5 MT. Contractor shall have to provide the required quantity of filler wires and take special note to provide the filler wires and requirements of other process like Welding process, Pre- heating & Post heating requirement during welding etc. The complete work of laying, alignment, fixing, supporting, Welding with Radiography & NDE, Pre & Post heat treatment shall form the integral part of TG and TG Aux. work.

4.7 Other Rotating Machines Installation

4.7.1
All rotating machinery and equipments shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. If in the opinion of BHEL engineer, the equipment is to be checked for clearances, tolerances

at any stage of the work or during testing, pre-commissioning, facilities for dismantling, cleaning, lubricating and re-fitting shall be provided by the contractor. All rotating machines shaft shall be rotated periodically to avoid bowing of shafts.

4.7 2
Trial run of the drive in un-coupled state and then coupled with equipment has to be done after necessary alignment etc

4.7.3
Forced lube oil systems of motors and/or rotating equipments form the part of work under this specification

4.7.4
Performance of hydro test of oil coolers & Air coolers of rotating machines, if any, is included in the scope of work.

4.7.5
Certain rotating machinery after, initial runs and commissioning of the equipment, may have to be hot aligned.

4.7.6
Protective lubricant coats/ fill provided on the critical area of equipments have to removed at appropriate stage and regular lubricants, after removal/ cleaning of protective coat/fill, as per specifications should be filled/applied. Cleaning/flushing agents/oils will be provided by BHEL.

4.7.7
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 re-setting/re-alignment/hot-alignment. Contractor will have to arrange labour for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after re-alignment, quoted tonnage rate shall be inclusive of the above.

4.7.8
Even though rotating machines may be grouted to foundation using non-shrink grout mix, blue matching of packer plates/shims with foundation/ between packers/ equipment base should be done wherever instructed by BHEL engineer.

4.7.9
Vital clearances of shop assembled rotating machines should be checked at site and adjusted if required.

4.8 Testing, Pre-Commissioning, Commissioning, Stability Run/PG Test

4.8.1
Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing, trial runs of various equipments erected and systems installed, flushing of the lines by air, oil or steam as the case may be, chemical cleaning of various systems & piping, oil-flushing, steam blowing of the pipe lines, steam rolling, synchronization, trial operation etc, are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

4.8.2
All the above tests may have to be repeated till all the equipments satisfy the requirement/ obligations of BHEL to their client and also the relevant statutory authority.

4.8.3
For the purpose of Steam blowing, Oil flushing & Hydraulic test of TG piping, contractor shall lay/install necessary temporary piping, valves for conduct of hydraulic test, Oil flushing, steam blowing etc This may involve cutting of some portion of existing piping/valves, placing of rubber wedges/ blanks in the valves and other openings, installation of temporary arrangements like tanks, piping, temporary access platforms to mixing tanks etc Where required, bends have to be fabricated at site from running length of pipe. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work.

As such there is no such major system/piping involved, which requires the Chemical cleaning. For major systems / piping which are in Boiler contractor's scope, the Chemical cleaning including providing the arrangements & chemicals for such Boiler system / pre-boiler system is included in Boiler erection agency's scope.

For any small system/ piping under these specification, which may require chemical cleaning as per site/customer or procedural requirement, contractor in consultation with BHEL site engineer may make suitable arrangement/tie-up with Boiler erection agency and carry out erection of such systems/ piping well in advance, align his operations and complete including termination & welding of terminal joints of his this work to get these flushed simultaneously. For acid pickling of lube line ets. Wherever required, contractor shall have to make his exclusive arrangement.

4.8.4
All materials, equipments necessary for installation of temporary system as above will be supplied by BHEL in random sizes/lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the contractor. All temporary dummy/blank flanges, fittings & fixtures and temporary supports required to carry out Steam Blowing, Oil flushing and Hydraulic test will be arranged by contractor.

4.8.5
Fabrication, fit-up, welding, and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test is part work. Similarly, removal of blanks, restoration and normalisation of the concerned system/line is to be done as part of work. BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.

4.8.6
Overhauling, cleaning, servicing of tanks, equipments, valves, during erection and commissioning stages are in the scope of work. Gaskets, packing for replacement will be provided by BHEL.

4.8.7
Transportation of oil drums from customer's/BHEL's stores, filling of oil for flushing, first/fresh fill of lubricants and subsequent topping up during commissioning and post commissioning activities are included in the scope of this contract. The contractor shall have to return all the empty/ unused/partly used drums to the customer/ BHEL stores. Similarly, for various pre-commissioning/ commissioning activities/ processes mentioned in various clauses, transport of chemicals from BHEL/ customer's stores, charging of chemicals into the system and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.

4.8.8
During pre-commissioning/ commissioning, replacing/ changing mechanical/ other seals of equipments, pumps, removal and cleaning/replacing of filters etc is within the scope of work. Items required for replacement/change will be provided by BHEL.

4.8 9
Contractor shall render all assistance for filling of gas in generator gas system. Air tightness test has to be conducted to ensure leak-proof-ness of generator gas cooling system.

4.8.10
In case any defect is noticed during tests, trial runs of TG set & its auxiliaries such as loose components, undue noise or vibration, strain on connected equipment etc, the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the same shall be done as per BHEL engineer's instructions. Claim, if any, for these works from the contractor shall be governed by clauses 13.1 to 13.8.

4.8.11
Contractor shall cut/open work, if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.

4.8.12
Similarly, during the course of erection, if certain portion of equipment's erected by the contractor has to be undone for enabling other contractors/agencies of BHEL/customer to carry out their work, contractor shall carry out such jobs expeditiously and promptly and make good the job after completion of work by other contractor's/ agencies of BHEL/customer as per BHEL engineer's/agencies of BHEL/customers instructions. Claims, if any, in this regard shall be governed as per clauses 13.1 to 13.8.

4.8.13
During this period, though BHEL/ client's staff will also be associated in the work, the contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc, till such time the commissioned unit is taken over by BHEL's client.

4.8.14
Commissioning activities will continue till the completion of trial run/Stability run/PG test for erection works. During this period contractor shall make available the services

of separate dedicated labour-force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc

4.8.15
It shall be specifically noted that the contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The contractor's quoted rates shall be inclusive of all these factors.

4.8.16
The contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the contractor.

4.8.17 Assistance for Stability run/PG Test

The contractor shall provide assistance for conducting Stability run and complete Performance Guarantee (PG) Test related works as a part of his regular scope of work. This shall include installation of instrument tapping points / fixing & welding of thermowells, manpower assistance, small T&P, providing access platforms/ scaffolding/ ladders, lighting arrangements and other enabling facilities associated with above typical test.

4.9 Final Painting

4.9.1
Preservation painting of exposed metal surfaces / damaged shop-painted areas during execution of the work under scope of this contract and Final Painting, marking of colour bands, inscription on equipments/Pipe lines, flow-direction arrow etc. for identification and specification as decided by BHEL/ Customer at site for the equipments, structures, piping and Auxiliaries etc covered under this tender specification shall be carried by contractor. Contractor shall arrange consumables like brush, cleaning agents etc with all T&P, manpower and supervision etc as part of scope of work.

4.9.2 PREPARTION OF SURFACES

Components will generally be with one coat of finish paint. In cases where such shop paints have peeled off / damaged, the same shall have to be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter. Mechanical cleaning by power tool and scrapping with steel wire brushes or shot / sand blasting shall be adopted to clean the surfaces to SA 2 ½ .Cleaning with solvents shall be resorted to only in such areas where other methods specified above have not achieved the desired results. Cleaning with solvents shall be adopted only after written approval of the OWNER / ENGINEER.

4.9.5 FINISH PAINT
Epoxy paint conforming to IS 14209 shall be used for finish coats. After cleaning the dust on the dried up primer, first coat of Epoxy paint shall be applied. After this first coat dries up hard, the gloss from the entire surface shall be gently removed and surface dusted off. Thereafter, the second finish coat of Epoxy paint shall be applied.

4.9.6 SUGGESTED COLOUR CODES FOR PAINTING

SN	ITEM/SERVICE	COLOUR	IS-5 Grade	COLOUR (BAND)	IS-5
1.0	Structures, platforms, galleries, ladders and handrails	Dark Admirality Grey	632	-	-
2.0	Boiler casing, ESP and ducting	Nut Brown	413	-	-
3.0	Crane				
3.1	Crane structure	Golden Yellow	356	-	-
3.2	Trolley and hook	Crimson	540	-	-
4.0	Fans, pumps, motors, compressors	Light Grey	631	-	-
5.0	Tanks (without insulation and cladding)				
5.1	Outdoor	Aluminium	-	-	-
5.2	Indoor	Light grey	631	-	-
6.0	Vessels & all other proprietary equipment (without insulation & cladding)	Light grey	631	-	-
7.0	Switchgear	Light grey	631	-	-
8.0	Control & relay panels	Light grey	631/7078 of IS 1650	-	-
9.0	Turbine	Golden Yellow	356	-	-
10.0	Generator & exciter	Light grey	631	--	-
11.0	Transformers	Aluminium	-	-	-
12.0	Machinery guards	Signal red	537	-	-
13.0	Piping (without insulation and cladding_)				
13.1	Water System				
	Boiler feed	Sea green	217	-	-
	Condensate	Sea green	217	Light brown	410

SN	ITEM/SERVICE	COLOUR	IS-5 Grade	COLOUR (BAND)	IS-5
	D M Water	Sea green	217	Light orange	557
	Soft water	Sea green	217	French blue	166
	Bearing cooling water	Sea green	217	French blue	166
	Potable & filtered water	Sea green	217	French blue	166
	Service & clarified water	Sea green	217	French blue	166
	Raw water	Sea green	217	White	-
	Cooling water	Sea green	217	French blue	166
13.2	Air System				
	Station air	Sky blue	101	-	-
	Control air	Sky blue	101	White	-
13.3	Oil system				
	Fuel oil	Light brown	410	French	166
	Light oil	Light Brown	410	Brilliant green	221
	Lubricating oil	Light brown	410	Light grey	631
	Transformer oil	Light brown	410	Light orange	557
13.4	Gas system				
	Carbon dioxide	Canary yellow	309	Light grey	631
13.5	Fire services	Fire red	536	-	-
13.6	Vacuum pipes	Sky blue	101	Black	-
13.7	Fuel pipes (pulverised coal)	Light brown	410	-	-
13.8	Drainage	Black	-	-	-

Notes :

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

Where band colour is specified, same shall be provided at 30 metre intervals on long uninterrupted lines and also adjacent to valves and junctions.

4.10.0 **General Responsibility of the Contractor**

4.10.1
Steam piping, Extraction piping, Drain line, Oil line, Service air piping, Cooling and Service water lines between the BHEL supplied equipments/ auxiliaries and battery limits of customer is in the scope of this tender specification.

4.10.2
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.

4.10.3
The contractor shall have total responsibility for all equipment and materials in his custody at contractor's stores, loose, semi-assembled, assembled or erected by him at site. He shall effectively protect the finished works from action of weather and from damages or defacement and shall also cover the finished parts immediately on completion of work as per BHEL engineer's instructions. The machine surfaces/finished surfaces should be greased and covered.

4.11 Preservation & Protection of Components

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

4.11.1
The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/ equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.

4.11.2
Contractor shall collect all scrap materials periodically from various area of work site, deposit the same at one place earmarked at site or shift the same to a place earmarked in BHEL/ client's stores. In case of failure of contractor in compliance of this requirement, BHEL will make suitable arrangement at contractor's risk and cost.

4.11.3
The entire surplus, damaged, unused materials, package materials/ containers, special transporting frames, gunny bags, etc, shall be returned to BHEL stores by the contractor.

4.11.4
The contractor shall not waste any materials issued to him. In case it is observed at any stage that the wastage/excess utilisation of materials is not within the permissible limits, recovery for the excess quantity used or wasted will be effected with departmental charges from the contractor. Decision of BHEL on this will be final and binding on the contractor.

4.11.5
For any class of work for which no specifications have been laid down in these specifications, work shall be executed as per the instructions of BHEL.

4.12 Common Requirements

4.12.1
All welded joints should be painted with anticorrosive paint immediately after completion of radiography and stress relieving works. Necessary paints and other consumables for the above work are in the scope of the contractor.

4.12.2
Suspensions/supports for tubes/piping, etc, will be supplied in running/ random lengths/ sizes which shall be cut to suitable sizes and adjusted as required.

4.12.3
Spring suspension/constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc, have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.

4.12.4
Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection.

4.12.5
Welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow metering & measurement devices, and control valves to be provided on TG & its auxiliaries, integral & external pipe lines covered within the scope of this specification, will also be the responsibility of the contractor and shall be done as per the instructions of BHEL site engineer. The installation of all the above items will be contractor's responsibility even if the :

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

NDE, and post weld heat treatment for above shall be done as per the specifications as part of work.

4.12.6
Fixing and seal welding of thermo-wells & plugs before hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermo-wells after hydro test/steam blowing of lines as part of work.

4.12.7
Actuators/drives of valves, dampers, gates, powered vanes etc may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.

4.12.8
All electrical motors have to be tested for IR&PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

4.12.9 Insulation
As such application of thermal insulation of TG equipments will be carried by Boiler erection agency. However the welding of attachments such as studs/hooks/ supports on equipments to hold insulation will be carried out by contractor under these specification as scope of work. Contractor shall co-operate, coordinate, extend the necessary help/assistance and complete the erection work of his scope of all related equipments and system well in advance as per instruction of BHEL engineer's instruction at site to achieve the total integrated committed schedule of project.

The insulation of temporary system as required during steam blowing/flushing/ chemical cleaning for operations of scope of work under these specification shall be carried out by contractor as part of scope of work. BHEL will provide the insulation materials for such temporary work.

4.13 **Piping Installation**

4.13.1
The work on piping systems (Air, Water, Oil, Steam, Gas etc.) will include fabrication, laying, edge preparation, fixing & welding of the elbows/fittings/ valves etc On the line, fixing & adjustment of supports/angles shock absorbers and carrying out all other activities/work to complete the erection and also carrying out all pre-commissioning/ commissioning operations mentioned in the specification as per BHEL engineers instructions and/or as per approved drawings/documents.

4.13.2
Fittings like bends tees, elbows, reducers, flanges etc, will be supplied as loose items which shall be matched with the corresponding piping. Bends of tube size up to OD 65mm will have to be fabricated at site at no extra cost.

4.13.3
All pipes & tubes shall be sent from units in commercially available lengths. Certain adjustments in length may be necessary while erecting pipelines. The contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges both for IBR & Non-IBR pipes and adopting specified heat treatment procedure at no extra cost.

4.13.4
Minor adjustments like removal of ovality in pipes and opening and closing of the bends of pipe by process of heat or correction of any other method approved by BHEL engineer to suit the layout, with specified heat treatment procedure, are in the scope of work.

4.13.5
Flame cutting of piping, where required shall be done as per BHEL engineers instructions.

4.13.6
All drains/ vents/ relief/ escape/ safety valve piping to various tanks/ sewage/ drain canal/ flash box / sump / atmosphere etc From the stubs on the piping and equipments erected by the contractor is completely covered in the scope of work.

4.13.7
Connection (either flanged/bolted or welded) of piping to the terminal points/equipments etc Is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, is also within the scope of work/specification. Terminal points works of various piping schemes with customer lines and other contractor's lines. The terminal points work is inclusive of cutting of existing lines, edge preparation, welding/blanking and hook up work.

4.13.8
Erection, Welding & UT/radiography test of BHEL supplied flow nozzles in customer terminal/tapping points is the part of scope of works. Same will be carried out as per BHEL engineer's instruction at site and shall be binding on Contractor.

4.13.9
Drilling, welding of stubs for drains, vents, instrument tapping points, Welding of attachments for supports etc is part of the work. No additional payment is envisaged for this work .

4.13.10
Erection and installation of Motorised valves & Control Valves shall be treated as part of piping work. No separate rate on this account will be payable.

4.13.11
Erection of Critical piping systems like Main Steam upto ESV, Feed Water system, Condensate, Extractions system works (excluding which are specifically included under this tender specification) which are to be connected with equipments under this tender specification, will be carried out by other erection agency. Contractor shall carry out erection and placement of related equipments and auxiliaries on priority basis as per instructions of BHEL Site-In charge to enable to achieve day to day activities/milestone events and the over all commissioning schedule of project.

4.14 Laying Of Pipes/Tubes including Impulse Pipes

A Installation of impulse pipe of CS/AS/SS material shall include cleaning, air flushing, cutting to length from the running meter, edge preparation, cold bending, welding of sockets/ reducers/ tee/ cross/ isolating valves/union nut and nipples/tail pieces etc, mounting of SS/AS/CS three/five valve manifolds and compression fittings, condensate pot/equalizing vessel, providing supports, clamping, conducting leak test/hydraulic pressure test, painting and other accessories as per instrument hook-up diagram. Piping works shall involve either arc or TIG welding.

IBR certified welders shall be deployed for welding of impulse pipe and contractor shall take approval for welder and welding consumables from BHEL site engineer.

B All fittings and accessories for impulse pipe and air line shall be provided by BHEL. Quoted rate for piping shall include cost of installation of such fittings as no separate rate is envisaged.

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

D Erection of impulse piping work shall be carried out upto nut & tail including root valves.

4.15 Instrument & Service Air Piping (GI Pipe)

Laying of GI pipe for instrument air line shall include air blowing, cutting from the running meter length, threading, installation of elbows/ tee/reducer/ moisture traps/auto drain pot/check valves/isolating valves, supporting clamping, conducting leak test etc Threaded joints of air pipeline shall be made leak proof by using teflon tapes or sealing compound. Seal welding of threaded joints may be called for if required. This shall be done within the quoted rate.

4.16 Field Instrumentation

As such Electrical and instruments works like placement of panels, calibration, cabling and tray works etc. are excluded from scope of works of this tender specification, However contractor shall provide necessary assistance for erection, testing and commissioning for instruments which are received with main equipments including the works of turbo-supervisory systems etc. Contractor shall abide by BHEL site Engineer's instruction and shall be binding on Contractor.

4.17 Exclusions

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

1. Electrical and Control & Instrumentation works except which are specifically included.
2. Application of spray insulation of steam Turbine.

Section-5

Special Conditions of Contract

5.0 Obligations of the Contractor (Tools, Tackles, Consumables etc.)

5.1 Labour Colony

No space/land for labour colony will be provided by BHEL/customer. The bidder has to make his own arrangements for labour colony including water and electricity.

5.2 Tools And Tackles

5.2.1

The contractor shall provide all required tools and plants, inspection, measuring and test equipments and handling & transportation equipments including heavier consignment like Condenser, Steam Turbine, Generator etc for the scope of work covered under these specifications. Contractor shall deploy all the T&P including Condenser, Generator & Steam turbine handing, transportation/shifting, lifting & placement to foundation along with other auxiliaries and measuring/testing equipments/instruments required to carry out & complete the works covered under this tender specification. Customer's 30 MT capacity EOT crane in TG hall will be provided free of hire charges for handling and erection of TG equipments subject to its availability and accessibility. No claim on account of non-availability of Customer's EOT will be entertained.

5.2.2

All tools and tackles to be deployed by the contractor for the work shall have the prior approval of BHEL engineer with regard to brand, quality and specification.

5.2.3

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

5.2.4

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

5.2.5

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

5.2.6

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

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

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

5.3 Consumables

5.3.1
The contractor shall provide all consumables including fuel, lubricant, hydraulic oil and grease for all his T&P etc as required from time to time for carrying out the work covered under these specifications excepting those, which are specifically indicated as BHEL scope.

Special Consumables like Hylomer, Golden Hermite, Stag-B, Molykote, Anabond compound, Rubber fixing compound, grouting materials (like free-flow, quick-setting readymade grout mix, Portland cement, other building materials etc. and any other routine consumables for entire scope of work for TG, TG Aux, Pumps, Tanks / Vessels etc. along with Anti corrosive paints for site weld joints, as required shall be supplied by contractor as part of scope of work.

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
Wherever required contractor shall provide concrete blocks/concrete sleepers for stacking of materials and pre-assembly alignment/leveling/checking of pressure parts/duct and other fabricated components is storage yard, Pre-assembly yard and closed shed as per required.

5.3.4 Primer, Paints etc.

The contractor shall provide ROZC Primer conforming to IS:2074 for touch up painting of all site weld and gas cut joints/edges, Steam washable Paints and Coal tar Epoxy paints for Condenser steam pace and water space painting.

With regard to paints in BHEL's scope of supply, please refer Section-7 of Special Conditions of Contract.

5.4 Welding Electrodes, Filler Wires for TIG Welding and Gases

5.4.1
All the required welding electrodes, including Stainless Steel and special 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.

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

5.4.2
BHEL will not supply any filler wires for TIG welding. The contractor shall provide all types of filler wires & welding electrodes for the works under these tender specifications including the filler wires & welding electrodes as required **for welding of X-20 piping material (Main steam piping between ESV to Steam Turbine)** in adequate quantity.

5.4.3
All the required gases for welding and gas cutting like Argon, Oxygen, Acetylene etc. shall be arranged by the contractor at his cost.

5.4.4
If at any time during the execution of work, it is noticed that the work is suffering on account of non-availability of consumables from the contractor's side BHEL will make alternate arrangements at the risk and cost of contractor. The expenditure incurred with overheads will be recovered from the contractor.

5.5.0 Field Office

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

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.

5.6.0 Area Lighting

5.6.1
Contractor shall arrange adequate floodlights, hand lamps and area lighting. Provision of distribution lines for lighting from the single point to the required place with proper distribution boards, observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor including all the materials like cables, fuses, switch boards etc.

5.7.0 **Construction Power & Water**

5.71.
Construction power (415v/440v) will be provided at a single point within the project site. The contractor shall provide all necessary cables, glands, fuses, switches, switchboards, ELCB, energy meters etc for further distribution and any other installation as specified by statutory authority in this regard for further drawl of power. Obtaining approvals, payment of necessary fees, duties etc towards the clearance of such installations, prior to their being put to use or as may be specified, shall be the responsibility of the contractor. Construction Power for construction purpose will be provided free of charges, However any levy/duties as charged by customer shall be charged to Contractor.

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

5.7.3
The customer will provide water for construction purpose at a single point near the site. Further distribution, if permitted by the customer, has to be arranged by the contractor at his cost.

5.7.4
In case of non-availability of customer supplied power and/or water; it is the responsibility of the contractor to make alternate 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.

5.8 Contract Labour

5.8.1
The contractor in the event of his engaging 10 or more workmen will obtain independent license under the contract labour (regulations and abolition) act 1970 from the concerned authorities based on the certificate (Form –V) issued by the principal employer/customer.

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

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

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

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

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

5.9.0 Taxes, Duties, Levies

5.9.0

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.

5.9.2 Service Tax & Cess on Service Tax

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

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

5.9.3 VAT/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 Submission Of Periodical Reports

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

1) Consumption of consumables like welding electrodes, gases and paints
2) Consumption of construction power
3) Availability and utilization of BHEL's Tools & Plants
4) Availability and utilization of contractor's Tools & Plants
5) Daily manpower reports
6) Daily progress reports of activities & incidents
7) Calibration reports
8) Records of wages payment
9) Any other report/record as may be specified by BHEL/client.

BHEL at site will inform formats for these reports.

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

5.12 Compliance with Requirements of Statutory/Mandatory Authorities

5.12.1
Refer Section-8 for contractor's responsibilities regarding the work related inspection by statutory authorities.

5.12.2
The responsibilities of contractor with regard to compliance with requirements of statutory/mandatory authorities have been specified in various clauses of the specification. However, in addition to those specified already, the requirements of any other authority viz factory inspector, provident fund commissioner, labour commissioner etc. in connection with this work has to be complied with by the contractor.

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 like high pressure welders 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-III. 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 out-turn 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 Industrial Relations and Labour Laws

An industrial relations supervisor shall coordinate for the implementation of local labour laws, maintenance of records as required by contract labour (regulation and abolition) act and also coordinate with the local labour authorities and any other such authorities under whom this work falls.

6.7

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

6.8 Site Organization

The contractor shall provide adequate staffing in the following major areas.

A. Planning, Monitoring and Control

B. Materials Management

C. Condenser & Auxiliaries

D. Turbine & auxiliaries

E. Generator and auxiliaries

F. Pumps & Auxiliaries

G. Piping

H. Welding and NDT

I. Quality Assurance and Control

J. Safety

K. Industrial relations and welfare

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

Section-7

Special Conditions of Contract

7.0 Obligations Of BHEL

7.1 Facilities Provided By BHEL

7.1.1 Space For Field Office

Refer section-5 in this regard.

7.1.2 Construction Water

Refer section-5 in this regard.

7.1.3 Construction Power

Refer section-5 in this regard.

7.1.4 Other Materials and Consumables:

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

7.2 Test Blanks (Plates & Pipes)

BHEL will provide only temporary pipes & valves for steam blowing / chemical cleaning & oil flushing. All the temporary plates & dummy/blank flanges required to carry out above test will be arranged by Contractor at his own cost.

7.3 Filler Wire For TIG Welding

Refer section-5 in this regard.

7.4 Equipments – Tools & Plants

7.4.1

Facility of 30 MT capacity EOT crane inside the TG hall will be extended free of hire charges, subject to its availability and accessibility. No other cranes / equipments will be provided by BHEL for the work under the scope of this tender specification. As such the contractor shall make his own independent arrangement for handling and erection of heavier assemblies of Condenser, Turbine, Generator etc. which are beyond the capacity of the EOT crane. No claim of extra payment on account of non-availability of EOT crane shall be entertained at any point of time.

7.4.2

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

7.4.3

The contractor must not use these equipments for any purpose other than what they are intended for. Misuse, if any, will result in penalty.

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

7.5 Consumables

7.5.1 Chemicals and Lubricants for Pre-Commissioning and Commissioning

All lubricants and chemicals required for testing, preservation, chemical cleaning/ acid cleaning, oil flushing, lubricants for trial run of the equipment, initial fill and top-up will be supplied by BHEL free of charges. Contractor shall handle the consumables including pouring/charging and return of surplus/used quantities.

7.5.2 Primer & Paints

BHEL will provide primer and finish paint for regular preservation (excluding the anticorrosive paints for site weld joints, Steam washable paints, Coal tar Epoxy paints - refer clause 5.3.4) and Final Painting free of charges for equipments, Aux, piping and structures etc covered under these specifications. Contractor shall assess the requirement well in advance and submit the list to BHEL for procurement.

Section-8

Special Conditions

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

8.3

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

8.4

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

8.5

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

8.6

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

8.7

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

8.8

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

8.9

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

8.10

Vibration indicators/vibration recorders/vibration analyzers will be provided by BHEL for checking and analyzing vibration levels of rotating equipments with necessary operators. Contractor shall provided necessary labour for carrying out such tests. Similarly, BHEL will provide the oscilloscope for any specific requirement.

8.11

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

8.12 **Stage Inspection By FES/QA Engineers**

8.12.1

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

8.13.0 Statutory Inspection Of Work

8.13.1

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

8.13.2

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

1) Inspectorate of steam boilers and smoke nuisance
2) Any other authority connected to this work.

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

8.13.3

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

8.13.4

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

8.13.5

BHEL will pay fees for visits, inspection fees etc of these statutory authorities. all other expenses shall be borne by the contractor. in case these inspections have to be repeated due to default/fault of the contractor and fees have to be paid again, the contractor has to bear the charges.

8.13.6

Contractor should be qualified to execute pressure parts & piping work coming under the purview of IBR, for which he should register himself with CIB of state in which project is being installed. Similarly it is the responsibility of contractor to obtain license from chief electrical inspector of concerned State, wherein project work is to be carried out for carrying out high voltage work. Contractor also should be aware of the latest IBR regulations and electricity act, including the amendments thereof.

8.14

The quality management system of BHEL, Power Sector – Western Region (PSWR) has already been certified and accredited under ISO 9002 standards in this regard. The basic philosophy of the quality management system is to define the organizational responsibility, work as per documented procedures, verify the output with respect to acceptance norms, identify the non-conforming product/ procedure and take corrective action for removal of non-conformance specifying the steps for avoiding recurrence of such non-conformities, & maintain the relevant quality records. The non-conformities are to be identified through the conduct of periodical audit of implementation of quality systems at various locations/stages of work. Suppliers/ vendors of various products/services contributing in the work are also considered as part of the quality management system. .as such the contractor is expected not only to conform to the quality management system of BHEL but also it is desirable that they themselves are accredited under any quality management system standard.

SECTION-9

Special Conditions of Contract

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

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

9.1 Responsibility of the Contractor in Respect of Safety of Men, Equipment, Material And Environment.

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:

Name of Contractor

Name of Contractor Site-in-charge & Telephone number

Job Description in short

Date of start of job

Date of expected completion
Name of BHEL Site-in-charge.

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

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

SPECIAL CONDITIONS
Safety
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 environmen t 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.

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.

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

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

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.

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

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

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.

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.

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

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

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

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

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

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

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

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.

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.

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

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

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.

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.

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.

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.

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.

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

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

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

9.2.1.15.2
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 aid personnel shall be included in the emergency response team. Contractor employees and

workmen are encouraged to participate in first aid training programmes whenever organised by BHEL.

9.2.2 OCCUPATIONAL HEALTH

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

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

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

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

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

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

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

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

9.2.2.8
Adequate arrangements shall be made to provide safe drinking water

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

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

9.2.3.0 HYGIENE and HOUSEKEEPING

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

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

9.2.3.3
BHEL may take up appropriate remedial measures at the cost of the contractors if the contractors fail in good housekeeping 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 im pacts and their improvements.

WASTE MANAGEMENT

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.

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

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

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

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

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**

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 inboth the cases, the contractor must specify in writing the name of such persons to the BHEL Engineer in Charge.

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.

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

TRAINING & AWARENESS

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

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.

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

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

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

REPORTING

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.

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.

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.

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

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

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

AUDIT REVIEW AND INSPECTION

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

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

- Compliance with procedures and systems
- Availability, condition and use of PPE
- Condition of maintenance tools, equipments, facilities
- Availability of fire fighting equipments and its condition
- Use of fire fighting equipments and first aid kit
- Awareness of occupational health hazard
- Awareness of safe working practices
- Presence of quality supervision
- Housekeeping

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

NON COMPLIANCE:-

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

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

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

9.8

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:

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

IS No.	YEAR	Amd. upto	DESCRIPTION
IS 10204	1982		PORTABLE FIRE EXTINGUISHERS MECHANICAL FOAM TYPE
IS 10245	1994		SPECIFICATION FOR BREATHING APPARATUS
IS 10291	1982		SAFETY CODE FOR DRESS DRIVERS IN CIVIL ENGINEERING WORKS
IS 10658	1983		HIGHER CAPACITY DRY POWDER FIRE EXTINGUISHERS (TROLLEY MOUNTED)
IS 10662	1992		COLOUR TELEVISION
IS 10667	1983		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF FOOT AND LEG
IS 11037	1984		ELECTRONIC FAN REGULATORS
IS 11057	1984		INDUSTRIAL SAFETY NETS
IS 11451	1998		RECOMMENDATION FOR SAFETY AND HEALTH REQUIREMENT RELATING TO OCCUPATION EXPOSURE TO ASBESTOS
IS 1169	1967		PEDESTAL FANS
IS 1179	1967		SPECIFICATION FOR EQUIPMENT FOR EYE AND FACE PROTECTION DURING WELDING
IS 11833	1986		DRY POWDER FIRE EXTINGUISHERS FOR METAL FIRES
IS 11972	1987		CODE OF PRACTICE FOR SAFETY PRECAUTION TO BE TAKEN WHEN ENTERING A SEWARAGE SYSTEM
IS 1287	1986		ELECTRIC TOASTER
IS 13063	1991		STRUCTURAL SAFETY OF BUILDINGS ON SHALLOW FOUNDATIONS ON ROCKS
IS 13385	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE WHEEL MOUNTED WATER TYPE (GAS CARTRIDGES)
IS 13386	1992		SPECIFICATIONS FOR FIRE EXTINGUISHERS 50 LITRE MECHANICAL FOAM TYPE
IS 13415	1992		CODE OF SAFETY FOR PROTECTIVE BARRIERS IN AND AROUND BUILDINGS
IS 13416	1992		RECOMMENDATIONS FOR PREVENTIVE MEASURES AGAINST HAZARDS AT WORKING PLACE PART 1 TO PART 5
IS 13430	1992		CODE OF PRACTICE FOR SAFETY DURING ADDITIONAL CONSTRUCTION AND ALTERATION TO EXISTING BUILDINGS
IS 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 No.	YEAR	Amd. upto	DESCRIPTION
IS 2309	1989		PRACTICE FOR THE PROTECTION OF BUILDINGS AND ALLIED BUILDINGS AGAINST LIGHTENING
IS 2312	1967		EXHAUST FANS
IS 2361	1994		SPECIFICATION FOR BUILDING GRIPS - FIRST REVISION
IS 2418	1977		TUBULAR FLUORSCENT LAMPS IS 2418 (FT-1)
IS 2750	1964		STEEL SCAFFOLDINGS
IS 2762	1964		SAFE WORKING LOADS IN KGS FOR WIRE ROPE SLINGS
IS 2878	1986		FIRE EXTINGUISHERS CARBON DIOXIDE TYPE (PORTABLE AND TROLLEY MOUNTED)
IS 2925	1984		SPECIFICATION FOR INDUSTRIAL SAFETY HELMETS
IS 3016	1982		CODE OF PRACTICE FOR FIRE PRECAUTIONS IN WELDING AND CUTTING OPERATIONS- FIRST REVISION
IS 3315	1974		DESERT COOLERS
IS 3521	1989		INDUSTRIAL SAFETY BELTS AND HARNESS
IS 368	1983		IMMERSION WATER HEATERS
IS 3696	1991		SAFETY CODE OF SCAFFOLDS AND LADDERS PART 1 TO 2
IS 3737	1996		LEATHER SAFETY BOOTS FOR WORKERS IN HEAVY METAL INDUSTRIES
IS 374	1979		CEILING FANS INCLUDING REGULATORS
IS 3764	1992		EXCAVATION WORK - CODE OF SAFETY
IS 3786	1983		METHOD FOR COMPUTATION OF FREQUENCY AND SEVERITY RATES FOR INDUSTRIAL INJURIES AND CLASSIFICATION OF INDUSTRIAL ACCIDENTS
IS 3935	1966		CODE OF PRACTICE FOR COMPOSITE CONSTRUCTION
IS 4014	1967		CODE OF PRACTICE FOR STEEL TUBULAR SCAFFOLDING
IS 4081	1986		SAFETY CODE FOR BLASTING AND RELATED DRILLING OPERATIONS
IS 4082	1977	1996	STACKING AND STORAGE OF CONSTRUCTION MATERIALS AND COMPONENTS AT SITE
IS 4130	1991		DEMOLITION OF BUILDINGS - CODE OF SAFETY PART 1 TO 2
IS 4138	1977		SAFETY CODE FOR WORKING IN COMPRESSED AIR (FIRST REVISION)
IS 4155	1966		GLOSSARY OF TERMS RELATING TO CHEMICAL AND RADIATION HAZARDS AND HAZARDOUS CHEMICALS
IS 4209	1967		CODE OF SAFETY FOR CHEMICAL LABORATORY
IS 4250	1980		FOOD MIXERS
IS 4262	1967		CODE OF SAFETY FOR SULFURIC ACID
IS 4756	1978		SAFETY CODE FOR TUNNELING WORK
IS 4912	1978		SAFETY REQUIREMENTS FOR FLOOR AND WALL OPENINGS, RAILINGS AND TOE BOARDS
IS 5121	1969		SAFETY CODE FOR PILING AND OTHER DEEP FOUNDATIONS
IS 5182	1969	1982	METHODS FOR MEASUREMENT OF AIR POLLUTION
IS 5184	1969		CODE OF SAFETY FOR HYDROFLUORIC ACID
IS 5216	1982	2000	RECOMMENDATIONS ON SAFETY PROCEDURES AND PRACTICE IN ELECTRICAL WORK PART I AND II
IS 555	1979		TABLE FANS
IS 5557	1995		INDUSTRIAL AND SAFETY LINED RUBBER BOOTS (SECOND REVISION)
IS 5916	1970		SAFETY CODE FOR CONSTRUCTION INVOLVING USE OF HOR BITUMINOUS MATERIALS

IS No.	YEAR	Amd. upto	DESCRIPTION
IS 5983	1980		SPECIFICATION FOR EYE PROTECTORS - FIRST REVISION
IS 6234	1986		PORTABLE FIRE EXTINGUISHERS WATER TYPE (STORED PRESSURE)
IS 692	1994		CRITERIA FOR SAFETY AND DESIGN OF STRUCTURES SUBJECTED TO UNDERGROUND BLASTS
IS 6994	1973		SPECIFICATION FOR SAFETY GLOVES
IS 7155	1986		CODE OF RECOMMENDED PRACTICE FOR CONVEYOR SAFETY (PART 1 TO 8)
IS 7205	1974		SAFETY CODE FOR ERECTION OF STRUCTURAL STEEL WORK
IS 7293	1974		SAFETY CODE FOR WORKING WITH CONSTRUCTION MACHINERY
IS 7323	1994		GUIDELINES FOR OPERATIONS OF RESERVOIRS
IS 7812	1975		CODE OF SAFETY FOR MERCURY
IS 7969	1975		SAFETY CODE FOR HANDLING AND STORAGE OF BUILDING MATERIALS
IS 8089	1976		CODE OF SAFE PRACTICE FOR LAYOUT OF OUTSIDE FACILITIES IN AN INDUSTRIAL PLANT
IS 8091	1976		CODE OF PRACTICE FOR INDUSTRIAL PLANT LAYOUT
IS 8095	1976		ACCIDENTS PREVENTION TAGS
IS 818	1968	1997	CODE OF PRACTICE FOR SAFETY AND HEALTH REQUIREMENTS IN ELECTRIC AND GAS WELDING, AND CUTTING OPERATIONS
IS 8448	1989		AUTOMATIC LINE VOLTAGE CORRECTOR (STABILISER)
IS 8519	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR BODY PROTECTION
IS 8520	1977		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR EYE, FACE AND EAR PROTECTION
IS 875	1987		STRUCTURAL SAFETY OF BUILDING: LOADING STANDARD PART 1 TO 5
IS 8807	1978		GUIDE FOR SELECTION OF INDUSTRIAL SAFETY EQUIPMENT FOR PROTECTION OF ARMS AND HANDS
IS 8978	1985		INSTANTANEOUS WATER HEATERS
IS 8989	1978		SAFETY CODE FOR ERECTION OF CONCRETE FRAMED STRUCTURES
IS 940	1989		PORTABLE FIRE EXTINGUISHERS WATER TYPE (GAS CARTRIDGE)
IS 9457	1980		SAFETY COLOURS AND SIGNS
IS 9679	1980		CODE OF SAFETY FOR WORK ENVIRONMENTAL MONITORING
IS 9706	1997		CODE OF PRACTICE FOR THE CONSTRUCTION OF AERIAL RPEWAYS FOR THE TRANSPORTATION OF MATERIAL
IS 9759	1981		GUIDELINES FOR DEWATERING DURING CONSTRUCTION
IS 9815	1989		SERVO MOTOR OPERATED LINE VOLTAGE CORRECTOR (SERVO STABILISER)
IS 9944	1992		RECOMMENDATIONS ON SAFE WORKING LOAD FOR NATURAL AND MAN-MADE FIBRE ROPE SLINGS
IS 996	1979		SINGLE PHASE ELECTRIC MOTORS
ISO 3873	1977		SAFETY HELMET

SECTION-10
SPECIAL CONDITIONS OF CONTRACT

10.0 Drawings and Documents

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

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

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

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

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

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

10.7
In case of discrepancy between quoted item rate and corresponding amount in the rate schedule, the **quoted item rates shall be reckoned as correct and amount recalculated**. Quoted item rates shall also prevail for arriving at the total price quoted for offer evaluation and Work Order placement. Order will be placed by BHEL for all the items under the scope of this contract to one bidder without splitting of scope.

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

Section-11

Special Conditions of contract

11.0 Time Schedule, Mobilization, Progress Monitoring, Overrun etc.

11.1 Time Schedule & Mobilization

11.1.1
The contractor has to mobilize his resources and work force within the **TWO** weeks from receipt of telegraphic/fax letter of intent to commence the materials receipt & handling activities and shall further augment the manpower and T&P resources in such a manner that the entire work is completed to achieve the following **tentative time schedule**:

SN	Activities	Completion (Months)
1.	Placement of Condenser on foundation	1
2.	Placement of Generator	2
3.	Turbine Box Up	3
4.	Hydraulic test of Condenser	3
5.	Alignment completion of TG set	4
6.	Completion of TG Integral piping	4
7.	Oil flushing completion	5
8.	Barring Gear	5 ½
9.	Rolling & Synchronisation	6
10.	Trial operation and completion of PG test related works	7
11.	Stability Run and Handing over	8

11.1.2
The contractor shall reach site and establish his site office and mobilise to commence the work as per directions of BHEL engineer. Mutually agreed programme shall be drawn by the contractor primarily to achieve the schedule as aforesaid, taking into account available and anticipated materials inflow, and other inputs. These may have to be further fine tuned with shorter duration programmes as the case may be.

The date of start of Contract Period shall be reckoned from the date of erection of the first equipment or first component on it's designated and permanent position / foundation. However the contractor shall mobilize resources as necessary prior to this event for other services like those at stores, materials management, watch & ward and other miscellaneous services under the scope of this contract.

11.1.3
In order to meet above schedule in general, and any other intermediate targets set, to meet customer requirements, contractor shall arrange all necessary resources in consultation with BHEL. Contractor shall have to provide additional manpower with matching sufficient T&P resources and work in all available parallel fronts accordingly as per availability of erection materials to achieve the above commissioning schedule without any extra compensation.

11.1.4 **Contract Period**
Contract Period will be of **8 (Eight)** months. Commencement of Contract Period shall be reckoned as defined in clause 11.1.2 above.

11.1.5 **Grace Period**

Contractor shall complete all the works in scope of these specifications within the Contract Period. A Grace Period of **2 (Two)** months beyond the Contract Period will be allowed at the discretion of BHEL without any additional financial implications on either side.

11.2 **Progress Monitoring, Contract Extension and Overrun**

11.2.1 **Progress Monitoring**
Progress will be reviewed periodically including month end review vis-à-vis the plans drawn as above. The contractor shall submit periodical progress reports, and other reports/ information including manpower, consumables etc, as desired by BHEL.

11.2.2 **Ascertaining and Establishing the Reasons for Shortfall**

The onus probandi that the causes leading to extension in the contract period is not due to any reasons attributable to the contractor is on him (the contractor). Review of the performance as stated vide clause11.2.1 above will be made considering the availability of components to be erected and other constraints over which the contractor has no control. The programme will be reviewed area-wise and the following facts will be recorded in case of shortfall at the end of every month:

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

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

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

It is specifically mentioned that Contractor may have to work on extended hours beyond the normal working hours to achieve the set targets / schedule. Contractor shall have to provide additional manpower with matching sufficient T&P resources and work in all available parallel fronts and extended hours accordingly. All above shall be the part of scope of work with out any extra compensation.

11.2.3 **Contract Extension**

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.

11.2.4

A joint programme shall be drawn for the work to be completed during the extended contract period. Review of the program and record of shortfall as describe vide clause no. 11.4.2 shall be done during the extended period. The over run charges will be paid in proportion to the achievement of the respective month vis-à-vis the plan for the month (for assessing the performance, the agreed plan shall be reduced by shortfall attributable to the BHEL). BHEL may disallow contractor's claim for over run charges if the monthly programme as mentioned here not made by him.

11.2.5

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

11.2.6 **Overrun Compensation**

If the contract is extended for any reason other than those attributable to the contractor or force majure conditions, the contractor will be compensated by payment of overrun charges at the rate of **Rs.30,000/- (Rupees Thirty Thousand Only)** per month. Overrun compensation will be paid for the extension attributable to BHEL. No overrun compensation will be payable for the extension on account of reasons attributable to contractor and/or force majure conditions. Pro-rata payment will be made for part of a month considering daily ORC = Monthly ORC rate divided by 30.

11.3 **Price Variation**

No price variation is applicable under this contract. Accordingly, the clause no. 2.15 of general conditions of contract shall not be applicable.

11.4 **Variation in Quantities**

Quantities indicated in this Tender Specification are tentative and likely to vary. Agreed lumpsum price of Rate Schedule shall be firm for any upward or downward variation in quantities. No any additional/ extra payment will be made on account of any variation of quantities in this regard.

11.5 **VARIATION IN QUANTITY & SITE WELD JOINTS:**

Quantity and weight of equipments and piping indicated for TG, TG equipments with related Aux. Pumps, Tanks, Vessels etc. including the TG integral piping scope of work under this tender Specification are also tentative and likely to vary. Also the quantity of site weld joints and their NDT requirement including the heat treatment as required shall be carried out on actual basis within the agreed lump sum price of Rate Schedule. The agreed lump sum price for this scope of work shall be firm for any upward or downward variation in quantity, weight & weld joints and no additional/ extra payment or recovery will be made on account of any variation of quantities & weight in respect of agreed lump sum price.

11.6 Interest Bearing Recoverable Advance

Interest bearing (@ 12% per annum interest 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).

11.7 Definition of Work Completion

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

Section-12

Special Conditions of Contract

12.0 Terms of Payment

12.1 Payment for Work Completed.

12.1.1 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.

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

12.1.3 Release of payment in each running bill will be restricted to 95% of the value of work admitted, as per the percentage break-up for the stage of work completion stipulated vide clauses hereinafter. The 5% thus remaining shall be treated as amount payable but not due and shall be on account of workmanship guarantee of work executed. The same is to be released after completion of the defect liability period of **12 months** from the date of completion of entire work as certified by BHEL engineer. However this amount may be released on submission of bank guarantee of equal amount and tenure in prescribed format and the BG shall be kept valid till completion of such guarantee period and an additional six months claim period.

12.2 Stages of Progressive Payments

12.2.1 Progressive payment of agreed lump sum price for condenser, turbine, generator with aux., pumps & aux., tanks & vessels and integral piping etc. will be made as per following break up of activities. BHEL (Construction Manager) shall have the rights to break down these percentages further for any activity on merit.

12.2.1.1 <u>Condenser (12%)</u>

01) Preparation of Foundation, Placement, Leveling and alignment of Sole plates	:	1%
02) Erection & Alignment of condenser	:	3%
03) Erection & Alignment of Hot Well	:	1%
04) Tube insertion & expansion	:	2%
05) Condenser neck welding with Turbine	:	2%
06) Hot well welding with Condenser	:	1%
07) CW piping connection	:	1%
08) Hydro Test	:	1%

12.2.1.2 Turbine (15%) :

01) Preparation Of Foundation, Placement, Leveling Of Base Plates & Bearing Pedestals : 2%

02) Placement, Assy. & Centering Of Turbine Casing : 3%

03) Box Up Of Turbine : 1%

04) Rotor Alignment : 2%

05) Reaming and coupling : 2%

06) Grouting of Frame/ foundation : 2%

07) Assembly Of Regulation System : 1%

08) Installation Of System Control Valves : 1%

09) Final Bearing Box up : 1%

12.2.1.3 Generator (33%) :

01) Preparation Of Foundation & Base Plates : 2%

02) Readiness of Generator Stator lifting arrangement at site : 5%

03) Lifting of Generator Stator to required elevation : 5%

04) Placement, Leveling and centering of stator on foundation : 5%

05) Threading Of Rotor & Assy. Of End Shields : 2%

06) Alignment Of Rotor : 1%

07) Reaming and coupling : 2%

08) Grouting of Frame/ foundation : 2%

09) Bearing Box up : 1%

10) Final – Box Up Of Generator : 1%

11) Erection Of Excitation System : 1%

12) Erection Of Generator Auxiliaries : 1%

13) Erection of Generator air Coolers : 2%

14) Erection of Co2 system : 3%

12.2.1.4 Pumps and Auxiliaries (18%):

01) Preparation Of Foundations, Placement BF Pumps & Motors (2 Sets) : 1%

02) Leveling & Alignment Of BFP (2 Sets) : 2%

03) Completion of Final Grouting of BFP (2 sets) : 1%

04) Preparation of Foundations and Placement of Condensate Extraction Pumps (2 Sets) : 1%

05) Leveling & Alignment of C. E. Pumps (2 Sets) : 1%

06) Completion of Final Grouting of C. E .Pumps (2 sets) : 2%

07)	Erection Of Lube Oil Pumps, Oil Centrifuge, Oil Coolers, Duplex Oil filters & Other Misc. Pumps	:	3%
08)	Erection Of Main Oil Tank, Over Head Oil Tank and Drain Cooler etc.	:	2%
09)	Erection Of HP Heaters and accessories	:	1%
10)	Erection Of LP Heaters and accessories	:	1%
11)	Erection Of Gland Steam Condenser	:	1%
12)	Erection Of Steam Air Ejectors	:	2%

12.2.1.5 <u>TG Integral Piping with Valves, Fittings, Supports etc.(10%):</u>

1)	Erection, alignment, welding/NDE, supporting and hydraulic testing of Lube oil system/ Governing oil system/Jacking oil system pipings etc.	:	4%
2)	Erection, alignment, Welding/NDE, supporting & Steam blowing etc. of MS line from ESV to Turbine.	:	2%
3)	Erection, alignment, Welding/NDE, supporting etc. of Gland Steam piping & Steam Extraction lines.	:	1%
4)	Erection, alignment, Welding/NDE, supporting etc. of Cooling water connection piping.	:	1%
5)	Erection, alignment, Welding/NDE, supporting etc. of drains & vents and Misc. piping.	:	2%

12.2.1.6 <u>Final Painting</u> : 2%

12.2.1.7 <u>T.G. Commissioning (10%):</u>

01)	Commng. Of Feed System Including BFP	:	1%
02)	Commng. Of Condensate System Including CEP	:	1%
03)	Commng. Of Vacuum System & Steam Ejectors	:	1%
04)	Commng. Of CW Pumps & System	:	1%
05)	Turbine Oil Flushing & Oil System Commng.	:	2%
06)	Barring Gear	:	1%
07)	Rolling & Synchroniz ation	:	1%
08)	Trial operation	:	1%
09)	Stability run & completion of PG test related works	:	1%
	Grand Total	**:**	**100%**

Section -13

Special Conditions

13.0 Extra Charges for Rectification and Modification

13.1
If extra works (requiring less than **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, are needed due to any change in or deviation from the drawings and design of equipment, operation/ maintenance requirements, mismatching, transit damages and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, are done, no extra charges will be paid. The 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 the contractor's 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, for such of those works 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 13.4 to13.8 and/or 14.2.1 to 14.2.10 as the case may be. It may be specifically noted that the decision of BHEL as to whether such payment is due shall be final and binding on the contractor.

13.4
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 13.1 which require major modification/ repair/ reworks/ 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 the site engineer and accepted by the designers and/or competent authority of BHEL, will be considered for extra payment.

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

13.6
All the extra work should be carried out by a separately identifiable gang, without affecting routine activities. Daily log sheets in the pro-forma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered/entertained in the absence of the said supporting documents i.e. Daily log sheets. It may, however be noted that signing of log sheets by BHEL engineer does not mean the acceptance of such works as extra works. All admissible claims shall be submitted to BHEL

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

13.8
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.

13.9 Extra charges

Single average man-day rate, including overtime if any, and other site expenses and incidentals, including consumables, tools & tackles and construction equipment etc. for carrying out any major rework/ repairs/ rectification/ modification/ fabrication of 8 hours as may arise during the course of erection.

Rs. 320/- (Rupees three hundred and twenty only)

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

Section-14

Special Conditions of Contract

14.0 Insurance

14.1 Transit Storage and Erection Insurance – Repairing Damages

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

14.2 Reporting Damages / Loss and Carrying Out Repairs / Fabrication

14.2.1
Checking all components/equipments at siding/site and reporting to transport and/or insurance authorities of any damages/losses will be 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/repair 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
In case of theft / damage / loss of materials due to negligence or failure attributable to the contractor, the expenses incurred on account of repair/ replacement of such components in excess of the amount realized from the underwriters shall be recovered from the contractor limited to Normal Deductible Franchise (DF) / Excess as per applicable Insurance (TAC) tariff guidelines. However, in case such insurance claim is summarily rejected by the underwriters towards damage/loss due to **wilful negligence / gross failure** on the part of the contractor, the total cost of repair/ replacement shall be recovered from the contractor.

14.2.9
Insurance cover under this contract will be as per clauses 2.10.1 to 2.10.4 of general conditions of contract to the tune modified by the Special Conditions of Contract.

14.2.10
Payments for all extra works for repair/rectification/reworks of damages and fabrication of materials lost will be as per provisions of clause 13.7.

14.2.11
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.

14.3 Insurance by the Contractor and Indemnification of BHEL

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

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

14.3.2
Contractor shall obtain suitable statutory as well as non-statutory insurance policies for all the properties belonging to him and also for his personnel deployed at project for execution of the contract work.

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. 1,50,000/- (Rupees one lac, fifty thousand only).

One time EMD is 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 remittance shall be acceptable to BHEL.**

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.

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 (either by cash/DD or BG **for maximum 50%** of total SD) before start of the work and the balance SD may be recovered from the running bills.

EMD of the successful tenderer, excepting those who have remitted one time EMD, shall be converted and adjusted against the security deposit .
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.

Tentative Scope of Equipments/Systems under this Tender Specification.

(A) Surface Condenser

1. Spring loaded Condenser (shell in assembled condition)
2. Hotwell, Atmospheric relief valves, water Boxes, Water expansion relief valves
3. Condenser Tubes, Collar, top Connecting piece
4. Stand & Surge pipes, Sacrificial anodes and vents & drain valves
5. Foundation parts

(B) Steam Turbine & Auxiliaries:

1. Steam Turbine with parts in dismantled condition
2. Emergency trip cum stop valve
3. Blanket plate for steam blowing
4. Steam turbine Governing valve
5. Steam strainer built into Stop valve
6. Manual barring device
7. Electric Hydraulic Turning Device
8. Solenoid valve for remote tripping
9. Turbine sole plates & foundation bolts
10. Shaft grounding device
11. Mating flanges for turbine inlet & extraction flanges
12. Gland sealing system including inlet and Dump control valves
13. Gland Steam leak off piping
14. Turbine drain water piping within TG block
15. Safety relief valve in controlled extraction line
16. Main Steam Piping from Emergency Stop Valves to Steam Turbine Control Valves.

C) Oil Supply System:

1. Main oil tank including drain & maintenance openings, level indicator, level signalling device, connection for Oil purifier/oil centrifuge.

a. Main oil pump with AC Motor
b. Auxiliary oil pump with AC Motor
c. Emergency Oil pump with DC Motor
d. Jacking oil pump with AC motor
e. Duplex Filter for lube oil.
f. Oil accumulator
g. Trans-Flow valves for Duplex Oil Filter
h. Change over device for oil coolers
i. Vent & drain valves for oil coolers on water and oil sides
j. Oil mist fan with AC motor
k. Pressure throttles for bearings
l. Complete Lube oil piping (supply, return, vent & drain etc) between MOT to Equipments bearings including pumps & Aux.
m. Complete control oil piping .
n. Overhead Lube oil tank with complete piping
o. Oil accumulators

Tentative Scope of Equipments/Systems under this Tender Specification.

p. Oil Centrifuge along with complete oil piping
q. Governing Console consisting of Duplex filter for control oil, Main trip solenoid valve, Electric Hydraulic Converters, solenoid valves for remote engagement of tripping device & other hydraulic components.

2. Steam Jet Air Ejector

a. Running erectors 2X100%
b. Starting ejector 1X100%
c. Steam & air vapour suction headers
d. Slide plates & Foundation parts
e. Isolation valves on steam supply header & Individual ejector
f. Water expansion relief valves
g. Instruments isolation valves
h. Vents & drain valves
i. Silencer for starting ejector
j. Strainers

3. **Gland Steam Condenser** with Steam jet ejectors 2X100%, Water expansion relief valve, Stand pipe, Isolation valves for instruments & stand pipes, Vents & drain valves.

4. **Lube oil coolers (2 Nos.)** with change over valves device, Isolation valves on CW side, Drain & vents valves, counter flanges on CW side with gaskets & fasteners.

5. Generator & Auxiliaries:

a. Closed circuit air cooled Generator with stator, Rotor, Bearings and foundation parts & Generator air coolers with CW side inlet/outlet valves for each cooler and inlet/outlet terminal point of customer, Isolation valves for each header and related Aux..
b. Brushless exciter with PMG
c. CO_2 fire extinguishing equipment for generator.

6. Balance of Plant- Mechanical

a. Vertical CEP with AC Motors & Accessories –2 sets
b. Boiler Feed Pumps with related Aux. & lube oil system –2 sets
c. LP Heaters-1&2 (Vertical– each 1 No.
d. HP Heaters-4&5 (Vertical – each 1 No.)
e. Drain Coolers
f. Equipment drains.
g. Turbine drains piping.
h. Chimney steam piping.
i. Gland steam piping.

Tentative Scope of Equipments/Systems under this Tender Specification.

j. Balance piston piping.

k. Extraction lines to Gland Steam Condenser.

l. Instrument air piping from terminal point to consumption point in STG hall.

m. Thermal insulation of piping.

n. Cooling water inlet & out let piping from Heat exchangers to terminal points.

NOTE:

Bill of quantity, dimension, weight of components are tentative and will be received in loose condition. Apart from above certain items will be supplied in assembled condition. Entire work along with instruments/items supplied in assembled condition shall be carried at site as per BHEL drawings & terminal points issued at site & instruction of BHEL site engineer.

Tentative Weight details and Dimensions of Major Equipments

Sl No.	Description / Dimensions (in mm)	Weight (in MT)
1.	**Surface Condenser**	
	(i) Shell (Size (W5000XH4400XL11000 mm)	43.5
	(ii) Hot-well (Size W3400XH2200XL6500 mm)	19.0
	(iii) Dome (Size W3400XH2200XL7000 mm)	23.0
	(iv) Stand Pipe (Size Dia 114.3 X L 5500 mm)	2.0
	(v) Surge Pipe (Size Dia 506XL5500 mm)	3.0
	(vi) Tubes (OD 22XThk-1 XL7500 mmX10365 Nos.)	44.5
2.	Steam Jet Air Ejector (W 2000XH 3200X L 6000 mm)	7.5
3.	Gland Steam Condenser (Size Dia 406 X L 2800 mm)	1.1
4.	Drain Cooler (Size Dia 600 X L 5200 mm)	5.2
5.	LP Heater-1 (Dia 1200 X H 9400 mm)	6.7
6.	LP Heater-2 (Dia 1200 X H 7500 mm)	5.7
7.	HP Heater-4 (Size Dia 1300 X H 9400 mm)	11.5
8.	HP Heater-5 (Size Dia 1300 X H8300 mm)	12.0
1.	Steam Turbine Oil Cooler (Dia1250XL 3000 mm X 2Nos. Weight 3 T each)	6.0
10.	Generator Air Coolers (Size W700XH500X L 4200 X 8 Nos., Weight 0.96 T each)	7.7
11.	**Steam Turbine**	
	(i) Outer Casing (Upper part, size 3725x3110x 1600 mm)	14.0
	(ii) Outer Casing (Lower Part, size 3495x3100x1600 mm)	15.0
	(iii) Exhaust hood (upper part, size 5800X2100X2000 mm)	15.0
	(iv) Exhaust hood (Lower part, size 5800X2100X2000 mm)	22.0
	(v) Rotor assembly (size 7200x2300x2300 mm)	23.0
	(vi) Front Brg. housing assly. with bed plate (size 1600x2000x1500 mm)	7.5
	(vii) Rear Brg. housing assly.(size 4300x1600x1500 mm)	7.0
	(viii) Inner Casing (size 1300x1500x1250 mm)	4.0
	(ix) Guide blade carrier-I (Size 600x1300x1200 mm)	1.8
	(x) Guide blade carrier-II (Size 600x1500x1500 mm)	4.7
	(xi) Guide blade carrier-III (Size 350x2000x2000 mm)	3.5
	(xii) Guide blade carrier-Iv (Size 420x2400x2200 mm)	4.8
12.	Lube oil pump Assly. (Size 2500x1000x900 mm, 2 Nos., weight 1.1 T each)	2.2

Tentative Weight details and Dimensions of Major Equipments

13. EOP Assly. (DC) (Size 1600x750x700 mm)	0.7
14. JOP Assly. (AC&DC) (Size 1550x1350x800 mm)	2.0
15. Oil accumulator assembly (Size 1000X500X2300 mm)	0.6
16. Lube oil tank (Size 4450X2700X3000 mm)	5.5
17. Oil Centrifuge (Size 2200X1900X2000 mm)	1.0
18. Duplex oil filter (Size 1500X500X2000 mm)	0.5
19. Over head tank (Dia2800 X2700X2800mm)	3.0
20. Governing Cons ole (Size 1800X1500X1500 mm)	1.0

21 Generator

(i)	Stator (Size L6000XB3500XH3500 mm)	100.0
(ii)	Rotor (Size L8300XB1000XH1000 mm)	23.7
(iii)	Bearings (Size L2000XB1000XH1200 mm)	4.6
(iv)	Exciter (Size L1500XB1200XH1500 mm)	2.0
(v)	Foundation items (Loose)	6.7
(vi)	Air Coolers Ducting items (Loose)	3.0
(vii)	CO_2 System with cylinders (Loose)	3.0

22. Condensate Extraction Pumps(2 sets)

(i)	Pump Assembly (Size Dia 711XH4774 mm)	2.08
(ii)	Canister (Size Dia 880 XH380 mm)	0.5
(iii)	Foundation Ring (Dia 1080 XH150 mm)	0.185
(iv)	Suction Strainer (Size Dia 825 X 920 mm)	0.55
(v)	Drive Motor (Size Dia 2130 X H 2170 mm)	3.3
(vi)	Motor Stool (Size Dia 1150 XH 440 mm	0.215
(vii)	Connecting coupling (loose)	0.42
(viii)	Tools & Tackles (loose)	0.11

23. HP Boiler Feed Pumps (2 sets)

(i)	Boiler Feed Pump set (Size L 2500X B 2400 X H 2200 mm)	5.4
(ii)	Seal Water Cooler (Size L 700X B 700 X H1200 mm)	0.11
(iii)	Suction strainer (BP) (Size L 2500X B 2400 XH 2200 mm)	0.32
(iv)	Connecting Coupling(BP/Motor) (Size L400X B250 XH 250 mm)	0.025
(v)	Connecting Coupling(Motor/HC) (Size L750X B400 XH 400 mm)	0.17
(vi)	Connecting Coupling(HC/BFP) (Size L600X B300 XH 300 mm)	0.045
(vii)	Booster Pump (Size L2000X B1400 XH 2000 mm)	2.5
(viii)	Motor (Size L4800X B3600 XH 3000 mm)	8.8
(ix)	BFP Lube Oil Unit skid (Size 2000X2000X2500 mm)	3.2
(x)	BFP Hydraulic Coupling	1.7
(xi)	Tools & Tackles (loose)	0.7

NOTE:
*Above weights & dimensions are tentative and may vary. All equipments & Aux. are to be handled & erected as dispatched from manufacturing units & received at site.

Appendix – II (B)

Summary of Tentative Weight of Systems Involved in this Tender Specification.

SN	Description	Total Weight Involved (MT)
1.	Condenser & Auxiliaries	135.0
2.	Steam Jet Air Ejector	7.5
3.	Gland Steam Condenser	1.1
4.	Drain Cooler	5.2
5.	LP Heaters –1 & 2	12.4
6.	HP Heaters -- 4&5	23.5
7.	Steam Turbine & Aux.	122.3
8.	Steam Turbine Lube oil Pumps, Tanks & Aux.	22.5
9.	Generator & Auxiliaries	150.7
10.	Boiler Feed Pumps & Aux.	43.0
11.	Condensate Extraction Pumps & auxiliaries	15.0
12.	**Piping, Valves, Hanger & Supports & Fittings Aux.**	
	(i) Carbon steel Piping	20.0
	(ii) Alloy Steel Piping	1.5
	(iii) Alloy steel Piping (X-20, Cr Mo V 12.1 Material) (Pipe size OD 170 x 14.27 Thick, 20 Joints)	3.5
	(iv) Stainless Steel Piping	3.0
	Total Weight	**566.2MT**

NOTE :

All above weight details given are only tentative and likely to vary. The erection, testing, commissioning has to be carried out for all the Equipments/Auxiliaries/Items covered under this tender specification that are necessary for completion of the total system.

Appendix-III

Format for Bidder's month-wise manpower deployment plan (category-wise numbers to be indicated for each month)

SN		Months									
		1	2	3	4	5	6	7	8	9	10
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	Millwright fitters										
11	Crane operator										
12	Truck/trailer drivers										
13	Store keepers										
14	Electricians										
15	Semiskilled/ unskilled workers										
	Month wise total										

Signature of bidder

Date:

Appendix–IV
Format for deployment plan for major T ools and Plants of Bidder

(Please indicate month-wise quantities)

SN	Description & capacity of T&P	Min. Qty	Months quantity									
			1	2	3	4	5	6	7	8	9	10
1	Mobile Crane of suitable capacity	01										
2	Trailer with Tractor of suitable capacity	01										
3	TIG welding sets	3 sets										
4	Pipe bending m/c electro-hydraulic	As reqd.										
5	Stress relieving equipment with temperature recorders	As required										
6	Radiography source & other arrangement	1set										
7	Electric distribution board with energy meter	1set										
8	Welding Generators/rectifiers	6 sets										
9	Hydraulic test pump cap.150 Kg/cm2	1 Set										
10	Any other major T&P planned by the contractor	As required										
11	Lifting and shifting arrangement for heavy consignments / equipments	1 set										
12	Hydraulic Jacks of adequate capacity	As required										

(*) NOTE: This list is 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

No claim whatsoever will be entertained on this account.

DATE: signature of the bidder

Appendix-V
Planned workers man-days in various areas

Sl. No.	Description of work	Man-days Planned	Remarks
1.	Surface Condenser		
2.	Turbine with Integral Piping		
3.	Generator		
4.	T G Auxiliaries		
5.	Piping		
6.	Other Auxiliaries		
7.	Electrical		
8.	Control & Instrumentation		
9.	Materials Management		

Appendix-VI

Concurrent Commitments

Sr. No.	Full postal address 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 bidder

Date:

Appendix-VII
Analysis of unit rate quoted

SN	Description	% of quoted rate	Remarks
01	Site facilities viz., electricity, water other infrastructure.		
02	Salary and wages + retrenchment benefits		
03	Consumables		
04	T&P depreciation & maintenance		
05	Establishment & administrative expenses		
06	Overheads		
07	Profit		
TOTAL		100%	

Signature of the bidder

Date: