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NOT FOR PUBLICATION **ORIGINAL COPY**

TENDER NO. BHEL: NR (SCT): MSIL: STG & HRSG: 740

FOR

"Erection, Testing, Commissioning, Trial Operation & Handing over of All Mechanical, Electrical ,C&I, Balance of Plant & Material Handling Work of 1x17.5 MW STG & 2x75 TPH HRSG at M/s Maruti Suzuki India Ltd(MSIL) , Gurgaon, Haryana."

PART I – TECHNICAL BID

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA

ISO 9001, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA
Phone: 0091-0120-2416513/ 2416251 / 2416279
Fax 091-0120-2515464 / 2515467
Email: msd@bhelpsnr.co.in / sca@bhelpsnr.co.in

TENDER NO. BHEL: NR(SCT): MSIL : STG & HRSG:740

IMPORTANT NOTE

PURCHASER OF THIS TENDER DOCUMENT IS ADVISED TO CHECK AND ENSURE COMPLETION OF ALL PAGES OF TENDER DOCUMENT AND REPORT ANY DISCREPANCY TIMELY FOR CORRECTIVE ACTION, IF ANY, TO THE ISSUING AUTHORITY BEFORE THE BIDS ARE SUBMITTED. ORIGINAL COPY OF TENDER DOCUMENT COMPLETE IN ALL RESPECTS MUST BE SUBMITTED BACK AS PART OF THE BID WITHOUT WHICH THE SAME IS LIABLE TO BE REJECTED BY BHEL.

THIS TENDER SPECIFICATION ISSUED TO:

M/S----------

INDEX

ISO 9001, ISO 14001 and OHSAS 18001 certified company
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Power Sector – Northern Region,
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TENDER NOTICE

Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of "Erection, Testing, Commissioning and Trial Operation of All Mechanical, ,Electrical ,C&I, Balance of Plant & Material Handling Work of 1x17.5 MW STG & 2x75 TPH HRSG at M/s Maruti Suzuki India Ltd(MSIL) , Gurgaon, Haryana".

TENDER NO. BHEL: NR (SCT): MSIL: STG & HRSG: 740

QUALIFYING REQUIREMENTS :

1.0 Tenderers who wish to participate should have executed during last seven years reckoned as on the date of bid-opening.

1.1 Work of at least one GT/STG of 14 MW or of higher ratings.

1.2 Work of at least one 60 TPH HRSG/Boilers or of higher ratings.

2.0 Tenderer should also have an average annual turnover at least Rs. 2 crores based on the audited accounts of last three financial years (2006-07, 2007-08 & 2008-09). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.

NOTES:

(i) **The Tender Documents comprise of following;**

(a) General Conditions of Contract (GCC),
(b) Special Conditions of Contract (SCC), Tender Notice, Project Synopsis, etc.
(c) Rate Schedule

(ii) Tender Documents with complete details are hosted on BHEL's web page www.bhel.com. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer.

(iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e ***upto 09.11.2010*** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.

(iv) Tenders must be submitted to the undersigned 'OR' to Shri Quamarudin, 'OR' to Smt. Usha Kochhar, Sr. Astt. in Room No. 104, PSNR, NOIDA latest by **15:00 Hrs. on *09.11*.2010**. Technical bids shall be opened at **15.30 Hrs. on *09.11*.2010**. Tenders received after the due date & time shall be liable to be summarily rejected.

(v) Earnest Money Deposit (EMD): Refundable, Non-interest bearing **EMD of *Rs 2,00,000/-*** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA . Those bidders who have already deposited ' One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.

(vi) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.

(vii) **All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in the related web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.**

(viii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.

(ix) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/ post.

(x) BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation. As such, the bidders should submit their best price in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).

Authorization of representative who will participate in the on line Reverse Auction Process:

a. Name and Designation of official
b. Postal Address (Complete)
c. Telephone Nos. (Land line & Mobile both)
d. FAX No.
e. E-mail address
f. Name of Place/State/Country, wherefrom he will participate in the RA.

(xi) Bids, once submitted, shall not be returned.

(xii) Unsolicited discount/rebate shall not be accepted after bid opening.

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Sr. DGM/ SCP

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TENDER NOTICE - NEWSPAPER

LAST DATE OF SALE : *09.11.*2010 (12.00 Hrs)
DUE DATE OF SUBMISSION : *09.11.*2010 (15:00 Hrs.)

NIT NO. / NAME OF WORK
TENDER NO. BHEL: NR(SCT): MSIL : STG & HRSG:740 **Sealed tenders are invited from the contractors fulfilling qualifying requirements given in the detailed tender specifications for the work of "Erection, Testing, Commissioning and Trial Operation of All Mechanical, Electrical ,C&I, Balance of Plant & Material Handling Work of 1x17.5 MW STG & 2x75 TPH HRSG at M/s Maruti Suzuki India Ltd(MSIL) , Gurgaon, Haryana."**

NOTES

1. Please visit our website at www.bhel.com for complete details of the tender.
2. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted on above web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.

Sr. DGM/SCP

PROJECT SYNOPSIS

1.	Name of the Owner	:	Maruti Suzuki India Limited (MSIL) Gurgaon
2.	Address	:	MSIL , Gurgaon
3.	Installed capacity	:	New Project
4.	New stallation	:	1x17.5 MW + 2x75 TPH HRSG
5.	Nearest Railway Station	:	Gurgaon
6.	Nearest city	:	Gurgaon
7.	Neareast Airport	:	New Delhi
8.	Maximum Temperature	:	43 deg C
9.	Minimum Temperature	:	7 deg C

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
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PROCEDURE FOR SUBMISSION OF SEALED TENDERS:

The tenderers must submit their tenders as required in **two parts** in separate sealed covers **prominently superscribed as Part-I Technical bid and Part-II ,Price bid** also indicating on each of the cover tender specification no., date and time as mentioned in tender notice.

TECHNICAL BID (COVER-I)

Except **Price bid Part-II**, complete set of tender document consisting of General conditions of Contract, "Technical specification & Special terms and condition" (Part-I) issued by BHEL shall be enclosed in **Part I Technical Bid only**. All schedules, data sheets and details called for in the specification shall also be submitted along with technical bid. All details / Data / Schedules including offer letter duly signed and stamped are to be **submitted in duplicate**.

PRICE BID (COVER-II)

Tenderers may please note that price bid is **to be submitted only in original copy** of Tender i.e. Price bid (Part-II) issued by BHEL and no duplicate copy of same is required.

These Two separate covers i.e. cover I & II shall together be enclosed in a **third envelope (Cover-III)** and this sealed cover shall be superscribed with tender specification No., due date, time and submitted to officer inviting tender as indicated in tender notice on or before due date as indicated.

SECTION-III (PART-A)

SPECIAL CONDITIONS OF CONTRACT

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SECTION-III (PART-A)

SPECIAL CONDITIONS OF CONTRACT

34.0 **GENERAL**

34.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.

34.2 The contractor shall carry out the work in accordance with standard practices / codes/ instructions /drawings/ documents/ specification supplied by BHEL from time to time to the satisfaction of owner of the project.

34.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies/ departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including BHEL's applicable overhead charges.

34.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:

(a) Provision of all types of labour, supervisors, Engineers, watch and ward as required, tools & tackles, calibrated inspection, measuring and test equipment as specified and otherwise required for the work and consumables for erection, testing and commissioning including material handling.

(b) Proper out-turn as per BHEL plan and commitment.

(c) Completion of work as per BHEL Schedule.

(d) Good quality and accurate workmanship for proper performances of equipment.

(e) Repair and rectification.

(f) Re-conservation / preservation of all components during storage / erection till handing over.

(g) Keeping all the erection area neat and clean.

34.5 BHEL-Power Sector (NR) is ISO 9001, ISO 14001, OHSAS 18001, BS 7799 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, T&P, inspection, measuring and testing equipment etc. as per instructions of BHEL engineer. Contractor have also to comply with the applicable legislation and regulations with regard to their scope of work including health, safety and environment (HSE) aspects of minimizing risk arising from occupational health, safety hazards, controlling pollution and wastage's. Besides above the technical clearance from respective statutory bodies for above shall be obtained by contractor at their cost to meet regulatory/ statutory requirements.

In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least **100 trees** or equivalent in the vicinity of the project as per the available space and as per the advice of Engineers.

35.0 FOUNDATIONS AND GROUTING

35.1 Foundation for all equipment and steel structure and necessary civil works shall be provided by Customer. The dimensions and locations of the foundations, pockets, and anchor bolt pitch shall be checked by the contractor for their correctness as per drawings. The top elevation of foundations shall be checked with respect to bench mark etc. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 40mm, enlarging the pockets in foundations etc., increasing the existing floor opening for cable entry, fixing panels and repair of same as may be required for the erection of equipment / panels shall be carried out by the contractor within the tonnage rate.

Chipping and dressing of foundations up to a 40 mm thickness is in the scope of contract. While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided BHEL Engineer allows it. When required by manufacturers, the embedded sub-sole plates shall be scraped and checked with Prussian blue to get the required contact with frames.

35.2 While on the job, care is essential to avoid too much chipping and resultant lowering of level. In case of excess chipping, contractor has to arrange additional packing plates as per requirements provided it is allowed by BHEL Engineer. The embedded sub sole plates shall be corrected and checked with Prussian blue to get the required level and contact with frames.

35.3 The contractor shall ensure perfect matching of structure/ equipment, packer plates including machining, scraping and blue matching with foundation by dressing the foundation, as well as perfect matching between the packer plates and the base plate of structural column and equipment to the satisfaction of BHEL Engineer. BHEL at its discretion can accept rough chipping of foundations, embedding packer plates in cement mortar etc. If required the packer plates may have to be aligned and fixed on the foundations using approved quality special high strength, non-shrinking and quick-setting grouts. The minimum thickness below the packer plate should be 25 mm. The material required for this has to be arranged for by the contractor at his cost.

35.4 **Entire grouting work of foundation bolt grouting, base plate grouting etc. including materials will be carried out by another agency of MSIL**. While grouting will be carried out by other agency, the contractor has to ensure that all the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer. All assistance required has to be provided by the contractor.

35.5 Any civil works required for safe and efficient operation of tools and tackles like excavation / casting of foundation / anchor points for derricks, winches, guy ropes fastening, etc. any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.

35.6 All the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer.

35.7 NA

35.8 After the grouting, the foundations are to be cure by contractor to the satisfaction of Engineer. The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

35.7 The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

36.0 CONSUMABLES

36.1 The contractor shall provide within finally accepted price / rates, all consumables like all welding electrodes (including alloy steel and stainless steel), gaskets for temporary work, TIG filler wires (over & above as supplied by the unit along with the plant materials, which will be given free of cost to bidder), all gases (inert gases, welding gases and cutting gases), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. wooden planks, scaffolding materials hardware items etc required for temporary works such as supports, scaffoldings are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, for temporary work, required for completion of work except those which are specifically supplied by manufacturing unit are also to be arranged by him.

36.2 All the shims & gaskets which go finally as part of equipment shall be supplied by BHEL free of cost.

36.3 It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.

36.4 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc. before procurement of welding electrodes / TIG wires. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch No. date of expiry etc. and produce test certificate for each lot / batch with correlation of batch / lot no. with respective test certificate. No electrode will be allowed to be used without valid test certificate.

36.5 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.

36.6 Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost including arrangements for the same.

36.7 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first / subsequent bill at market value plus the departmental charges of BHEL as applicable from time to time (30% at present). Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the Contractor.

36.8 **All lubricant and chemicals required for cleaning, pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL**. All services including labor and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants / chemicals shall be properly accounted for and surplus material if any shall be properly stacked and returned to BHEL/ CUSTOMER stores at no extra cost to BHEL. Recoveries shall be affected for wastage by the contractor.

36.9 Transportation of oil drums, from stores, filling of oil and filling of oil for flushing, first filling of oil and subsequent changeover or topping / making up till the unit is fully commissioned and handed over to customer is included in scope of this contract within the awarded value. Wights for such lubricants shall not be payable and contractor shall take care of such aspects in their offer. The contractor shall have to return all the empty drums to BHEL/ BHEL's client store at no extra cost. Any loss / damage to above drums shall be to contractor's account.

36.10 All charges on account of Octroi, terminal or sales tax and other duties on materials obtained for the works from any source shall be borne by the contractor.

37.0 TOOLS AND PLANTS / IMTES

37.1 T&P being provided **by BHEL, as per Annexure-V,** to sub-contractor free of hire charges shall be shared by other sub contractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.

37.2 Besides the T&P being made available to contractor free of hire charges by BHEL, all other T&Ps and IMTEs which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor at his own cost. Contractor should ensure that these are in good working condition. In the event of the failure of contractor to bring necessary and sufficient T&Ps and IMTEs, BHEL will be at liberty to arrange the same and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor. Indicative lists of T&Ps and IMTEs to be arranged by the contractor are given **as per Annexure-VI & VII.**

37.3 All distribution boards, connecting cables, wire ropes, hoses, pipes etc. including temporary air / water/ electrical connections etc. shall have to be arranged by the contractor at his own cost.

37.4 In case of non-availability of the T&Ps to be provided by BHEL due to breakdown, major overhauls, distribution pattern or any other reason, the contractor shall plan / amend / alter his activities to meet erection / commissioning targets in consultation with BHEL.

37.5 BHEL shall provide operator for BHEL's crane of 100 MT & above capacity free of cost & for other BHEL's T&P/cranes contractor shall have to arrange at his own cost. The fuel, consumables & helpers for the operation of all BHEL's T&P including cranes will be in the scope of contractor. All lubricants for these cranes such as mobile oil, gear oil, brake oil, hydraulic oil, torque converter oil and grease will be provided by BHEL free of cost.

37.6 The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps. Their skill / performance will be checked by BHEL Engineer before they are allowed to operate the same. However checking of skills by BHEL does not absolves contractor of his responsibilities for proper and safe handling of equipment. Consistent good performance of operators and regular performance evaluation of operators shall be ensured by the contractor.

37.7 The day to day and routine maintenance of BHEL's T&Ps should be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. However, Service Engineer of manufacturer shall be available on routine inspection/ maintenance of BHEL T&P, as per BHEL's directions. These shall be maintained in good working condition during the entire period of use. T&Ps in defective / damaged condition shall be rectified promptly to the full satisfaction of BHEL Engineer. Contractor shall maintain records for maintenance of major T&Ps, which shall be made available for Inspection whenever required. In case of any lapses on the part of the contractor BHEL at its own discretion get the servicing / repair of equipment done at the risk and cost of the contractor with BHEL overheads. Further, if there are breakdowns / damages due to negligence of the contractor, the complete service / repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.

37.8 Repair of self, dynamo, battery and electric wiring of BHEL's T&P's shall be the responsibility of the contractor. The charges of the replacement of the other damaged / worn out parts of BHEL cranes will be borne by BHEL, provided the damage is not due to negligence of the contractor. However, if there are breakdowns / damages due to negligence of the contractor, the complete service/ repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.

37.9 Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost. All necessary manpower, tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost.

37.10 The area and infrastructure development of area to be carried out by the BHEL / customer. However in construction projects of this magnitude it is possible that all the areas/ approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc. for safe operation / movement of equipment including cranes / trailers etc. shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.

37.11 In the event of contractor not using and maintaining BHEL T&Ps according to BHEL's instructions, BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account.

37.12 The contractor shall furnish regular utilization report of the BHEL's T&Ps as per requirement of BHEL.

37.13 Any loss / damage to any part of BHEL T&Ps shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.

37.14 It shall be responsibility of the contractor to take delivery of T&Ps and IMTEs from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL / its Customer's store/ place as intimated by BHEL Engineer in project site in good working conditions after use.

37.15 Replacement cost including BHEL's overhead in respect of irreparable / completely damaged / non return of T&Ps shall be recovered from the contractor's running bills.

37.16 The contractor shall return BHEL's / its Customer's T&Ps and IMTEs issued to him in good working condition as and when desired by BHEL. If return of T&P and IMTE is delayed by contractor, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return.
T&Ps and IMTEs returned in damaged / unserviceable condition shall be got repaired by BHEL at its own discretion and entire cost of repair with BHEL overheads shall be recovered from the contractor.

37.17 Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, Manila ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to BHEL Engineer for inspection as and when required. Identification for such T&Ps will be done as per BHEL Engineer's advice.

37.18 Contractor shall ensure deployment of reliable and calibrated IMTEs (Inspection measuring and Test equipment). The IMTEs shall have test/ calibration certificates from authorized/ Govt. approved / accredited agencies traceable to National / International standards. Each IMTE shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.

37.19 Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer with in the contract price. The contractor will also have alternate arrangements for such IMTE so that work does not suffer when the particular instrument is sent for calibration. Also if any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument, failing which BHEL may deploy IMTEs and retake the readings at contractor's cost.

37.20 BHEL shall have lien on all T&PS, IMTEs & other equipment of the Contractor brought to the Site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of Contract. No

material brought to the Site shall be removed from the site by the Contractor and / or his Sub-contractors without the prior written approval of the Engineer.

37.21 The month-wise T&P deployment plan to be submitted as per format (at Annexure-D to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account.

38.0 SUPERVISORY STAFF AND WORKMEN

38.1 The contractor shall deploy all the skilled workmen like millwright fitters, welders, crane operators, drivers, gas cutters, riggers, sarongs, masons, carpenters, electricians, helpers and instrument technicians to carry out the works as per specifications. In addition to skilled, semi-skilled and unskilled workmen required for all the works, suitable workmen required for handling and transporting of equipment from site storage to erection site, erection, testing and commissioning as contemplated under this specification shall be deployed. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and other personnel who will be deployed by the contractor. BHEL reserves the right to insist on removal of any employee / workman of the contractor at any time, if they find him unsuitable. The contractor shall remove him forthwith.

38.2 The supervisory staff including qualified Engineers deployed 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 and in general see that the works are carried out in a safe and proper manner and in coordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

38.3 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations / activities at site. The contractor and his personnel shall cooperate with other personnel / contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

38.4 The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with other personnel/ contractor, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

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

38.6 It is the responsibility of the contractor to engage his workmen in shifts (two or three shifts as per the requirement) or on overtime basis for achieving the targets set by

BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates / prices shall include all these contingencies.

38.7 During the course of erection,

- if the progress is found unsatisfactory.
- if the target dates fixed from time to time for every mile stones are to be advanced / not being met.
- if it is found that the skilled workmen like fitters, operators, technicians etc. deployed are not sufficient.

BHEL after giving reasonable opportunity to the contractor will induct on the work the required workmen in addition to the contractor's workmen to improve the progress. The expanses so incurred shall be recovered from the contractor's bills with applicable overheads.

38.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wire, trees or any other property or to any part of erected components etc., the contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

38.9 The **month wise manpower deployment plan** to be submitted as per format (at **Annexure-C** to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. The contractor shall identify separate persons at site for quality control and safety.

38.10 Though every endeavor shall be made to ensure that all plant materials are supplied as per schedule. However in a job of this kind it is possible that some materials may be delayed. In order to achieve the ultimate targets, the contractor may have to augment his manpower and resources. No compensation on this account shall be admissible.

39.0 MATERIAL HANDLING AND STORAGE

39.1 All the equipment/ material furnished under this contract shall be received from the project stores, sheds / storage yards & transported to pre assembly area / erection site & stored in the storage spaces in a manner so that they are easily retrievable till the contractor erects them. While drawing / lifting material from BHEL / customer stores, contractor shall ensure that the balance / other materials are stacked back immediately. No claim is admissible on this account

39.2 While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection. They should take the delivery of the same, following the procedure indicated by BHEL, and transport the material safely to pre-assembly yard / erection site in time, according to program.

39.3 The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.

39.4 The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.

39.5 All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes / slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.

39.6 Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor.

39.7 Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances without any extra cost.

39.8 Contractor shall be responsible for examining all the plant and materials issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc before they are moved out of the stores / storage area. The contractor shall be solely responsible for any shortages or damages in transit, handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient number of watch / ward personal to avoid any pilferage of material. As per General Conditions of contract under provisions of clause No 29 BHEL will reserve the right to recover the cost of repair / replacement, if any, to bring back the equipment in original order, in case the equipment / material is lost / damaged while in the custody of the contractor. BHEL's decision in this regard shall be final and binding on the contractor.

39.9 The contractor shall maintain an accurate and exhaustive record-detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.

39.10 All the material in the custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.

39.11 All electrical panels, control gear, motors and such other devices shall be properly dried by heating before they are installed and energized. Exposed parts those required special protection such as bearings, slip rings, commutators shall be protected against moisture ingress and corrosion during storage and are periodically inspected. Heavy rotating parts in assembled conditions shall be periodically rotated to prevent corrosion due to prolonged storage

39.12 If the material belonging to the contractor are stored in area other than those earmarked for his operation the engineer will have the right to get it moved to the area earmarked for the contractor at the contractors risk and cost.

39.13 The contractor shall be responsible for making suitable indoor storage facilities to store all equipment (drawn by the contractor from BHEL / customer stores), which require indoor storage till the time of their installation. The Engineer will direct the contractor in this regard, which item in his opinion will require indoor storage, and the contractor shall comply with Engineer's decision.

39.14 The contractor shall ensure that all surplus / damaged / scrap / unused material, packing wood / containers/ special transporting frames etc are returned to BHEL at a place in project area identified by the Engineer. The contractor will maintain an account for all items received and returned to BHEL. Any shortage in returning such items shall be chargeable to the contractor except for a 5% allowable against wastage for packing wood only.

39.15 The contractor shall hand over all parts / materials remaining extra over the normal requirement with proper identification tags to the stores as directed by the concerned BHEL engineer.

39.16 The contractor shall ensure that all the packing materials and protective devices installed on equipment during transit and storage are removed before installation.

39.17 It shall be the responsibility of the contractor to keep the work / storage areas in neat, tidy and working conditions. All surplus/unusable packing and other materials shall be removed and deposited at location(s) specified by BHEL within the project premises. If required weighing of the same within the project premises will have to be carried out.

39.18 Transformer main tanks, the accessories and oil will be issued to the contractor from BHEL stores / place of stacking for installation. All arrangements for receiving, transporting & handling of tank , accessories, transformer oil drums etc. are to be made by the contractor except those spelt out else where in the contract.

39.19 Till the start of erection of respective transformers, supplied oil / Gas filled, it will be contractor's responsibility to maintain the gas pressure and replace/ reactivate silica gel , as applicable . Silica gel will be arranged by contractor within the accepted rates. However the N2 gas if required will be provided by BHEL free of cost & filling etc. will be arranged by the contractor with in the accepted rates for transformer erection & commissioning.

40.0 PRESERVATION OF COMPONENTS

40.1 After taking delivery from BHEL's / customer's stores, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.

a) Items stored outdoors shall be stored in such a way that item is at least six inches (6") above the ground

b) Motors, valves, electrical equipment, control equipment and instruments etc. shall be stored indoors in warehouse provided by contractor. If situation warrant: Motor windings shall be kept dry by use of external heat or space heaters.

c) Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.

d) Insulation materials shall be stored indoors or otherwise protected against getting wet.

40.2 It shall be the responsibility of the contractor to apply preservatives / touch up paints (primer) on equipment handled and erected by him till such time of final painting. It shall be contractor's responsibility to arrange for required paints (Primer), labour, scaffolding materials, cleaning materials like wire brush, emery sheets, etc., cleaning of surface and provide one coat of preservatives / paints (primer) from time to time as decided by BHEL engineer. The accepted rate shall include this work also. It is to be noted that such painting may have to be done as and when required till such time the final painting is carried out.

40.3 A separate gang of minimum two persons with all the necessary paints (Primer) / preservatives, scaffoldings and other arrangements shall be provided by the contractor within the finally accepted rate.

40.4 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts then and there for their protection.

40.5 Any failure on the part of contractor to carry out works according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.

41.0 ERECTION

41.1 All the Fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, preassembly, installation, welding, lifting and handling or checking etc during pre-assembly and erection shall be arranged by contractor at his cost.

41.2 It shall be contractor's responsibility to check the various equipment foundations for correctness with respect to level, orientation, dimensions etc. and ascertained dimensions shall be measured and submitted to BHEL for approval before erection.

41.3 All works such as cleaning, checking, leveling, blue matching, aligning, assembling, welding, temporary erection for alignment, dismantling of certain equipment for checking / cleaning, surface preparation, fabrication at site, cutting, grinding, straightening chamfering, filing, chipping, drilling, reaming, scrapping, machining, surface grinding, shaping, fitting up including NDT & PWHT etc. as may be applicable in such erection works are to be treated as incidental to erection and necessary to complete the work satisfactorily and shall be carried out by the contractor as part of the work.

41.4 It shall be the responsibility of the contractor to provide prefabricated ladders **including materials at his cost** on columns for initial work till such time stairways are completed. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.

41.6 No members of the ladder/structure/platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL/ customer without any additional cost.

41.7 The contractor is strictly prohibited in using the HRSG / BOILER components like angles, channels, hand rails etc. for any temporary supporting or scaffolding works. In case of such misuse a sum as determined by BHEL Engineer will be recovered from contractor's bills.

41.8 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes/ pipes within finally accepted rates.

41.9 All fittings like 'T' pieces, weld neck flanges, reducers etc. shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection/ after chemical cleaning and during commissioning within finally accepted rates.

41.10 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carryout such work within the finally accepted price / rates as per instructions of BHEL, which shall include specified heat treatment & NDT procedures etc.

41.11 Certain adjustment in length may be necessary while erecting pipelines / ducts/ casings/ claddings etc. and the contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified welding/NDT/ heat treatment procedures, at no extra cost. It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

41.12 The contractor shall completely erect & test all the piping systems, covered in the specification including sampling lines upto & including sample coolers, hangers & supports, valves & accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, preheating, stress relieving, testing, cleaning & painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to lines & elevation as indicated in the drawings. All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated at suitable sump-pit (unless otherwise directed) as directed by the engineer. The contractor shall assist BHEL in preparation of as built piping drawings.

41.13 Steel for suspensions for piping, ducting etc will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.

41.14 Pipes sent in running lengths shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to 80 mm NB will have to be fabricated and tested at site within the finally accepted rates.

41.15 Economiser / super heater coils/ Reheater coils, burner panels & valves may have to be hydraulically tested individually, if required, before erection as instructed by BHEL engineer within finally accepted rates.

41.16 Fittings and welding of necessary instrumentation tapping points, thermocouples pads, valves, root valves, condensing vessels, flow nozzles, Orifice plates and control valves etc. will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer within finally accepted rates. The erection, welding / NDT of all the above items will be contractor's responsibility even if the:

(i) Product groups under which these items are released, are not covered in the scope of this tender.

(ii) Items are supplied by any agency other than BHEL.

41.17 a) All the valves including motorised valves, flap valves, dampers, actuators etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding / jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the finally accepted rates.

b) The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It will be the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.

c) The contractor shall dismantle the valves & actuator for overhauling, servicing & lubrication wherever required as advised by the Engineer. The contractor shall also lap or grind valve seats for ensuring the satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.

41.18 No temporary supports should be welded on the pressure parts or piping. Welding of temporary supports / cleats etc., on main HRSG / BOILER columns should be avoided. Incase of absolute necessity prior approval from BHEL Engineer will be obtained by contractor.

41.19 All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost and contractor shall be eligible for payment of such additional supports as per applicable item of rate schedule.

41.20 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows:

- After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start up.
- Piping in the hot position with the unit operating at the maximum load.
- Piping in the cold position during the first complete shut down.

41.21 Spring suspensions/ constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required.

41.22 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Separate temporary supports shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the building structure.

41.23 All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall have to be done by the contractor within finally accepted rates only.

41.24 NA

41.25 Layout of small bore piping in HRSG / BOILER and fuel systems etc. as required 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 or from aesthetic point of view. Contractor at no extra cost to BHEL should carry this out. Bends up to 80 mm NB will have to be fabricated and tested at site within the finally accepted rates**.** As built drawings shall also be made by the contractor and submitted to BHEL after final execution of respective small bore piping work with in the final accepted tonnage rate.

41.26 Additional platforms and ladders of permanent nature for approaching different equipment, as per site requirement which may not be indicated in drawings shall be fabricated and installed by the contractor. However, the contractor will be paid for this work on accepted tonnage rate for erection irrespective of number of platforms. The materials required for platforms excluding consumables and T&P will be provided by BHEL, some materials for such work may have to be taken from packing materials, the contractor will be required to retrieve the same from packing materials by using gas cutting etc. at no additional cost to BHEL.

41.27 Erection of power cylinders, motorised valves, valve actuators etc. coming under various groups is covered under the scope of this specification including their calibration. The alignment and any mechanical adjustments including link adjustment, opening & reconnection of links, replacement of valve / actuator or any mechanical part, air filter & regulator cleaning etc. required during calibration and operation, the same shall be carried by the contractor for this package. However, if re-calibration is required till handing over of the equipments the same shall be organised by the contractor for this package as detailed above with in the final accepted rates. The valves & electrical operated actuators covered under this package shall be erected, tested & commissioned by the vendor for this package.

41.28 Hanger rods are shown in the pressure parts arrangement drawings for HRSG / BOILER. Any cutting / welding of these hanger rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of torque wrench, which is to be arranged by the contractor.

41.29 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. If, in the opinion of the BHEL engineer, the equipment is to be checked for clearances, tolerances at any stage of the work or during commissioning period, the contractor at

his cost shall carry the dismantling, cleaning, lubricating and re-fitting. All rotating machines shall be rotated periodically during storage, erection and log maintained to avoid bowing of shafts.

41.30 All the shafts of rotating equipment should be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. The equipment shall be free from excessive vibrations so as to avoid over heating of bearings or the conditions which may tend to shorten the life of equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

41.31 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition, Checking alignment and re-coupling the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction.

41.32 Forced lub oil system of motors or rotating equipment form parts of the work under this specification.

41.33 All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are be machined by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.

41.34 The contractor, at no extra cost to BHEL, shall carry out servicing and realignment of skid mounted equipment, if required by BHEL.

41.35 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.

41.36 Contractor shall carry out kerosene testing of all bearing housing of various rotating equipment like pumps, fans etc. as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and other equipment as per BHEL engineer's instructions is included in the scope of work.

41.37 Certain rotating machinery after, initial runs and commissioning of the equipment, have to be hot aligned as per the instructions of BHEL engineer. Cleaning fans, ducting etc., free of extraneous steel, scaffolding materials, electrodes, all foreign materials etc. before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.

41.38 All the bearings, gear boxes, shaft and other rotating parts etc. of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer, for cleaning the bearing, gears etc. with kerosene or some other reagent, if necessary, by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, within the finally accepted rates. Lubricants will, however, be supplied free of cost by BHEL.

41.39 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking

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

41.40 Packer plates should not only be blue matched with the foundations but also inter packer contact surfaces, contact surfaces between packer and equipment , contact surfaces between packer and foundation frame etc. shall also be blue matched by Prussian blue match checks and percentage contact shall be achieved by chipping, machining, scrapping as per BHEL engineer's instructions.

41.41 Contractor shall arrange changing of preservative oil in the gear boxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / customer's stores and transporting to site. No additional payment will be made for such works even though supply of lub oil might have been made under regular despatchable unit no. against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil to be drained and collected in drums provided by BHEL and returned to BHEL /customer's stores.

41.42 The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing if required. Check for air gap and adjustment of stator/ rotor for magnetic center of HT motor shall be carried out as part of erection.

41.43 The contractor shall be responsible for obtaining necessary approval and making whatever additions / modifications considered necessary by the Electrical Inspector, Boiler inspector or other authorities to bring the installation in conformity with the applicable rules and regulations. The liaison with the inspectors, arrangement for inspection / inspector's visit, preparation of documents, furnishing clarifications, information etc. as and when required will have to be done by the contractor with in the final agreed price.

41.44 Contractor shall take all safety measures and ensure that adequate precautions are enforced for area safety and good house keeping is maintained in their work area in line with BHEL and it's client's safety policy. All packing material and scrap steel etc. shall be cleared from work site both inside 'plant courtyard' and area so allotted for site fabrication, on regular basis and transported to identified disposal yard as allocated by BHEL / it's client.

41.45 The temporary wiring used for construction power supply in fabrication area shall be taken through PVC pipes / conduit or overhead on temporary poles.

41.46 The entire work is being executed as per the specifications, drawing and documents furnished by BHEL manufacturing units and as directed by BHEL Engineers at site to the entire satisfaction of BHEL' client. BHEL's client / client's consultant has full authority to check / recheck / inspect any work, T&P, procedure, process etc. at any point of time jointly with BHEL or independently. It shall be responsibility of the contractor to cooperate in every respect and provide the necessary assistance with in the final accepted rates.

41.47 The fans and other rotating machines shall be checked for clearances & other vital tolerances. The IGV unit shall be serviced. Necessary assistance for balancing of equipment during trial run, if required, shall be provided by the contractor free of cost.

41.48 The contractor shall paint the name / put tag numbers on all the equipment / instruments / cables etc. erected by him. Materials for tagging shall be supplied by the contractor. Contractor at his cost shall also arrange the adhesive etc.

41.49 The contractor should note that after execution of work they will hand over marked up drawings "as erected" drawings to BHEL Engineer at site for preparation of firm "as built" drawings. "As erected" drawings will bear the signature of BHEL Engineer and contractor.

41.50 Contractor shall fabricate and erect stands / supports for Junction boxes, push button stations, fixing of push button and plugging of holes in JB's. This is considered inclusive in the item erection.

42.0 DRUM LIFTING & PRESSURE PARTS MODULE ASSEMBLIES ERECTION

42.1 Boiler drum shall be unloaded either in storage area or near the erection site / boiler / HRSG depending upon site conditions. Shifting / dragging of the same to erection site for erection shall be within the scope of this contract and will be erected as per site conditions and instructions of BHEL Engineer.

42.2 The boiler drum of HRSG has to be lifted with crane after the pressure part modules are positioned & secured. Being self-supporting the drum will not have any suspension arrangement. Fabrication & installation of the temporary structure for supporting & final alignment is in the scope of contractor. The structural material will be supplied by BHEL free of cost. This temporary structure is to be removed after the completion of welding of connecting piping.

42.3 The pressure parts (modules) are received at site with temporary transportation arrangement. The contractor has to remove these structures at defined stages of material handling / erection at no extra cost to BHEL. The temporary structures has to be accounted / returned to BHEL stores within the quoted rates.

42.4 Structural steel will be provided for handling of single module of HRSG and for up-righting them. Fabrication of this structure will be in the scope of the contractor. After erection of the modules this structure has to be accounted for / returned to BHEL stores. The contractor will be paid as per the quoted tonnage rate.

43.0 WELDING, HEAT TREATMENT, RADIOGRAPHY and NDT:

43.1 The pressure parts & IBR pipe lines shall be erected in conformity with the provision of Indian Boiler Regulations and as may be directed as per any other standards/ specification in practice, in BHEL. The method of welding (ARC, GAS, TIG or other method) may be indicated in the detailed drawings/ schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements. Semi automatic welding (GMAW) process shall be used for non-pressure parts / ducting / structures etc to the maximum possible, considering its cost efficiency, better quality and time saving features.

43.2 Welding of pressure parts / equipment / piping / high tensile structural steel shall be done by certified high pressure welders who possesses valid certificate of CIB of the state in which the equipment is erected as per provision of IBR. The HP welder who possesses necessary certificate shall appear well in advance before the expiry of the validity of his certificate for re-qualification test as per relevant provision of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired, shall have to be terminated forthwith.

43.3 All welders including tack welder, structural and high pressure welder shall be tested as per ASME section IX and approved by BHEL Engineer before they are actually engaged on work though they may possess the IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The records of qualification and performance of each HP welder shall be maintained by the contractor in Performa given by BHEL Engineer. All the welders qualified for the work will be issued an identity card by the contractor with the approval of BHEL Engineer and welder will keep the same with him at work place. The record of joints, consumables & equipments along with welders identity shall be maintained by the vendor as per BHEL Engineer's instructions.

43.4 The root run welding of all butt welds of tubes/ pipes (HP or LP), instrumentation tapping points etc. will be done by TIG welding process only. Subsequent welding will be done as per welding schedule / Instructions of the engineer including full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. The contractor within the finally accepted rates shall arrange purging with inert gas in case of stainless steel joints as per requirement.

43.5 Complete penetration of welding shall be achieved and all welded joints shall be subject to acceptance by the Engineer.

43.6 Engineer may stop any welder from the work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by a particular welder which, in the opinion of the Engineer, will adversely affect the quality of the welding though the welder has earlier passed the tests prescribed by Engineer. The welders having passed qualification tests does not relieve the contractor of contractual obligation to continuously check the welder's performance.

43.7 Faulty welds caused by the poor workmanship or lack of supervision of lack of supervision on the part of the contractor shall be cut and re-welded at the contractors expenses. The procedure for the repair of defective welds shall be approved by the Engineer prior to any repair being made. For each batch of approved brassed certified showing compliance with the specification shall be secured and shall be submitted to the BHEL Engineer.

43.8 All charges for testing of contractor's welders including destructive and non destructive tests conducted by BHEL at site or at any laboratory shall have to be borne by the contractor only. The materials for plate test pieces and for pipe and tube will be given by BHEL.

43.9 All welds shall be painted with anticorrosive paint, once Radiography and stress relieving works are over. Necessary consumables and scaffolding etc. Including paints shall be provided by contractor at his own cost. Daily welding reports in the Performa suggested by BHEL should be submitted without fail.

43.10 Only BHEL approved **electrodes and filler wire**s as accepted by principal owner of plant will be arranged and used by the contractor, within the finally quoted price. BHEL reserves the right to test any approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor**.** All electrodes shall be baked and dried in the electric electrode drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate will have co-relation with the lot No. / batch No given on electrode packets. No electrodes will be allowed to be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven should also be calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards shall be submitted to BHEL before putting the oven in use. Periodical calibration for the same shall also be arranged by the contractor within the finally accepted rates.

43.11 The regulators used on welding machines shall be calibrated before putting these into use for work. Periodic calibration for the same shall also be arranged by the contractor at his cost and records shall be maintained. The regulators used with the gas cylinders should be of repute make and preferably ISI marked.

43.12 Preheating, radiography and other ND tests, post-heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. All equipment's and consumables essential for carrying out the above process have to be arranged by the contractor at his cost.

43.13 Contractor shall arrange all necessary heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, heating elements, thermocouples, etc. insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieve operations. Temperature shall be measured at least at two different points for pipes above 200 mm dia. by thermocouple, and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL. The contractor has to provide thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets, etc. for checking within the finally accepted rates. All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost. The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder after setting up the weld joints for heat treatment operation prior to the starting.

43.14 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR, DIN or ISO as specified by BHEL.

43.15 Iridium-192 shall be used by contractor for radiography work. The geometric unsharpness shall not exceed 1.5 mm. Taking adequate safety precautions shall be the responsibility of the contractor while carrying out radiography. Necessary safe guards required for radiography (including personnel from BARC) shall be arranged by contractor at his cost. All related documents issued by BARC shall be submitted by the contractor to BHEL.

43.16 Low speed high contrast, fine grain films (D-7 or equivalent) in 10 cm. width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.

43.17 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetra meter as per ASME, DIN, and ISO and as specified by BHEL must be used for each exposure.

43.18 Lead numbers and letters are to be used (generally 6 mm size) for identification of radiographs. Contract no., joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

43.19 Lead intensifying screens for front and back of the film should be used as per the above referred ASME specification.

43.20 The joint is to be marked with permanent mark A,B,C, etc., to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down stream side of the weld.

43.21 For multiple exposures on pipes, an overlap of about 25 mm of film should be provided.

43.22 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories i.e. all the facilities including air conditioners for storing and processing radiography films. There should be adequate number of radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiography test in accordance with safety rules laid down by Division of Radiological protection. These personnel should also be registered with DRP / BARC for film badge service. The proof of having sufficient film / chemicals to complete the entire work should be shown to BHEL.

43.23 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and/or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.

43.24 Contractor shall note that 100% radiography will be done at the initial stages on all the HP welding joints. Subsequently, radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of IBR or as specified by BHEL. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Every rejection shall be penalised with further two no of additional weld joints to be radiographed in case of percentage radiography.

43.25 If the contractor does not carryout radiography work due to non-availability of source/ film/ chemical/ operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.

43.26 All the radiographs shall be properly preserved and shall become the property of BHEL.

43.27 Since radio-isotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/Customer shall be strictly followed. BARC/ DRP Certificates to be provided before taking up the work.

43.28 The defects as pointed out by the engineer shall be rectified and re-radiographed immediately to the satisfaction of BHEL Engineer. The decision of the engineer regarding acceptance or otherwise of the joint will be final and binding on the contractor.

43.29 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he shall be replaced immediately.

43.30 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if the defect persists after first repair, as per radiograph, carrying out radiography shall be repeated till the joints is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

43.31 The contractor shall also be equipped for carrying out other NDT like LPI / MPI/ UT etc. as required as per welding schedule/ drawings within the finally accepted rates/ prices.

43.32 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labour, supervisor/ Engineer required for the work as per directions of BHEL.

43.33 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection, heat treatment (if any) etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or other wise of the welds shall be final. All site welding joints shall be subject to acceptance by BHEL Engineer.

43.34 All butt / fillet welds shall be subject to dye penetration test as per the instructions of the Engineer at no additional cost.

43.35 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only wherever edge preparation otherwise is impractical. All slugs / burrs shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of engineer.

43.36 The contractor's Engineer shall prepare as per direction of BHEL Engineer the complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site and submit the same to BHEL Engineer for approval. Such schedules shall be strictly adhered to by the contractor after approval.

44.0 APPLICATION OF INSULATION

The application of insulation materials & sheet casing work include but not limited to the following.

44.1 All attachment welding including welding of hooks / supports as per pitch both on equipment & piping shall have to be done by the contractor as per drawings or as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks without any extra cost. The HRSG / BOILER ducting / casings shall be internally insulated with ceramic wool and cladded with stainless steel sheet on stainless steel hooks & retainers. Plasma cutting machine required is to be arranged by the contractor.

44.2 Applying of red oxide paint including supply of paint on welded portions as directed by Engineer.

44.3 The mineral wool mattresses (bonded / unbounded) are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.

44.4 The no. of layers / thickness of mineral / ceramic wool shall be as per various drawing / insulation schedule and as directed by Engineer. After applying the mineral / ceramic wool mattress, the required holding materials if necessary (by fabrication of rings/ hooks at no extra cost) shall be fixed as directed and as per drawings and specifications. Required material for fabrication of rings / hooks shall be supplied by BHEL free of cost.

44.5 Application of two coats of anti-corrosive black bituminous paint (corresponding to relevant IS code) on inner surfaces of sheet cladding and bitumen sealing compound on cladding joints, if necessary, is included in the scope of this work and will be carried out within the finally accepted rates. The sealing compound and the anti-corrosive black bituminous paint required for this work is to be arranged by the contractor at his cost

44.6 To ensure that the finished surface of the insulation conform to the dimensions and tolerances given in the drawing. Aesthetic finish and accuracy of work are most important.

44.7 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions tending to affect its quality by the provision of closed / semi closed sheds at his cost. If any damage occur to the material due to improper storage or due to any causes attributable to the contractor except for normal breakages or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

44.8 Contractor is liable for the accounting of the material issued to him and any unaccountable losses shall be made good by him.

44.9 All the surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.

44.10 Contractor shall mix & apply the refractory / insulation as per the instructions of BHEL Engineer. Castable refractory / insulation after application shall be cured as per the instructions of BHEL Engineer.

44.11 Application of Castable refractory between tubes, around burners, on ceiling is to be done as directed by Engineer and as per detailed drawings & specifications.

44.12 Dressing of insulation brick to suit site conditions, curing refractory concrete applied / sheet cladding over insulation form part of this work.

44.13 Contractor shall observe all precautions for laying / curing of Castable refractory. Any defective works found shall be rectified by contractor at his own cost including materials.

44.14 Making structural supporting work for pour able insulation, laying pour able insulation, adhering to all specifications and instructions during application form part of this work.

44.15 The contractor shall provide the required quantity of wire, nails, planks for formwork and other material for centering and grouting works.

44.16 The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost.

44.17 Plates, bars and rods and other materials shall be cut and rewelded from the fabricated pieces to suit erection requirements for which no extra payment shall be made to the contractor.

44.18 Aluminum / stainless steel sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Their application shall be carried out by fabrication to the sizes and shapes specified in drawings, beading, swaging, bewelling of sheets, crowning the sheets if necessary, application of two coats of anti-corrosive black bituminous paint on inner surfaces, fixing the same to supports over wool insulation with screws as specified in BHEL drawings or as instructed by BHEL Engineer.

44.19 A logbook shall be maintained by the contractor for the clearance of the area for application of insulation. If the contractor does the work on his own accord without prior permission the area shall be redone at his cost.

44.20 Wastage allowance for insulation materials issued are as follows:

a) Wool / LBM mattresses and cladding sheets : 2%
b) Castable refractory : 2%
c) Insulation bricks & mortar : 2%

44.21 If during erection and commissioning any of the parts are to be temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and reapplication of insulation and sheet metal cladding, which shall be done by the contractor at no extra cost and the erection rate quoted shall be inclusive of such contingencies.

44.22 Insulation of all expansion joints, dampers etc. shall be carried out after NDT / gas tightness test is completed.

44.23 Removable type of insulations to be provided for valves, fittings, expansion joints etc. as per the drawings or as directed by BHEL Engineer.

45.0 TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST-COMMISSIONING.

45.1 The contractor shall carry out the required test on the HRSG / BOILER, ducts and pipelines such as gas / air leak test, hydraulic test etc. as instructed by BHEL using contractors own consumables, labour and scaffoldings. Air leak test on pressure parts preliminary to Hydraulic test by compressed air shall also be carried out to check and rectify the various leakage / defects etc.

45.2 The contractor shall carry out all the tests as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor.

45.3 All the above tests should be repeated till all the equipment satisfy the requirement / obligation of BHEL and BOILER Inspectorate, if required at various stages. The contractor shall do the entire repair for site-welded joints arising out of the failures during testing as part of work within finally accepted rates.

45.4 Contractor shall lay out all necessary temporary piping, install the pumps, blowers, tanks etc., with access platforms, valves, pressure gauges, electric cables, switches, cutting of some of existing valve, placing of rubber wedges in the valves etc., required for hydro test, air /gas leak tests, alkali boil out, chemical cleaning and steam blow off, oil flushing or for any other tests as the case may be required for system completion will carry out above activities under this scope of work as per instructions of BHEL. The scope also covers the off site disposal of effluents, site clean up and removal of temporary piping, pumps etc. and returning same to stores.

45.5 Items required for conducting hydraulic test, air/gas leak test, alkali boil out, chemical cleaning of pipe lines and equipments, steam blowing etc., will be supplied by BHEL/ its Customer. However, servicing, erection and dismantling and returning of the same to Stores is the responsibility of the contractor at no extra cost to BHEL and no weights shall be payable for such temporary works the contractor should take care of this aspect while submitting his offer.

45.6 It shall be the responsibility of the contractor to preserve the HRSG / BOILER as per BHEL's requirement.

45.7 Drum may be dispatched without fixing internals and internals may be sent separately in loose. The internals have to be fixed as and when required. Dismantling and re-assembly to be done to suit various commissioning requirements at no extra cost to BHEL

45.8 Commissioning of the HRSG / BOILER will involve trial run of all the equipment erected, alkali flushing, alkali boil out, acid cleaning, passivation, preservation, steam blowing, floating of safety valves, flushing of all the lines by air, oil or steam as the case may be, trial run of the HRSG / BOILER, servicing of valves and any other works incidental to commissioning. Contractor shall provide various category of manpower in sufficient numbers along with supervisors / engineers including

necessary consumables, IMTEs, T&P etc and any other assistance required during pre-commissioning, commissioning & post commissioning of equipment & attending any problem in the equipment erected by the contractor till handing over. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

45.9 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after alkali boil out, steam blowing and during commissioning as may be necessary and is the part of erection & commissioning.

45.10 In case any defect is noticed during tests, trial runs and commissioning 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 contractor within the finally agreed tonnage rate shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.

45.11 During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTEs till such time the commissioned units are taken over by the BHEL's customer.

45.12 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.

45.13 In case, any rework is required because of contractor's faulty erection which is noticed during commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.

45.14 During commissioning, opening / closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage, minor adjustments of erected equipment may arise. The finally accepted price / rates shall include all such works.

45.15 All temporary supports shall be removed in such a way that pipe supports are not subjected to any sudden load. During hydro static testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.

45.16 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. System for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer and to ensure that no valves and valve actuators are left un-serviced. Wherever necessary as required by BHEL Engineer, the contractor shall arrange to lap/ grind valve seats at no extra cost.

45.17 The contractor shall carry out any other test as desired by BHEL Engineer/ Manufacturer on erected equipment covered under scope of this contract during

testing and commissioning to demonstrate the physical completion of any part or parts of the work performed by the contractor.

46.0 FINAL PAINTING

All exposed metal parts of the equipments, structures, auxiliaries, piping, ducts and other items (covered within the scope of this contract) after installations are to be painted. The surfaces are to be thoroughly cleaned of all dirt, rust, scales, grease, oils and other foreign materials by wire brushing, scrapping, any other method as per requirement of BHEL. The same will be inspected and approved by the engineer before painting.

Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned & touch up paint with primer paint

Besides above two coats of approved primer paint is to be applied on all the bare / unpainted surfaces. The gas cut stubs would require being ground and rounded.

After applying the primer paints, wherever required, all structure / equipment / items, shall be painted with paints as specified by BHEL engineer/ its customer. The number of coats / paint thickness shall be as indicted in the drawing / documents. However at least two coats of finish painting is to be applied. In case proper finish is not obtained in two coats, the contractor shall apply additional coat (s) till proper finish / paint thickness is achieved. Certain equipment / Items are required to be painted with approved quality heat resistant paint / primer. After completion of painting all bright spots shall be cleaned to the satisfaction of Engineer.

Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting. Spray painting at the job site shall be permitted only at times and locations approved by Engineer.

Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for touchup / finish painting. Paint shall be of BHEL/ its customer's approved make only (i.e. enamel, epoxy, fire resistant or of any other required category specified by BHEL / its customer, drawings, documents and specifications for this package) and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work**.**

The contractor may be required to fill up dents / marks by applying putty before final painting of equipment. All materials and arrangements have to be made within quoted lump sum price/rates.

The contractor shall provide legends with direction of flow on equipments and piping in size specified by Engineer. Letter writing shall be done in Hindi /Local language/ English or in all the languages as specified by the engineer.

The painters have to undergo test and only qualified painters will be allowed to work.

The contractor shall ensure availability of

- Ford Cup-4 to measure consistency of paint,
- Automatic magnetic gauge to measure the dry film thickness and
- SSPC Visual standards to assess degree of cleanliness of surfaces to be painted.

All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes

47.0 PROGRESS REPORTING

47.1 Contractor is required to draw mutually agreed monthly erection program in consultation with BHEL Engineer well in advance. Contractor shall ensure achievement of agreed programme and shall also timely arrange additional resources considered necessary at no extra cost to BHEL

47.2 Weekly progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled programme shall be discussed for actions to be taken for achieving targets. Contractor for discussions shall also present the programme for subsequent week. The contractor shall constantly update/ revise his work programme to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of non-conformities.

47.3 The contractor shall submit daily, weekly and monthly progress reports, HP joints welding and radiography reports, manpower reports, materials reports, consumables report and other reports as per proforma considered necessary by the Engineer.

47.4 The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any, and shall give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original programme and the slippages do not accumulate and effect the overall programme.

47.5 The daily manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.

48.0 DRAWING AND DOCUMENTS

48.1 The detailed drawings, specifications available with BHEL engineers will form part of this tender specification. These documents will be made available to the contractor during execution of work at site. The contractor will also ensure availability of all drawings / documents at work place.

48.2 Necessary drawings / documents to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.

48.3 The contractor shall maintain a record of all drawings and documents available with him in a register as per format given by BHEL Engineer. Contractor shall ensure use of pertinent drawing/ data/ documents and removal of obsolete ones from work place and returning to BHEL.

48.4 The data furnished in various annexure enclosed with this tender specification are only approximate and for guidance. However, the change in the design and in the quantity may occur as is usual in any such large scale of work.

48.5 Should any error or ambiguity be discovered in the specification or information the contractor shall forthwith bring the same to the notice of BHEL before

commencement of work. BHEL's interpretation in such cases shall be final and binding on the contractor.

48.6 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimension / details, without specific approval of BHEL.

48.7 Any ambiguity found in the drawings should be brought to the notice of engineer prior to start of work.

48.8 Certain revisions of drawings are received during the course of execution, if the same have been received prior to start of particular (specific) job then no claim will be admissible on this account.

49.0 EXTRA WORK:

49.1 BHEL may consider for payment of extra works on man-hour basis @ Rs.30/- (Rupees Thirty only) per man-hour only for such of those works which:

a) Require major revamping or repair on the BHEL / CUSTOMER supplied material and which are totally unusual to normal erection work.

b) Require rectification / modification for change or improvement in the design during erection or commissioning,

c) Requiring fresh fabrication of components in place of rejected /replaced components. Where rejection is not due to contractor's workman-ship.

49.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals.

49.3 The extra works, if any, shall be carried out by a separate gang, which can be identified for certification of man-hours. Logbook should be maintained and should be signed jointly by the contractor's representative and the BHEL Engineer on day-to-day basis. However, signing of the logbook does not necessarily mean acceptance of the extra works, which would be identified by Engineer whether work is covered in one of the above categories. Only those works and man-hours, which are certified by the BHEL Engineer-in-charge, will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.

50.0 TAXES & DUTIES

50.1 **TDS under Income Tax, Sales Tax, VAT, Surcharge etc,** if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished.

50.2 Price quoted shall be inclusive of all taxes except service tax. The service tax, as legally livable & payable by the contractor under the provisions of applicable law/act, shall be paid by BHEL as per contractor's bill. However, contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration

should also bear endorsement for the premises from where the billing shall be done by contractor on BHEL for this project The contractor shall obtain prior approval of BHEL before billing the service tax amount.

With introduction of Cenvat credit rules 2004 which came into force w.e.f. 10.09.2004, excise duty paid on input goods including capital goods used for providing the output service and service tax paid on input service can be taken credit of against the service tax payable on output service. As such, while offering the rates, the contractors may take into account the benefit of above provisions as the cost of input to contractors will be the cost net of excise duty and service tax and adjust their offer price accordingly to make it more competitive.

50.3 In VAT applicable States, "Tax Invoice" if required under the relevant State VAT law shall be submitted along with other compliances as per concerned VAT Act.

50.4 Contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay on this account and delay in bringing the material shall be to contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.

50.5 **Contractor has to make his own arrangement at his cost** for completing the formalities, if required, with Sales Tax/VAT Authorities, for bringing their materials, plants, and equipment at site for the execution of the work, **including arrangement of Road permit as applicable under this contract.**

51.0 PRICE VARIATION

51.1 The finally accepted rates for scope of work as defined in this tender are subjected to price variation provisions as per following formula.

$$P1 = \frac{0.75 \times P0 \, (F1 - F0)}{F0}$$

P1 = Increase / decrease in billing amount (variation) for the particular month of billing.

P0 = Grossed billed amount for the month as per contract provisions.

F1 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month under consideration i.e. for which bill has been raised.

F0 = All India CPI published by Labour bureau, Simla, Govt. of India, for Industrial workers (Base 2001 =100) applicable for the month of opening of technical bid.

51.2 The contractor will be required to raise the bills for price variation payments on a monthly basis irrespective of the facts whether any increase or decrease in CPI. Price variation as per above formula will be calculated and paid/deducted on the total contract value on month-to-month basis. BHEL however reserves the rights to

freeze variation for that much of duration of delays, from time to time, which are entirely attributable to the contractor. Average of applicable index of PVC paid shall be taken as index for PVC for final 5% amount.

51.3 With the provision of price variation as above **NO CLAIM / COMPENSATION** on account of any increase whatsoever, (irrespective of whether variation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, electrodes, gases or any other item / reason) will be payable during the entire period of execution including extended period, if any.

52.0 RATE SCHEDULE

52.1 Contractor shall fully understand equipment description and scope of work before quoting. The scope of work and responsibility of the contractor as mentioned under these specifications shall be covered within the quoted rates.

52.2 The tenderer shall quote the rates as per the rate schedule only, in part II price bid (Original). Conditional price bids or price bids with any deviation / clarification etc. are liable to be rejected. No cutting / erasing / over writing shall be done.

53.0 INSTRUCTIONS TO TENDERER

53.1 Offers received without data / information required to be submitted under tender clauses-11.1 to 11.11 are liable to be rejected. All these data / information should be duly supported by documentary evidences (Refer note below clause-11)

53.2 No deviations to the tender conditions will normally be accepted.

53.3 The tenderer are advised to physically visit the site and fully acquaint themselves with site conditions, **safety norms being followed / to be followed during working,** transportation routes, various distances and the fact that other contractors would be working in this area their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors. Necessary precaution and arrangements including sprinkling of water during work as acceptable to BHEL for human health, safety & security for the above have to be made by the contractor. No claim whatsoever will be entertained by BHEL on any such account and the contractor's rates shall be deemed to have taken this into account.

53.4 The contractor in the event of this work awarded to him, shall establish a site office at site and keep posted an authorized responsible officer who should hold a valid power of attorney for the purpose of the contract. Any order or instruction of the Engineer or his duly authorized representative shall be communicated to the contractor's representative at site office and the same will be deemed to have been communicated to the contractor at his legal address.

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

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

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

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

54.0 LIQUIDATED DAMAGES (LD)

54.1 This clause shall be applicable as per clause no. 25.5 of the GCC of the tender.

55.0 SECURITY DEPOSIT

55.1 The contractor shall submit Security Deposit within 15 days from the date of issue of LOI as per clause no. 16.2 of the General Conditions of Contract (GCC). In case the contractor opts to furnish Bank Guarantee as a part of Security Deposit, the BG shall be issued as per the Performa enclosed as per Annexure-H of the GCC and also that the BG should be issued preferably through any of the Member Banks listed in the GCC;

For BG through any other Nationalized Bank (Not covered in the list of Member Banks of GCC), the discretion of its acceptance shall lie solely with BHEL.

56.0 OTHERS

56.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.

56.2 The tenderer shall specifically confirm that he has inspected the site of work and acquired full knowledge and information about the site conditions, wage structure, Industrial climate, total work involved and will not raise claim of any nature due to lack of knowledge of site condition. He will also confirm that local taxation laws at the site have been clearly understood by him.

56.3 The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation / Techno-commercial bids and acceptance of customer. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.

SPECIAL CONDITIONS OF CONTRACT

SECTION-III (PART-B)

INDEX

HRSG

57.0 SCOPE FOR HRSG

57.1 The scope of work under this tender generally consists of Erection, testing, commissioning, trial operation & handing over of 2X75 TPH HRSG & auxiliaries not limited to but covers mainly following:

- Taking delivery of the boiler materials from the project storage yard / stores / sheds to erection site.
- Their preservation, safe keeping, watch and ward.
- Checking, dressing, chipping and leveling of foundations.
- Pre-assembly, erection, alignment of various equipments pressure parts, trim and integral piping, non-pressure parts, structure, all piping specified in the specifications, machining.
- Welding, heat treatment, radiography, UT and other non-destructive tests wherever required
- Hydraulic testing, air/gas leak test, air tightness test, and other pre commissioning tests,
- Insulation, touchup and finish painting including supply of paints etc.,
- Chemical cleaning, alkali boil out, acid cleaning and passivation as per the scope given in the tender.
- Steam blowing and safety valve floating including erection and dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning operations and stabilisation of the unit, trial operation, resolving any deficiencies observed and handing over as per specifications/ drawings/ data sheets.

The brief description of items per HRSG will be as below:

a. HP & LP Drums with Internals

b. Spiral finned HP & LP super-heaters

c. Spiral finned HP & LP evaporators

d. Spiral finned HP economizer

e. Steam attemperator with Control valve

f. Complete gas ducts with necessary expansion joints

g. Boiler integral piping, valves and fittings as per schematics/ details including the drain and vent piping

h. HP Steam attemperator with Control valve

i. Supplementary Firing systems (for NG) consists of Duct burner assy., Gas piping, Scanner air system.

j. Two Nos safety valves with silencers on each drum, one no safety valve with silencer on each superheater, two nos DWLG for HP & LP drums & start up vent with silencer on MS line

k. Complete boiler supporting structural steel, stairways, platforms, Casing sheets and walkways, handrails, complete foundation bolts, anchor channels, for all the equipment and columns.

l. Setting and Inside insulation with required fixing components

m. 30 M high Steel chimney

The details of major items (PG) to be erected under this specifications are as per Annexure-I

Total tentative tonnage to be erected is 1204 MT (1084 MT for HRSG & 120 MT for chimney) **as per Annexure-I**. But the contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to commission above HRSG and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage rates.

57.2 The customer M/s. MSIL and / or their Consultant may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL

57.3 The HT, RG and NDT will have to be carried out by the contractor as per welding specifications within the quoted price.

STEAM TURBINE

58.0 SCOPE FOR STEAM TURBINE

58.1 The scope of work under this tender consists of Erection, testing, commissioning, trial operation & handing over of 1x17.5 MW STG, Auxiliaries & BOP etc. not limited to but covers mainly following:

- Taking delivery of the Turbo-generator materials (consisting of turbine, generator along with there rotating & static auxiliaries like BFPs, De-aerator etc materials from the project storage yard / stores / sheds to erection site.
- Their preservation, safe keeping, watch and ward.
- Checking, dressing, chipping, and leveling of foundations, pre-assembly, erection, alignment of various equipments, machining.
- Welding, heat treatment, radiography and other nondestructive testing wherever required,
- Touch-up and finish painting including supply of paints etc.,
- Erection and Commissioning of STG with all Auxiliaries.
- Erection and Commissioning of all BFPs
- Erection and commissioning Gland Steam Condenser, Drain Cooler,
- Erection and Commissioning of Deaerator and Feed Storage Tank with platform and accessories.
- Erection and Commissioning of Misc. Pumps, Piping and other BOP packages with their accessories
- Hydraulic testing, air leak test and other pre commissioning tests
- Cleaning of oil system,
- Steam blowing including erection & dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning & stabilization of unit,
- Unit trial operation and handing over of above as per specifications/ drawings/ data sheets.

The details of major items (PG) to be erected under this specifications are as per Annexure-III

58.2 Major equipment to be installed, tested and commissioned under this specification is given below.

17.5 MW Steam Turbine

- Steam Turbine including
- Main steam Emergency Trip Cum Stop Valve,
- Turbine Steam Governing Valves
- Steam Strainer Built into Stop Valve
- Blanket plate for steam blowing,

- Load/Reduction Gearbox between Turbine & Generator
- Coupling and Coupling Guard between Turbine & Gearbox
- Coupling and Coupling Guard between Gearbox & Generator
- Solenoid Valve for Remote Tripping,
- Turbine Sole Plates/ Foundation Bolts
- Turbine covers
- Shaft Grounding Device
- Gland Sealing System (Automatic) Inlet & dump control valves
- Exhaust-hood spray system (automatic),
- QCNRV's in extraction lines
- Manual Barring Device
- Turning Device -Electric
- Integral Piping Including Gland Steam Leak-off Piping, Gland
- Steam Piping for STG integral portion, Turbine Drain Water Piping within TG Block;
- Turbine Enclosure (To meet noise level requirements)
- Turbine Insulation (mineral Wool Mattresses) and Insulation of Integral Piping

17.5 MW Turbine auxiliaries

- Main Oil Tank (Carbon Steel) Including
- Main Oil Pump with gear box shaft driven
- Auxiliary Oil Pump with AC Motor
- Emergency Oil Pump with DC Motor
- Jacking Oil Pump with AC Motor
- Duplex Filter for Lube Oil
- Oil Mist Fan with AC Motor (2x100%)
- Oil Accumulators(where ever required)
- Oil centrifuge (1000 LPH)
- Governing Console
- Complete Lube Oil Piping (Stainless Steel Material after filter outlet)
- Complete Control Oil Piping (Stainless Steel Material);
- GLAND STEAM CONDENSER.
- DEAERATOR

- LUBE OIL COOLERS - 2X100%.
- Auxiliary cooling water system-01 no
- Boiler Feed Pumps (HP) -03 nos

- Boiler Feed Pumps (LP) -03
- Make up water pumps-02 nos.
- LP dosing skids
- Monorail for BFP maintenance.
- Guillotine gate-01 no #
- Diverter dampers-01 nos. #

17.5 MW GENERATOR AND AUXILIARIES

- CLOSED circuit air cooled Generator
- Brush-less exciter
- CO2 fire extinguisher equipment for generator.
- GENERATOR AIR COOLERS.
- Phase side terminal boxes

NOTE:

- #Installation of diverter damper in existing GT#2 within the scope of contractor without any extra cost to BHEL.
- # Installation of guillotine gate in existing GT#3 within the scope of contractor without any extra cost to BHEL.

MATERAIL HANDLING

59.0 SCOPE FOR MATERAIL HANDLING

59.1 The scope of work under this tender consists of taking delivery of plant materials & other equipments (below mention at Sl. No. I & II) from transporters, unloading, handling & shifting of these materials to their designated locations, their verification, stacking, preservation, watch & ward, record-keeping and issue for erection.

- Plant materials/equipments which consist of HRSG, steam turbine, boiler feed pumps, piping along with the associated auxiliaries, Electrical, Control and Instrumentation System Equipments. These materials shall be supplied from BHEL's manufacturing units located all over the country as well as BHEL's vendors located both in the country and abroad.
- Various other equipment like cranes, tools, furniture being brought to the site to facilitate the site activities.
-

The delivery of these materials will mostly be inside the project campus by road transport. Delivery of some items may also have to be taken from godowns of transporters.

The details of major items to be handled at site are as per Annexure-IV.

Total tentative tonnage is about 2026 MT. But the contractor is required to handle actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete entire package work and complete the work in all respects as detailed in

tender specifications, for which payments shall be released on finally accepted tonnage rates.

59.2 The intent of specification is to provide material handling and materials management services according to the most modern and proven techniques and codes. The omission of specific reference to any method, equipment or materials necessary for proper and efficient unloading, transportation, verification, stacking/restacking & preservation etc shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

59.3. The work shall be executed under usual conditions affecting major thermal power projects in an existing power plant and in conjunction with numerous other operations at site. The contractor and his personnel shall cooperate with personnel of customer's contractor, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.

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

59.5 Approximately 2026 MT materials for entire main plant package will be supplied from our manufacturing units located all over the country as well as our vendors located both in the country and abroad. The scope of work for material handling under this tender consists of taking delivery of the materials from transporters; unloading shifting to their designated locations, verification, stacking & re stacking of consignments supplied to project shall be under the scope of contractor. The delivery of these materials will mostly be inside the project campus by road transport.
However, delivery of some items may also have to be taken from Godowns of transporters. All material entering the project premises shall have to go through security checks at entry gate. Contractor has to co-ordinate / makes all arrangements for entry of vehicles carrying material inside project premises, including initiating request for entry of material / vehicle within the finally quoted rates.

59.6 Brief descriptions of items; their unit weight and size are indicated under Annexure-IV.
The contractor has to handle whatever actual materials are dispatched for the project irrespective of any variations and payments shall be released for the actual gross tonnage handled.

The weights and dimensions of material shown are approximate and are liable to vary. No increase in quoted / accepted rates /prices shall be allowed due to change in weights and dimensions of the equipment / materials.

The HP & LP Boiler Drums will be transported to site by road. It is to be unloaded at the site near boiler area as directed by BHEL.

The Generator transformer shall be transported to site by road. The transformer received by road can be unloaded by using suitable capacity cranes to be provided by BHEL free of cost and contractor shall be paid for same based on tonnage rate quoted against item 4.0 of Rate Schedule.

In case suitable capacity cranes are not available with BHEL & the transformer is to be unloaded manually (by sleeper / jack method) at area specified by **BHEL,**

Contractor shall be paid for same based on Lumpsum rate quoted against item 5.1 of Rate Schedule.

Some consignments mainly smalls / parcels may also be received at Gurgaon. The contractor shall have to handle such consignments also as per rates quoted / accepted.

59.7 The contractor shall perform all required services for the materials handling which may not be specified herein but nevertheless required for the completion of work within quoted rates. All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously.

59.8 BHEL will provide free of cost all necessary preservatives like silica gel and end caps to contractor for preservation of components. All tools & tackles and consumables required for preservation of components including supervision shall however be provided by contractor at his own cost.

Preservation of components includes applying preservatives, paints, rust preventives, greasing of threaded portions, fixing of end caps in position for pressure parts, repainting of work order / DU numbers, component codes etc. After preservation wherever necessary, components will be stacked properly as per original stacking for which no additional payment shall be made.

59.9 The contractor has to mainly use his own equipment like suitable cranes / trucks / tractor-trailers & other material handling equipment including all necessary small / major T & P required for subject work.

59.10 It shall be the responsibility of the contractor to keep in touch with Engineer at site and find out arrival of consignments. The Contractor shall collect all the way receipts, parcel way bills / lorry waybills from BHEL site office either personally or through an authorized representative. The contractor or his authorized representative shall, for the purpose, visit the said office every day and collect available GR, LWB etc. While collecting the GR, LWB, contractor or his authorized representative will sign the register maintained for the purpose indicating date and time of collection. The contractor shall keep in touch with way authorities, carriers and arrange to effect delivery of consignments immediately on their receipts. Delay may cause deterioration of goods apart from attracting demurrage charges. Contractor shall also maintain a register indicating date of LWB, date of collection of the materials from road transport agencies / Lorries and date of stacking them at storage yard of BHEL.

59.11 It is possible that in certain cases, dispatch documents may not be received in time but BHEL may receive Photostat copies of the same. It is, therefore, the responsibility of the contractor to collect these Photostat copies while obtaining indemnity bond from BHEL authorities at site.

59.12 Payment of all demurrage that are due to contractor's fault, would be the responsibility of contractor and to his account. If BHEL has to make payment of demurrage along with freight, the amount so paid as demurrage, for the reasons stated above, shall be paid by the contractor forthwith or would be recovered from bills of the contractor.

59.13 In any case contractor will pursue with concerned Carrier authorities at all level (local/HQ etc.) for waiver / reduction to the minimum of such demurrage charges. Whenever such demurrages become payables due to reasons not attributable to

contractor, contractor will immediately bring it to the notice of BHEL with specific request to bear such charges. The decision of the Engineer in such case will be final and binding on the contractor.

59.14 Any discrepancy / shortage / damage found in the consignment after taking delivery from the carriers after giving clear receipt would be the responsibility of the contractor and the amount liable to be lost by BHEL on such accounts is recoverable from the contractor.In case of apparent damages / shortages in consignments /packing noticed by the contractor, such cases shall be brought to the notice of BHEL and cleared only with their consent/approval.

59.15 It would be responsibility of the contractor to examine the packages, consignments, etc. on arrival and bring to the notice of carriers and BHEL Authorities regarding loss / damages, if any, observed in the consignments proposed to be taken delivery of. Before taking delivery, particularly of consignments in 'smalls', the weight of the package shall be checked with the invoiced weight / contents of the packages and any discrepancy shall be reported immediately to BHEL/ carriers. In all the cases of loss / damages the contractor will take open delivery from the carriers. They shall forward such Open Delivery Certificates (ODC) to the Engineer within **7 days** of retiring such consignments. All expenses connected therewith shall be to the account of contractor. BHEL reserves right to claim losses, if any, accrued to BHEL in the event of contractor's non-compliance to above.

59.16 In case of short delivery and non-delivery, immediate notice of loss shall be filed with the carriers at places of dispatch and destination as also at any intermediate station, if it is a different one, under intimation to BHEL authorities at site.

59.17 BHEL reserves the right to recover from the contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other cause during stacking, when the custody of the equipment is with the contractor.

59.18 Unloading from trailer at storage area / work site stacking and re-stacking of heavy sophisticated equipment like boiler drums, HRSG modules, heavy motors, heavy bearings, transformers, rotors electrical panels turbine components, pumps, panels etc. Shall be done in the presence of or as per the directions of BHEL representative. Certain items may be dispatched with tie rods/ strips welded with frame carrying items and with trailer. These tie rods / strips are required to cut by using Gas flame or by other method as directed by Engineer for unloading of materials.

59.19 Since, the trucks / trailers are expected to arrive during any time of the day / night, the contractor shall have his workmen round the clock at site as well as other places as required to unload the materials.

59.20 Wagons / Consignments coming on Sundays and Holidays are also required to be handled by the contractor promptly. It will be the responsibility of the contractor to contact the site Engineer / his authorized representative of BHEL at their residence, if required, and obtain instructions to make suitable arrangements.

59.21 The detention charges, if any, in the event of delay in unloading from the carrier, will be to contractor's account.

59.22 It shall be the responsibility of the contractor, to provide all necessary facilities and tools to open the packages, in the presence of the Engineer, verifying their contents, re-packing wherever and whenever necessary, properly stacking them as may be

directed by the Engineer. These works should be so done so as to facilitate proper handling, periodical verification of materials, receipt position, stock taking etc. The contractor shall have experienced persons at site who can maintain the records of dispatch / receipt/ stacking / verification / shortage / damage / missing items etc. The **verification of materials** shall be carried out **within** 7days and report shall be submitted as a documentary proof.

59.23 All materials shall be stored at least 6" above ground level by use of concrete / wooden sleepers or on steel frames. No material shall be left to remain on ground at any time. Materials shall not be stacked in low-lying areas, where they are likely to get flooded during rains. Wooden sleepers / concrete blocks / steel frames and tarpaulins for this purpose wherever deemed necessary shall be issued by BHEL free of charges. However these items shall be stacked / stored properly at a location(s) specified by BHEL when not in use. The contractor is expected to use these most judiciously. In case it is observed that the contractor is not utilizing these optimally, he could be asked to re-stack the same at his cost.

59.24 NA

59.25 The material / equipment requiring indoor storage will be handled and stacked inside the storage shed (provided by BHEL) by the contractor using own material handling equipment like Hydra crane, etc. For checking / verification of the components / packages with packing slips GR/ LWB etc., sufficient experienced persons and other facilities shall be provided by the contractor as and when required by the Engineer.

59.26 Stacking of the material shall be done as per the instructions and to the satisfaction of the Engineer. The materials shall be so stacked that the same should facilitate easy handling. In the event of any improper stacking BHEL may ask the contractor to re-stock the material properly or failing which BHEL may get the job done by any other agency at the risk and cost of the Contractor. Re-handling & Re-stacking of materials as when called for by BHEL shall be within the scope of this contract. These also includes excess/redundant materials returned to stores by other agencies.

59.27 The contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence. Any loss to BHEL due to contractor's lapse / negligence shall have to be made good by the contractor.

In case contractor is not able to unload, transport, stack the material at a pre-determined area, as per direction of the Engineer for any reason whatsoever (including non-availability of crane, tractor-trailer and other T&P etc.), BHEL shall be at liberty to get the work done by engaging other agency / equipment / T&P etc. at the risk and cost of the contractor.

59.28 If the contractor or his workmen shall break, deface injure or destroy any part of a building, road, kerb, fenced enclosures, water pipes, cables, drains, electric or telephone posts or wires, trees, stored components or any other property or to any part of erected equipment etc., the contractor shall make the same good at his cost or in default the Engineer may cause the same to be made good by other workmen/agency or by other means and deduct the expense (of which the BHEL Engineer's decision is final) from any sum that may be then or at any time thereafter become due to the contractor.

59.29 It shall be the responsibility of the contractor to keep the storage areas (closed / semi-closed / open) in neat and tidy conditions. Any vegetation like grass, bushes, Sarkandas etc. shall be cut periodically in open storage area & removed as per

requirement & instructions of BHEL Engineer within the contractual value. All surplus / unusable packing materials shall be removed and deposited at location(s) specified by BHEL within the project premises (including weighing of the same within the project premises if required).

59.30 Normally the **consignments** from BHEL's manufacturing units / their sub-suppliers are **sent on freight paid basis**. In case any consignment is received at any place on freight to pay basis, it will be the responsibility of the contractor to pay the freight and take delivery of such consignments. The amount of freight paid by the contractor at any point of time in such cases will be limited to Rs. 5,000/-. However, the freight paid by the Contractor will be reimbursed by BHEL within a week's time on production of relevant receipts. In case of freight amounts exceeds Rs. 5,000/- contractor may request BHEL well in time to issue cheque /draft for such amounts in favor of carriers towards freight charges. Delay in issuance of cheque / drafts as above shall not in any case be taken as a cause of delay in taking delivery of consignment resulting in demurrage leviable by carriers. Receipt of payment and proof of taking delivery of consignment shall be submitted to BHEL by the contractor.

59.31 In case some materials are required to be dispatched from MSIL, Gurgaon site to manufacturing units, other sites or any other place, the contractor may be asked by the Engineer to get the same packed, transport it to nearest way Station / Carrier's godowns and get the same booked. The contractors are therefore, requested to quote their rate for this work in Rate schedule. In case of material is required to be booked as freight paid, the freight for the consignment limited to Rs.5,000/- shall be paid by the contractor. However, it shall be reimbursed by BHEL on submission of receipt within a week's time. The funds for freight charges exceeding Rs. 5,000/- shall be arranged by BHEL. Packing material required shall be provided by BHEL free of cost.

59.32 In case some of consignments are to be dispatched on full truck /trailer load basis, where the carriers will place their fleet inside the plant for loading, the contractor may be asked to collect them from different locations of store sheds/yard and load by using his crane and labour. Tenderer are required to quote rates for the work in rate schedule.

59.33 For any exigencies during execution of the contract, the contractor shall have to depute his personnel for collection/delivery of any material meant for site from/to out station if desired and instructed by the Engineer. The contractor will however reimbursed expenses incurred for such work for person deputed, as below:-

Second class train fare with reservation / supplementary charges/bus fare subject to furnishing details regarding ticket numbers, journey details, amount of fare etc.
Local conveyance charges (Actual bus / cycle rickshaw/ auto rickshaw fare for local journeys at out station) as permitted by the Engineer. of bill along with details / desired documents by the contractor subject to completion of work assigned to contractor personnel and to the entire satisfaction of the Engineer.

Tenderer may note that as the place of work is inside the POWER PROJECT and being manned by Security Force of MSIIL, all necessary system related to entry of men, vehicle & material, safety & security systems, work permit system etc. as applicable will have to be followed by the contractor.

59.35 The customer M/s. MSIL and / or their Consultant may depute their representative for checking and supervision of important stages of work. The contractor shall be

required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.

ELECTRICAL AND C&I WORKS

60.0 SCOPE FOR ELECTRICAL AND C&I WORKS

60.1 The scope of these specifications under this tender not limited to but covers mainly following:

Handling, transportation of materials from Project storage yard / stores to erection site / place of erection , storage at erection site, preservation, watch and ward, dressing, chipping and leveling of foundations, cleaning , checking, testing, pre-assembly, erection, calibration, alignment, welding, NDT wherever required, preservative/ touch-up painting including supply of paints etc, earthing of equipment, including other activities required for erection, testing, commissioning, post commissioning, trial operations & handing over of all ELECTRICAL, CONTROL & INSTRUMENTATION equipment and items indicated in the rate schedule covered within the scope of these specifications for 1X17.5,MW, 2X75 TPH HRSG AT MSIL,GURGAON.

60.2 The quantities mentioned in the rate schedule are tentative and may very as per the actual engineering / requirement to complete the package for electrical and C & I work. Some of the items may be added or deleted which shall have to be executed by the contractor within his scope of work and shall be paid as per the rates awarded in the contract. The contractor shall have to erect, test and commission entire material listed in the rate schedule. The decision of BHEL in this regard shall be final and binding on the contractor.

The rates for the additional items may be considered on the rates of similar category of items in the rate schedule as approved by BHEL.

The scope of work shall also include the following within the quoted item rates:

i.) Re-rolling of cables on drums as required by site engineer.
ii.) Obtaining provisional and final approvals from Electricity Authorities.

The scope of work also covers all performance tests necessary to ensure that workmanship confirms to relevant standards and that such tests are adequate to demonstrate that the installations complies with the requirements of this specification. All arrangements for conducting tests are to be made by contractor within their quoted rates and tests may have to be repeated to satisfy BHEL / MS

60.3 The brief description of major equipment/ items to be erected tested and commissioning under the scope of subject work is as described below. However change in design/specification may occur as is usual in any such large work for which no compensation will be payable.

Contractor shall complete the entire work as detailed in tender specification including dry out / centrifuging of transformers within the contractual rates. In case during testing, commissioning, post commissioning, trial operation the IR values of

electrical equipment is found low, the contractor shall make arrangements and dry out the equipment within the quoted rates. Removing & reconnection of equipment will be the part of scope at no extra cost to BHEL.

ELECTRICAL SCOPE

(A) HT TRANSFORMERS

01 nos Gen. Transformer of 11/11.5kV,20/25 MVA,ONAN/OFAF
Overall dimensions is 7500X7800X6600 mm
Oil qty. 14000 lts.

Scope of work includes checking and preparation foundation, erection of accessories and auxiliaries, carrying out minor modification wherever required; Preparation of oil and oil filling under vacuum, dry out of transformer, testing of transformer, oil and other auxiliaries, laying of cable trays up to marshalling box, cabling up to marshalling box and termination for auxiliaries, earthing of accessories to earth conductor /riser, testing of all auxiliaries, pre-commissioning and charging of transformers. Final painting of transformers as approved by BHEL Engineer

(B) 11 KV SWITCH GEAR

11 kV Switchgear System consists of one board consisting of 3 panels(approx.) The switchgear is Spring Operated Metal Clad Vacuum Interrupters with Protection and Metering CTs , PTs , Relays and Meters.
The weight of each panel including trolley is approx. 1.9 MT. Panels will be transported in section of 2-3 panels.
There are 1 Boards having 03 panels(Approx.)

Erection of Panels after foundation checking and carrying out minor modification wherever required, Jointing of panels, inter panel wiring, busbar & earth bar connections, mounting of loose supplied items, testing of complete panels, BEB, FEB and spare trucks, HV test of main and Control bus, testing & commissioning of breakers after scheme checking including testing / calibration of all instruments and relays.

(C) LT SWITCHBOARDs

The applicable panel are listed below:

415 V, 2500 A, PMCC-1	01 Nos
415 V, 2500 A, PMCC-2	01 Nos
415 V, 1000 A STG MCC-1	01 Nos
415 V, 400 A HRSG MCC-1&2	02 Nos
415 V, ACDB	02 Nos
110V, 630 A STATION DC DB	02 Nos
110V, UPSDB	01 Nos

(D) UNIT SERVICE TRANSFORMERS:

03 nos, UNIT SERVICE TRF, 11 kV/0.433kV, 2 MVA, ONAN

Overall dimensions is 3000X3500X3300 mm
Oil qty. 1400 lts.

Scope of work includes checking & preparation of foundation, erection of accessories and auxiliaries, carrying out minor modification wherever required; Preparation of oil and oil filling under vacuum, dry out of transformer, testing of transformer, oil and other auxiliaries, laying of cable trays up to marshalling box, cabling up to marshalling box and termination for auxiliaries, earthing of accessories to earth conductor /riser, testing of all auxiliaries, pre-commissioning and charging of transformers. Final painting of transformers as approved by BHEL Engineer

(E) LT BUSDUCT

415V,3200 A,50 Hz,CR enclosure,Non phase segregated bus duct connectingService transformer & LT switch gear.
Rated 3200 A-03 set(oil filled transformer)

Erection of Busduct Structures after foundation checking and carrying out minor modification wherever required. Erection of Busducts , Alignment of total Busduct, bolting of Ducts and Busbars and fixing of all flexible / rigid connections; Checking of bolt tightness, earth resistance of busduct and Hi-pot of busduct, Connection of Earth bar and fixing of space heaters, JBs, cabling and other accessories.

(F) DC BATTERY CHARGERS/UPS

01 set of 110V Battery Charger & charger size is 2500x830x2000 mm

Erection of Panels after foundations checking / fabrication of base frames or stools (wherever applicable) and carrying out minor modification wherever required; Joining of panels, inter-panel wiring, busbar & earth bar connections, mounting of loose supplied items, Testing of complete board & including testing / calibration of all instruments and schemes; Dummy load test of Chargers including arranging of dummy load and temporary power supply etc.

(G) DC BATTERY

01 set of 110 V STATION Battery System (Ni-Cd) 800Ah

Erection of battery after assembly of battery stands, inter-connection of batteries and first charging; Capacity testing using dummy load and subsequent recharging (in case of failure of capacity test, the charging Discharging cycle is to be repeated) Dummy load test of chargers includes arrangement of dummy load and temporary connection in absence of regular power supply.

(H) Neutral Earthing Equipment

01 no. Neutral grounding resistance are to be supplied for the Gen. Transformers. The NGR will be supplied in knocked down condition and is to be assembled at site.

NGR for Gen. Transformer – 01 no.

(I) CABLE RACK AND TRAY

Various types of sheet metal, galvanised cable tray, i.e. Perforated, ladder type, seal metal duct, solid bottom tray, shall be provided in a standard length along with accessories like hardware, bends, reducers, coupler plate, tray covers and tray clamps etc.

Installation of cable tray/cable duct shall include cutting, laying, jointing, supporting, drilling holes in the support, providing tees/reducers/bends/clamps as per tray route layout. Fabrication of bends/tees/reducers from straight length, fixing of tray covers, welding of tray on support, cleaning and application of cold galvanising paint on weld joints including supply of paint is in the scope of contractor. Installation of tray/duct covers, wherever provided, will be done as a part of tray erection and no extra rates will be payable.

In case cable trays are required to be fabricated from structural steel and installed, unit rate applicable for fabrication and installation of structural steel shall be applicable in such instance.

Cable trays/ducts have to be routed underground in cable trench, over head on structure, valves, floors etc. for various application such as cable laying, copper tubes, conduits, thermocouple, temperature gauge capillary etc. Cables trays wherever erected shall be preferably in vertical conditions.

(J) CABLE LAYING (POWER/ CONTROL/ INSTRUMENTATION SHIELDED/ UNSHIELDED CABLES/ ARMOURED/ UN-ARMOURED, SINGLE/ MULTI-CORE, PVC/ HR PVC/ FRLS/ TEFLON/ XLP INSULATION)

Cable laying include cutting to the required length, laying in overhead/underground cable trench/through pipes/flexible conduits, dressing/clamping in tray, drilling of holes in gland plates in panels and junction box, glanding, splicing, dressing of spliced wire inside the panel and JBs, providing PVC numerical/alphabetical / printed ferrules, termination by using crimp type copper tinned/aluminium lugs, insulated/un-insulated, termination (crimp, soldering, etc.), plug-in connections with insert type crimping, providing identification cable tags, PVC/aluminium at both the ends and at appropriate interval throughout the route length, continuity checking, insulation resistance checking, high voltage test on HT cables.

Entry to the panels and JBs may be at top, sides or bottom. All cables are required to be properly supported and clamped near to the JB/panel.

Wherever cable glanding is not possible, either due to the gland plate size limitations or more number of cable entries, prefab plug-in cables, etc., for such cases cables may have to be lifted inside the panel by either making cut-out in gland plate and providing rubber profile for sharp edge protection or alternatively, providing 4” or 6” PVC pipe coupling gland and these pipe coupling gland shall be supplied by contractor within the quoted rates.

Supply of, PVC cable ties, PVC ferrules, PVC button and tapes, cable identification tag of PVC/metallic, clamping and dressing material with hardware, PVC sleeves etc. shall be supplied by the contractor within the quoted rates for cable laying. The quality of material shall be got approved from BHEL engineer prior to their use on job. Required lugs will be supplied by BHEL

All care should be taken to avoid abrasion, tension, twisting, kinking, stretching of cables

during installation.

Cable shielding – all signal cables are supplied with bare shielded copper wire/with braided wire shield. Generally shield wire is kept isolated at instrument/field device end and continuity is maintained through JBs and grounded at panel end only. While terminating the shield wire either in panel or JBs, PVC sleeves are to be used to avoid two-point earthing.

Wherever cables run through ducts, conduits, valves, etc., they shall be sealed using fire/weather proof compound. In addition to this, cable entry in panels, MCCs, instruments, electrical actuators etc., are also required to be sealed. The required material for doing so shall be deemed to have been included by contractor in the cable laying.

Many of the cable trays and cables have to be laid in cable trenches. For this purpose, the cover of the trenches have to be opened for working in site and whenever the cables are to be laid in existing cable tray, all safety precautions have to be observed. After completing the work, the trenches have to be cleaned and covers put back into position. Contractor shall also carry out de-watering from the trenches if required and arrange pumps etc., at his cost.

Looping wire at terminal block of panels and electrical motors/actuator as shown in the inter-connection diagrams or as required is to be done by contractor at no extra cost.

Contractor shall carefully plan the cutting schedule of each cable drum in consultation with site engineer such that wastage are minimised.

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

% Wastage on issued Qty	
HT Cables	1%
LT cables above 70 mm square	1%
LT cables upto 70 mm square	2%
Control & special cables	3%
Fire survival cables	1%
Steel materials	1% by weight (for cable trays/tray support installation)

(K) JUNCTION BOX, PUSH BUTTONS ETC

Includes fabrication / fixing / painting of stands for junction boxes / push buttons / frame mounted panels etc.

(L) RIGID PIPE/CONDUITS

Cutting / threading of standard lengths of conduits, laying on fabricated supports or on floor, using screwed fittings, clamping, sealing of open ends. Approved Good quality sealant shall be used to make the joint water proof.

(M) PLICA FLEXIBLE CONDUIT

Laying of conduits in cable trays, end connection with instrument / J.B. /panel, using suitable connectors / unions etc. (which shall be supplied by BHEL). Suitable thread / Plica sealant shall be used to make the conduit system water proof. Aluminum painting, clamping and tagging in tray / angle forms part of erection job

(N) EARTHING

Earthing work mainly involves laying and tack welding of of conductors on columns / beams at every one meter interval and bolted connections with equipment at least at

two points. Low hydrogen content electrodes shall be used for welding. All the above ground welded joints shall be coated with two coats of red oxide primer and two coats of enamel paints.

(O) CONTROL PANELS

Control panels are normally supplied in suit of either one/two/three or loose shipping sections with integral base frame or loose supplied. These panels may have to be installed as stand alone or in group consisting of number of panels in each row, depending upon the plant layout and foundation arrangement.

Installation of panel shall include fixing of base frame, fabrication of base frame if required, leveling, alignment, fixing of anti-vibration pads, removal of side covers, fixing of cubicle interconnection hardware, bus bar jointing, wiring interconnection, welding and grouting of panels and base frames, mounting of panel canopy wherever supplied as part of panel, drilling of gland plates and sealing of cable entries. In certain case where canopies are not supplied but have to be fabricated out of MS/Aluminium sheets provided by BHEL, payment will be done on weight basis, the subcontractor to indicate the rate.

Panels have to be shifted to their locations through floor openings, temporary openings like floor grills, door etc. which shall be part of work and no claim whatsoever will be entertained with regard to non-availability of opening as per shortest route etc. Panel have to be erected in the ESP control room etc.

Panel and instruments once erected in position should be properly protected using necessary care to prevent ingress of dust/moisture. This will have to be periodically cleaned and surroundings have to be kept tidy.

Wherever the panels to be mounted on cable trenches, channel supports have to be provided across the cable trench over which the base frame of panel shall be mounted. For such work, structural steel fabrication, installation rates shall be applicable.

Normally the panels shall be supplied with instrument, relay, meters, electronic modules etc. mounted and pre-wired. However, if these are supplied loose / separately for safety in transit, contractor shall mount/wire such devices and made additional openings in the panels if required as part of the panel installation work and no separate rates shall be applicable unless otherwise specially listed in the rate schedule.

No separate payment shall be made for replacement of any devices like electronic modules, relays, conductors, terminal block, push buttons etc. which are found defective during pre-commissioning/ post-commissioning of the panels.

For troubleshooting and tuning/fine tuning C&I items to match machine commissioning/ operation process, several removal, recalibration, replacements will be required. This shall be considered as normal work & no separate payments shall be made for such rework.

Minor civil works like drilling, chipping, punching holes and opening in concrete floors, slabs and brick walls, grouting, related to Rack, support installation, minor civil works required for installation of control panels, Junction boxes etc., shall be included in the erection cost of such items. Also all miscellaneous civil works like chipping away and making good as necessary in floor slab/wall for cabling / earthing etc., as required are included in the scope for which no separate payment is applicable. The scope also includes supply of grouting/fixing material, if any.

(P) FABRICATION AND INSTALLATION OF STRUCTURAL STEEL

Structural steel material like MS angles, channels, beams, flats, plates etc. shall be supplied in running meter and same shall be used for fabrication of panel base frame, cable tray supports, canopies, instrument and junction box frames, impulse pipe/instrument air pipe supports and instruments etc.

This shall include cutting into size, conduiting of end connections, if required, welding, grinding of excess weld deposits, drilling of holes for mounting of device/instrument, installation at location, leveling, alignment, providing bracings and painting etc. No gas cut holes will be permitted.

All the fabricated supports/frames shall be applied with one coat of primer red oxide paint before installation and two coat of synthetic approved quality of prescribed shade of final paint,. If required, BHEL shall prescribe time gap between first and second coat of final paint.

Frame installation/cable tray accessories' installation at site may involve mounting either on concrete floor by grouting/using anchor fasteners or on steel structure by welding etc. All consumables including anchor fasteners shall be arranged by the contractor.

In certain packages, galvanized members of junction box frames and instrument racks shall be supplied in cut to sizes and frame assemblies are required to be done as per drawing by bolting/welding. The installation rate as quoted shall include the assembling of the frames.

Gas cutting of tray/impulse pipe support and gas cut holes in frame shall be avoided. Only drilled hole shall be permitted in frame etc.

(Q) FIELD INSTRUMENTATION(TRANSMITTERS / GAUGES / SWITCHS / TEMPERATURE SENSING ELEMENTS LIKE RTDs & THERMOCOUPLES)

- For instruments supplied loose, the scope includes issue from stores, calibration, erection (including fabrication and fixing of frames / stands by welding to steel structure or by chipping & grouting with RCC columns / floor) and charging / loop checking. The work includes installation of housing connecting manifold / PG valve on supports / racks to be suitably fabricated for the instruments being supplied loose.

- For instruments supplied duly mounted on skids / racks, the scope includes dismantling from skids / racks, reinstallation after testing / calibration, restoring electrical connections, if any, pressure testing of connected piping and charging / loop checking. Servicing of manifolds PG valves shall also form part of erection job within the quoted prices.

  Some instruments may need repeated calibration / replacement. The same will be carried out by the contractor at no extra cost to BHEL including calibration of instruments needed for replacement, which will be supplied by BHEL. Erection of thermo elements like RTDs & Thermocouples includes erection of thermo-wells, wherever required, at no extra cost to BHEL.

(R) DETECTORS / VIBRATION, SPEED & OTHER TURBOVISORY PICK UPS:

Blue matching with the assembly fixtures / main equipment surface trial fixing, fixing by drilling / tapping, final doweling. Moreover some detectors may have piggy-backs signal detectors mounted on them as such these forms part of detectors assembly. The integral cables of the above shall be routed & dressed properly up to their JB / Proximeter.

Erection of proximitors, proximitor housings / JB required for respective pick up and calibration / commissioning of pick ups will be included in quoted / accepted item rate of respective pickup.

(S) PNEUMATIC TUBES (COPPER / SS TUBING):

Fabrication and erection of single angle supports / tray supports for single multi run tube. Laying tubes in the angles / trays from the panel to the equipment, instrument to instrument, air supply line to drive / instrument, air line connections, clamping properly as per standard ferruling and termination at both ends. This includes all fittings and needle valves, stop valves etc. also. Proper tagging of valves and pneumatic tubes on both ends shall be done for proper identification. No extra charges will be claimed by contractor for any modification carried out after laying of pneumatic tubes / draft pipe lines due to site requirement in general.

(T) IMPULSE PIPES(CS/AS/SS)

Fabrication and erection of channel / angle / slotted angle supports, cleaning impulse pipe with wire brush and compressed air, edge preparation, cold bending, laying to the required slopes, clamping, welding of isolation / drain valves and fittings by butt / socket welding / swoze lock joints. Servicing of valves, connecting with the process end and to the instruments, NDT, Hydraulic testing the impulse lines, and painting the lines as per requirement of BHEL engineer. The impulse line may have to be cleaned chemically for removing grease / rusting. Proper tagging of valves and impulse lines on both ends shall be done for proper identification.

(U) COMPUTERS / PLC BASED EQUIPMENTS

All computer related items / equipment like CRT, monitors, printers, key boards, pre-fabricated connecting leads etc shall be installed in control room and control desk as per direction of BHEL Engineer. The Software installation and commissioning is not included in the scope of this contract. However, any assistance required for testing / commissioning have to be provided by the contractor within the quoted price. Hardware found defective during testing / commissioning and till handing over to Customer, have to be removed for repair / replacement and reinstalled within the quoted rates.

(V) ELECTRONIC WATER LEVEL INDICATOR SYSTEM

EWLI includes fixing of electrodes, local and remote indicator panel / display units and interconnection of these by cables. Only cost of laying cables for interconnection of EWLI system shall be measured and paid separately. Erection of all other

equipments / panels/ display units forming EWLI system shall be included in the quoted rate per system.

(W) CALIBRATION OF CONTROL VALVES

The work also includes minor rectification / alterations in tubing, servicing of accessories, setting of limit switches, calibration of Actuators and position feedback transmitters.

(X) SAMPLE HANDLING SYSTEM / ANALYZER SYSTEM

Includes installation of main analyzer panel, analyzer, probes, sensors and other accessories like sample gas cylinders, mechanical / electrical interconnections (including SS Tubing & Electrical heat Tracing, wherever required) between various components, energizing, testing & commissioning**.**

(Y) POWER CYLINDER ERECTION

Platforms on which Power Cylinders are to be mounted are usually provided by the Civil Contractor / other agency. However minor structure work required shall form a part of the work within the quoted rate of the the respective cylinder. Fabrication / erection of stands for mounting of the cylinders The work also includes minor rectifications/alteration in the tubing , servicing of accessories , setting of limit switches , calibration of actuators and feedback position transmitters .

60.3.1 Any cutting of masonry work, which is necessary shall be done by the contractor at his own cost and shall be made good to match the original work. The Contractor shall obtain prior approval before cutting any masonry / concrete work.

60.3.2 Conduits shall be thoroughly cleaned before pulling in the cable.

60.3.3 Pipes sent in standard length shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends upto 80 mm Nb will have to be fabricated at site.

60.3.4 In case of Transformers if any leakage / sweating is observed from field assembled / shop assembled gasket joints, valves, welded joints the same shall be attended by the contractor including draining of oil, refilling of oil & centrifuging if required at no extra cost to BHEL till handing over period. Sealing compound and any other consumable, if needed, shall be arranged by the contractor with in the quoted rates.

60.3.5 Calibration log-sheets / history cards of all the instruments, panels, drives, relay testing etc. under the scope shall be recorded and submitted on BHEL approved formats. Proper logging will form a part of calibration / erection activity for the purpose of monthly running bills payments.

60.3.6 The contractor shall use only SHEARING machine or HACKSAW for cutting angles, flats, channels and trays. No gas cutting is permitted. Drill machine shall be used for drilling holes.

60.3.7 The contractor should note that after execution of work they will hand over marked up drawings "as erected" drawings to BHEL Engineer at site for preparation of firm "as built" drawings. "As erected" drawings will bear the signature of BHEL Engineer and contractor.

60.3.8 The contractor shall paint the name / put tag numbers on all the equipment / instruments / cables etc. erected by him. Materials for tagging shall be supplied by the contractor. Contractor at his cost shall also arrange the adhesive etc.

60.3.9 Contractor shall fabricate and erect stands / supports for Junction boxes, push button stations, fixing of push button and plugging of holes in JB's. This is considered inclusive in the item erection.

60.3.10 DRIP SHIELDS shall be fabricated for all field mounted panels / instruments / instrument racks / JB Racks / control cabinets etc. The hardware / material shall be supplied by BHEL. The fabrication forms part of erection work.

60.4 TESTING, PRE-COMMISSIONING, COMMISSIONING AND POST-COMMISSIONING.

60.4.1 Site testing shall be required for all equipment installed by the contractor to ensure proper installation, setting, connection and functioning in accordance with drawings, specifications and manufacturer's recommendations.

60.4.2 Commissioning protocols are to be prepared as advised by BHEL Engineer for getting approved by customer / Consultant.

60.4.3 Testing, and pre-commissioning checks shall be as per relevant codes / practices and BHEL drawings / specifications/ approved commissioning Protocols and same shall include, but not be limited to the following

I. TRANSFORMERS

(a) Insulation resistance and earth resistance checks.
(b) Oil testing like BDV of oil of each drum before pouring, after processing and in the course of day out, moisture content tests as and hen required. Provision should be made for preparation of oil in a separate tank before filling in the main transformer tank.
(c) Checking of Buchholz Relay, oil level indicator PRV, calibration of OTI, WTI etc.
(d) Winding resistance, vector group, turns ratio test on different taps, magnetizing current, core balance check etc.
(e) After installation the contractor will get oil samples tested at an accredited test lab as per relevant IS as advised by BHEL Engineer and submit the test results, in case the test results are found unsatisfactory the tests will be got repeated by the contractor after reprocessing of oil & submitted to BHEL for approval/acceptance.
(f) Turns ratio, polarity, insulation resistance and winding resistance checks on all CT's.

II. HT / LT SWITCHGEAR PANELS:

(a) IR test of power and control circuits & High voltage test of Bus bar.
(b) Checking of protections and interlocks of all related schemes.
(c) Calibration of all indicating & metering instruments, relays, timers etc.
(d) Checking of operation of all relays and other protective devices e.g. thermal overload relays, single phasing preventers etc.
(e) Carrying out of suitable modifications as per system requirement.
(f) Operation of all illumination, space heating circuits etc.

III. BUS DUCTS:

(a) Insulation and earth resistance checks.

(b) High voltage test on Bus bars after drawing out VTs and disconnecting lightning arresters surge capacitors and other connected equipment e.g. generator , generator transformer etc.
(c) Measurement of contact resistance of joints, bus bar loop resistance etc.
(d) Testing of CTs, VTs, NGC including primary and secondary injection tests.
(e) Making all arrangements for testing of the Generator and GT on the 11KV side.
(f) Testing of generator circuit breaker.
(g) Testing pre-commissioning & trial run of hot air blowing unit.

IV. BATTERY AND BATTERY CHARGER, UPS

(a) Checking of battery charger panel.
(b) Calibration of all indicating and measuring instruments.
(c) Dummy load test of battery charger.
(d) Charging of battery and recharging after carrying out battery discharge test/ capability test of battery using dummy load.
(e) In the absence of regular power supply to battery chargers arrangements are to made for battery charging from temporary construction power supply points.

V. CONTROL & PROTECTION PANELS

(a) Checking of complete wiring and insulation resistance.

(b) IR test and loop checking of all field wiring in the panel.

(c) Checking of all protection, metering and indicating schemes.

(d) Calibration of all indicating and measuring instruments, relays, timers.

(e) Checking of all auxiliary schemes e.g. space heating, illumination.

(f) Checking of operation of all relays, switches and other indicators.

(g) Commissioning of total scheme including relevant internal equipment.

(h) Carrying out suitable modifications as per system requirement.

(i) Carrying out primary injection, secondary injection, stability checks etc.

VI. DRIVES AND CONTROLLERS

(a) All drives such as power cylinders, pneumatic / motorized valves / dampers etc. and controllers shall be checked for proper installation supports etc. before commissioning.

(b) All transmitters shall be calibrated and limit switches shall be adjusted.

(c) All pneumatic and impulse lines shall be cleaned as per instructions of BHEL Engineer.

(d) All drives shall be operated by simulating various conditions to ensure healthiness of components of the system.

(e) Re-calibration / rectification wherever required shall be carried out by the contractor within the quoted rates.

(f) Remote operation of all drives, valves, dampers shall be checked from control room as per instruction of BHEL Engineer.

VII. INSTRUMENTATION

All instruments shall be checked for proper installation, supports, impulse lines, cabling etc. and corrected, wherever required.
All instruments shall be calibrated before installation and proper calibration record shall be maintained to the satisfaction of BHEL Engineer. Instruments received in assembled condition in panels etc. shall also be dismantled, calibrated and re-assembled as per advise of BHEL Engineer.
All impulse and pneumatic lines shall be properly cleaned (oil flushed / chemical cleaned / air blown/ steam blown/ Hydraulic tested etc.) before being charged.
Some of the instruments may require re-calibration during commissioning. The contractor shall remove such instruments, recalibrate and install within the quoted rates.
Various type of Control Panels- Turbine and its auxiliaries Protection Panels, Boiler and its auxiliaries Panels have to be checked.

60.5 FINAL PAINTING

All the fabricated frames, instrument racks, Junction box frame, trays, supports, panel base frame, impulse pipes, etc., wherever applicable shall be first painted with one coat of primer paint (metal red oxide) and then two coats of approved quality paint of approved shade by BHEL Engineer after thoroughly cleaning the surface of dust, rust, scale, grease, oil, etc., by wire brushing, scrapping or any other suitable method. The quoted rates should be inclusive of all these including supply of paints and consumables.

Other equipments like JBs, Panels etc., shall be painted with two coats of synthetic enamel paint. The quoted rates should be inclusive of application of two final coats of synthetic enamel paint. All the consumables such as wire brush, other cleaning materials, painting implements, etc., is to be arranged by the contractor at his own cost. The quoted rates should be inclusive of supply of paints and consumables. All equipment painting will be done by spray painting.

All the weld joints of GI cable trays and GI structural members shall be applied with a coat of cold galvanizing zinc paint and paint shall be arranged by contractor at his cost.

Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for touchup / finish painting. Paint shall be of BHEL/ its customer's approved make only (i.e. enamel, epoxy, fire resistant or of any other required category specified by BHEL / its customer, drawings, documents and specifications for this package) and painting should be as per colour scheme and quality approved / specified by Engineer. Valid Test Certificate for the paint so supplied shall be made available before use of the same on work.

PIPING

61.0 SCOPE FOR PIPING

61.1 The scope of work under this tender for piping package broadly -but not limited to

consists of:

01. Collection of Materials from BHEL Store/yards/other designated places and transportation to erection site/ Floor, their preservation, safe keeping, watch and ward.

02. Checking, dressing, chipping and leveling of foundations, De-watering, Pre-assembly, erection, anchoring, alignment of various equipment, machining and grouting, wrapping, coating wherever applicable.

03. Welding, heat treatment, radiography (including supply of radioactive sources) and other non-destructive tests, heat treatment, hydraulic testing, during chemical cleaning/ flushing, steam blowing dismantling, re-erection etc wherever required

04. Pre- commissioning checks/ tests and commissioning and handing over of all items/ equipment in scope.

05. Erection and dismantling of all temporary piping, valves, etc during above operations, other commissioning activities including post commissioning, handing over and all assistance during PG test.

06. Painting, along with supply of required materials, machineries and other resources as required to carry out the job.

07. Insulation of all equipments as per requirement.

08. Arranging statutory co-ordination for IBR related activities.

09. Chemical cleaning (as applicable), oil flushing, steam blowing and associated testing plus related activities of different system and normalization.

10. Preparation of MIRs, drawings, following of safety and quality norms and documentation, preparation of material status and up-gradation of activities, networks at regular intervals.

Major equipment to be installed, tested and commissioned under this specification is given in Annexure II.

The contractor is required to erect/ commission actual tonnage/ quantities (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above systems and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted rates. The contractor undertakes to erect/ commission actual quantities as per advice of BHEL Engineer. And accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same.

61.2 **INSULATION**

All piping and equipment, as per requirement/ drawings are to be thermally insulated with bonded/ unbounded mineral wool/ LRB mineral wool and to be covered with aluminum cladding. Bidders are required to quote rate in Rs per MT against ITEM NO.-2.4 of RATE SCHEDULE for entire insulation work.

NOTES:-

a) All the above systems of piping include the erection of pipes, bends, elbows, valves,

fittings, impulse piping up to and including first root valve(s), sampling lines, drains, hangers and supports and other accessories so as to make the system complete in all respects.

b) Above systems of piping can be regrouped/ renamed or any addition or deletion in the system can be made in order to make system complete as per requirement. No extra claim shall be entertained on this account.

c) The equipment and piping systems indicated above are only major items and does not cover all the equipment/ piping system to be erected/ commissioned. Contractors are however, required to erect/ commission within the price quoted by them, all connected equipment/ system shown in manufacturer's drawings/ other documents which may be necessary for erection completion and overall commissioning of set under scope of this tender.

d) The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.

e) Carrying out piping as per the specification between equipment constituting terminal points, whether the terminal equipments fall with in the scope of work/ specification or not, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment need correction by suitably resorting to heat correction or other method as instructed by BHEL Engineer, the same need to be done by the contractor within the quoted rate.

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

STRUCTURE STEEL WORKS OF FABRICATION, ERECTION, TESTING, PAINTING

62.0 SCOPE FOR STRUCTURE STEEL WORKS OF FABRICATION, ERECTION, TESTING, PAINTING.

62.1 The scope of work under this tender generally consists of Structure steel work of fabrication, erection, testing & painting of deaerator & pipe rack structure.

The scope of this specifications not limited to but covers mainly following:

Collection of Materials from BHEL Store/yards/other designated places and transportation to erection site/ Floor, their preservation, safe keeping, watch and ward.

Fabrication & erection of structural steel work including interfacing work & misc. work. The nature work shall include columns, beams, splicing of steel works as needed, bracings, purling, sheeting runners, sag rods, ties, struts walkways, galleries, stairs, ladders, handrails, floor gratings ,chequered plate work, M.S.Pipes, equipment supporting platforms and all other structures for successful completion of project.

Supply, fabrication & erection of handrails as per drawing & specifications

Supply & fixing of floor gratings as per specifications

Supply of high tensile bolts, MS bolts, nuts, plain/taper & spring washers, all electrode required for shop & field work.

The detailed scope of work & the technical requirements for work to be executed under this specification shall be as per Specifications enclosed with this tender document.(Annexure-V)

Quantities mentioned in the rate schedules are approximate only and liable for variation due to change of scope of work / variation in schedule of quantities, changes in design etc. The tenderers shall undertake to execute actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out on the basis of quantities actually erected at site and payments will also be regulated for the same. The quantities indicated against each item may vary to any extent and no compensation will be payable in variation of Individual quantity

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the “Bill of Quantities” shall include but not be limited to the following.

a) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

b) Furnishing samples of all materials required by the engineers for testing / inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.

c) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.

d) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.

e) Arranging manufacturer’s supervision for items of work done as per manufacturer’s specifications when so specified.

f) Carrying out topographic survey of the entire area under scope of this tender & establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc. The contractor shall provide the owner/BHEL such a assistance, instruments, machines, labour and materials as are normally required for examining, measuring and

testing any work and the quality, weight or quantity of any material used.

g) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

62.2 The Customer Maruti Suzuki India Limited (MSIL) may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works at no extra cost to BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.

62.3 ISSUE AND ACCOUNTING OF STRUCTURAL STEEL

62.3.1 Structural steel (like plates, chequred plates, beams, channels, joist, angles, flats, tees, rolled sections , MS rounds, pipes and tubes) for structural steel work items only (except for items where supply by contractor is envisaged like HSFG/anchor bolts, doors, floor grating, MS grating covers etc.) will be issued by as a free issue materials from BHEL / MSIL site stores or other issue points as specified by the Engineer. Such issues would be only for permanent works. Necessary indents shall be raised by the contractor as per procedure laid down by the Engineer-in-Charge about 7 days in advance of the actual requirement for incorporation in the works.

62.3.2 Materials will be issued only for permanent works and not for making templates, other temporary works, enabling works etc. and the same shall not be taken into account for purpose of material reconciliation.

62.3.3 The contractor shall bear all other costs including the lifting, carting from issue points to works site/contractor's stores, custody and handling etc. and return of surplus/serviceable materials to Owner's stores to be designated by the Engineer-in-charge and all expenditure will be made by the contractor.

62.3.4 All steel shall be issued in available lengths / shapes and no claims for extra payment on account of issue of non-standard lengths/shapes will be entertained. For the purpose of billing and accounting only linear measurement will be taken and weight will be calculated as per the IS Co-efficient. The different in unit weight as per IS and actual as issued, if any shall be to the contractor's account and contractor shall quote the rates for corresponding item to take care of such difference.

62.3.5 In the case of steel materials, the same shall be issued generally on the basis of linear measurement and the corresponding weight will be calculated as per Indian Standard. For the purpose of billing & accounting, only linear measurement will be taken and any difference in weight based on linear measurement & actual weight shall be to contractor's account. Quoted price shall be deemed to include the above & the permissible wastage mentioned. No claim whatsoever shall be entertained on account of wastage & difference in weight as referred to above.

62.3.6 Issue of stores material is subject to availability and the contractor shall not be entitled to any claim or compensation for non-supply or delay in the supply under any circumstances. The material will be issued generally during the working hours.

62.3.7 The Contractor shall bear all incidental costs including site lifting, carting from issue points to site / contractor's store, custody and handling etc., and return of surplus / serviceable / scrap materials to Owner's Storage points designated by the Owner etc. and no separate payment for such expenditure shall be made.

62.3.8 The theoretical consumption of structural steel required for the work will be calculated on the basis of approved drawings / joint measurements. Structural steel shall be measured by weight in tones. The weight will be arrived at by multiplying the used length by the sectional weight. The sectional weight will be same as were applied at the time of issue. Standard hooks, cranks, bends and authorised laps, chairs, separator pieces etc. specified in drawing or instructed by engineer as required shall be measured and paid for. No payment shall be made for binding wires, spacer block etc. required for keeping the steel in position unless otherwise specified in the contract. No extra payment will be made for modification of already embedded reinforcement, if required due to faulty fabrication or placement.

62.3.6 The contractor shall submit proper account of material / material reconciliation statement for the material drawn by him from stores once in every three months. Failing compliance of this requirement further issue of steel to the contractor may be suspended and no claim of compensation for delay in execution on this account shall be entertained.

62.3.10 All the steel thus issued shall be properly accounted for as per the following permissible wastage over the theoretical quantity / consumption incorporated in the works.

Item	Area	Permissible variation
(a) Reinforcement bars	For all works except piling	3 %
	For piling works	5 %
(b) Structural steel	Accountable (visible)	4 %
	Un accountable (invisible)	1 %

62.3.11 Any unused / serviceable quantity of reinforcement steel & structural steel not returned in good condition & wastages / loss / consumption beyond specified / agreed limits shall be charged at penal rate of Rs 40,000 per MT for reinforcement steel & Rs 50000 per MT for structural steel respectively at the time of preparing final bill, during finalisation of the contract. The decision of Engineer-in-charge with regard to applicability of penal rates shall be final & binding upon the contractor.

62.3.12 Since the steel is being issued free of cost, the scrap generated shall belong to BHEL.

62.4 SCRAP & SERVICEABLE MATERIALS

62.4.1 All structural steel of length above 2 M except M.S. Plates shall be considered as serviceable materials provided the materials is in good and acceptable condition. Structural steel in length less than 2 M shall be treated as scrap.

62.4.2 Plates having both sides greater than 1 Metre OR If any side is less than 1 M but greater than 0.5 M and the total area is equal or greater than 2 Sq. Metre shall be considered as serviceable.

62.4.3 All pipes / reinforcement steel measuring 2 M and above in length shall be treated as serviceable materials provided they are in good and acceptable condition. Pipe in less than 2 M length shall be treated as scrap.

62.5 RECORD FOR MATERIALS CONSUMED

62.5.1 The contractor shall maintain and furnish to the Engineer the RECORD OF MATERIALS consumed in the works for each activity. The statement showing the theoretical vis-à-vis actual consumption of specified materials, such as structural /reinforcement steel, cement, bitumen, lead, paint etc., shall be enclosed along with the running bills submitted by the contractor. Contractor has to also furnish the test results of the materials used in the work as per IS specifications.

62.6 RECORDS AND MEASUREMENTS

62.6.1 All items having a financial value shall be entered in BHEL measurement Book so that a complete record is obtained of all works performed under the Contract.

62.6.2 Lump sum omissions will be entered for deduction. Measurement shall be restricted to that required to ascertain the financial liability of BHEL under the contract.

62.6.3 Work which fails to be measured in details shall be measured physically without reference to any local custom that may obtain excepting where it may otherwise be directed in the tender documents. The measurements shall be taken jointly by any person duly authorised on the part of BHEL and by the Contractor.

62.6.4 The Engineer shall give reasonable notice in writing to the Contractor of appointment for measurement.

62.6.5 The Contractor shall, without extra charge, provide assistance with appliances and other things necessary for measurement and shall bear all the cost of measurement of his work.

62.6.6 Measurement shall be entered in BHEL Measurement Book and signed and dated by both parties each day at the site on completion of measurement. If the Contractor objects to any of the measurements recorded on the behalf of BHEL, a note to that effect will be made in BHEL Measurement Book or against the item or items objected to and such note shall be signed and dated by both the parties engaged in taking the measurement.

62.6.7 If, as a result of such objection, it becomes necessary to re-measure the work wholly or in part the expense of such re-measurement shall be borne by the contractor.

58.7.8 If the Contractor's representative fails to attend when required, the Engineer shall have power to proceed by himself to take measurements and in that case these measurements shall be accepted by the Contractor as final.

62.6.9 The Contractor shall, once in every month, submit to the Engineer details of his claims for the work done by him upto and including the previous month which are not covered by this Contract Agreement in any of the following respects:

(a) Deviation from the items and Specifications provided in the Contract documents.

(b) Extra items/new items of work.

(c) Quantities in excess of those provided in the Contract Schedule.

(d) Items in respect of which rates have not been settled.

63.0 HEALTH, SAFETY & ENVIRONMENT MANAGEMENT AND SOCIAL ACCOUNTABILITY

Contractor shall ensure following towards HSE & Social Accountability :

63.1 The contractor will be responsible for **Health, Safety & Environment management at site** for the construction activities to be carried out by them in accordance WITH requirements given under section I (a) of GCC.

63.2 **Some of the common safety rules to be followed during working are as follows :-**

- No outsider is allowed to enter construction area without permission.
- No body is allowed to enter at construction site without Safety Shoe.
- Never enter work area without Safety helmet & chin strap in place.
- No climbing/working allowed without proper safety belt above 2 m. height.
- Do not exceed the speed limit 25 Kmph within premises.
- No debris obstacles allowed on the roads & passages.
- All accidents/incidents to be reported to site Incharge.
- Do not walk on pipelines or false ceiling.
- Maintain good Housekeeping at work site
- All Site supervisors & engineers (including subcontractors) must be imparted structured training on construction safety before start of the job & record to be maintained.
- Tools box talk (5-15 minutes) by supervisor prior to commencement of any job.
- Monthly safety meeting with Site In-charges.
- LPG cylinders not allowed for gas cutting.
- Good House keeping. Separate waste bins to be used for flammable & non flammable material.
- Safety awareness programs for workers by display of boards, posters, competitions, talks etc.
- Deployment of Safety Supervisors for every 250 workers and part there of at work site.
- Display of List of First Aid trained persons.
- Testing certificates for lifting tools & tackle.
- Provision & maintenance of fire extinguishers at construction site & material stores.
- Display of emergency telephone numbers at various locations.
- For work in confined space use 24 V lamp fitting & use tools with air motors or electric tools with max. 24 V.

63.3 Further, the contractor is required to provide proper Safety Net System wherever the hazard of fall from height is present as per instructions of BHEL Engineer at site. The safety net shall be fire resistant, duly tested and shall be of ISI mark and the nets shall be located as per site requirement to arrest or to reduce the consequences of a possible fall of persons working at different heights

63.4 **Contractor shall ensure following :**

(A) Contractor has to maintain contact with local hospital having scanning & other ultra modern medical facilities required during emergency.

(B) Contractor has to ensure pre employment medical check for all staff & workers.

(C) Contractor has to ensure that adequate First Aid facilities are available at work site for emergency purpose. This emergency set-up should include, but not limited to, the following

- Oxygen set up
- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.

An ambulance is required to be arranged and maintained at site by the contractor for entire contract period for subject work. This emergency facility set up including ambulance, male nurse etc. will be shared by BHEL and its other contractors working at same project at no cost to BHEL and its Sub contractors.

63.5 **The contractor shall comply with following towards Social Accountability:**

- The contractor shall not employ any employee less than 15 years of age in pursuant to ILO convention. If any child labour were found to have been engaged ,the Contractor shall be levied with expenses of bearing his education expenditure which will include stipend to substantiate appropriate education or employ any other member of family enabling to bear the child education expenditure.
- The contractor shall not engage Forced / Bonded Labour and shall abide by abolition of Bonded Labour System (Abolition) Act, 1976.
- The contractor shall maintain Health & safety requirement as stipulated in the Contract and Contract Labour (Regulation & Abolition) Act,1970.
- The Contractor shall abide by UN convention w.r.t Human Rights and shall be liable for Discrimination /Corporal punishment for failure in meeting with relevant requirements.
- The Contractor shall abide the requirement of Contract Labour (Regulation & Abolition) Act, 1970 for working hours.
- The Contractor shall abide by the statutory requirement of Minimum Wages Act 1948, payment of Wages Act 1936.
- The Contractor shall arrange potable drinking water to its employees & workers.

Contractor shall make necessary arrangements to ensure following:

1. **Contractor shall ensure deployment of qualified level-2 Engineers for NDT services at site.**
2. **Contractor shall ensure deployment of Qualified & Experienced Safety Engineers / Officers at site.**
3. Contractor shall ensure that all the **T & Ps deployed** by them, including cranes, (Indicative lists of **T&Ps and IMTEs** to be arranged by the contractor are given as per Annexure-III) **are regularly certified by approved testing agency** & the relevant certificates to this effect are to be given to BHEL for records.

   It may be noted that **non-compliance to the above three conditions** will result in **penal action** as may be decided by the competent authority of BHEL**.**

The Contractor shall be fully responsible for accidents caused due to him or his agents or workmen's negligence or carelessness in regard to the observance of the safety requirements and shall be liable to pay compensation for injuries. It may be noted that non-compliance to HSE requirements will result in penal action. In case of violations of safety requirements, the Contractor shall be liable for a penalty of Rs. 200/- for the first violation and Rs. 500/- for the subsequent violations. For serious lapses, as decided by BHEL Engineer, fines upto Rs. 5000/- at a time can be imposed.

The amount towards penalties as above will be deducted from running bills of the Contractor. The amount so collected above will be utilized for supporting the safety activities at site. The decision of BHEL on above will be final and binding on the Contractor.

63.6 **The contractor under this contract shall also provide free of cost services of manpower for a total period of 132 man-months exclusively for use by BHEL for following services**;

- Qualified computer operators for office work. (24 man months)
- Clerks / Skilled workers for working in store, office and colony. (36 man-months)
- Unskilled workers for working in store, office and colony. (72 man-months)

Persons so deployed shall have to work in extended hours whenever required. Workmen provided as per the above provisions shall be fully trained and experienced in the nature of work for which they are deployed.

In case contractor fails to provide above-mentioned man-power as desired by BHEL, the latter shall have right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the man-months as per above provision, fully or partly, recovery at the rate of the prevailing minimum wages at GURGAON for the workers categories stated above plus 10% will be made from the final bill of the contractor.

64.0 FACILITIES TO BE PROVIDED BY BHEL / CONTRACTOR

64.1 BHEL/MSIL shall provide adequate open space for temporary office & storage sheds free of all costs, to contractor within the plant boundary. It is the responsibility of the contractor to construct their office sheds, provide all utilities and dismantle and clear the site after completion of work or as and when required, as a part of his scope of work.

64.2 The Contractor shall be responsible for providing all necessary facilities like residential accommodation, transport, electricity, water, medical facilities etc. at his own cost as required under various labour laws and statutory rules and regulations framed there under to the personnel employed by him. Land for housing colony shall be provided by customer.

64.3 The contractor shall submit to BHEL Engineer his electrical power requirements. Construction power, for construction purposes as well as office use will be provided ON **FREE OF CHARGE BASIS** at points near erection site from supply point. Contractor at his cost shall do further distribution of power. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Required energy meter, duly calibrated, for measurement of power consumed has to be arranged / installed by Contractor at his cost.

64.4 The drinking water & construction water inside the Power plant shall be made available ON **FREE OF CHARGE BASIS** at points decided by BHEL/MSIL & further distribution as per requirement is to be made by the contractor.

64.5 The contractor should arrange at his cost for temporary lighting in & around his work area for execution of work. Adequate lighting facilities such as flood lights, hand lamps shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.

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

64.7 Provision of distribution lines of both electrical power and water from the supply points 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, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Earthing, change over switches etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

64.8 Following points should be strictly adhered to by the contractor while drawing construction power supply.

(a) All electrical installations should be as per Indian Electricity rules.

(b) All distribution Boards installed by the contractor should be constructed with fire proof materials viz steel frames, Bakelite sheets etc.

(c) Connection for single phase should be taken from phase and neutral. No where the connection should be taken with Earth as neutral.

(d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.

(e) Contractor have to make proper Earthing arrangement for their equipment / DB etc. The Earthing connections have to be done with proper size conductor and suitable lugs/clamps as per discussion with BHEL Engineer.

(f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.

(g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.

(h) Contractor should ensure that all the CBs / TPNs / Fuses / MCCB / ELCB cables etc. should be of adequate rating/ capacity.

(i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected / proposed loads.

(j) ELCB will be tested biweekly by actually simulating the earth leakage for all installations and the same shall be recorded by BHEL Engineer in the log book to be maintained by the contractor.

64.9 In case of power cuts / load shedding no compensation for idle labour or extension of time for completion of work will be given to contractor.

64.10 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, 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, same will be got done by the Engineer and expenses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.

64.11 The contractor has to bring all the accessories required for the distribution of construction power as detailed further and has to manage the construction power available near erection site and to distribute through cable, further as per use, by suitable capacity Power distribution boards for HRSG & TG works and other for storage area along with required cables to distribute further with MCBs, ELCBs, Welding Sockets etc. to Site Offices, Store sheds, other Site Requirements etc.

65.0 TIME SCHEDULE

65.1 The contractor is required to commence the work within 15 days from the date of issue of Letter of Intent. However the actual date of start of work as agreed and certified by BHEL ENGINEER shall be considered as **zero date of start of this contract.**

65.2 Entire work as detailed in tender specification shall be completed within **12 months** from the Zero date of the contract as per the programs / milestones indicated by BHEL from time to time. Contractor has to augment adequate resources to meet BHEL commitments to customer as indicated from time to time for which no compensation will be payable. However, in case of contractor discharges his contractual responsibility even before schedule contract period, he will be allowed to wind up his set up without any financial implications on either side.

65.3 The various tentative milestone dates to be achieved, for 2X75 TPH &1X17.5 MW STG, are as below:

MILE STONES	MONTHS
Start of MM work	Zero
HRSG#1 Erection start	15 DAYS
HRSG#2 Erection start	ONE
HRSG#1 Drum lifting	THREE
TG Erection Start	ONE
HRSG#2 Drum lifting	FOUR
HRSG#1 Hydro Test	FIVE
HRSG#2 Hydro Test	SIX
OFC-TG	SIX
Alkali boil Out completion(HRSG#1)	SEVEN
BARRING GEAR	SEVEN
Alkali boil Out completion(HRSG#2)	EIGHT
Steam Blowing completion/ Safety Valve Float(HRSG#1)	EIGHT
Rolling & synchronization	NINE
Steam Blowing completion/ Safety Valve Float(HRSG#2)	NINE
Trial Operation	TEN
Completion of all facilities	ELEVEN

Depending upon front and material availability all or some of the above milestones may be required to prepone by *one month*. Contractor is required to arrange additional resources to meet above requirement within their quoted price.

65.4 The work under the scope of this contract specification is deemed to be completed in all respects, only when all the works are carried out and the testing and trial runs including safety valve floating, synchronization & full load are completed including all pending / punch points. *The decision of BHEL on completion date shall be final and binding on the contractor.*

66.0 OVER RUN

66.1 In case due to reasons not attributable to the contractor, the work gets delayed and scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first **3 (Three)** months after the contractual completion date. In case the scheduled completion time gets extended beyond **3 (Three)** months as stated above, the contractor shall be considered for payment of fixed over run charges @ **Rs. 60,000/- (Rupees Sixty thousand only)** per month on receipt of advance notice intending to claim over run and on fulfillment of following conditions:-

a) The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.

b) The targets fixed during the over run period are achieved by contractor.

However, the over run charges shall be limited to 10 % of the contract value.

66.2 Once the claim of over run charges is admitted no other compensation whatsoever (like for delays in receipt of materials, availability of fronts etc.) will be entertained.

66.3 The contractor shall maintain sufficient workforce and other resources required for completion of the job expeditiously / regular up keep, operation, maintenance, lubrication of erected equipment till the actual commissioning of the unit for the entire contractual period including total extended period.

66.4 For the purpose of ORC the actual date of start of erection as certified under clause 65.1 will be considered.

67.0TERMS OF PAYMENT

67.1 The 'Engineer' will certify regarding the actual work executed in the measurement books and bills, which shall be accepted by the contractor in measurement book.

67.2 Contractor shall submit bills for the work completed under the specification, once in a month detailing work done during the month. The format for billing shall be approved by BHEL before raising invoices.

67.3 Subject to any deduction that BHEL may be authorised to make under the contract, the contractor on the certificate of the Engineer at site be entitled for payment as explained hereunder on prorate basis.

67.4 Contractor shall submit shortage/ damage reports on BHEL,s standard materials management forms. No payment shall be released till the contractor submits these reports and are verified by the Engineer.

PROGRESSIVE PAYMENT ON PRO-RATA BASIS .

A. 85 % of unit rate (ITEM NO 1.0,2.1,2.2,2.3 OF RATE SCHEDULE)

1. 15% of the applicable contract unit rate on pro-rata basis on completion of pre assembly wherever required and 15% of the applicable contract unit rate on pro-rata basis on placement in position and rough alignment.

OR

2. 30% of the applicable contract unit rate on pro-rata basis on placement in position and rough alignment for the items where pre-assembly is not involved.

55% of the applicable contract unit rate on pro-rata basis on completion of final alignment / fastening / welding / grouting along with proper supports including radiography / NDT / stress relieving wherever involved.

B. 85% OF UNIT RATE (ITEM NO 2.4 OF RATE SCHEDULE)

a. **40%** of the Contract rate on pro-rata basis on transportation/ fabrication/ fixing of retainers, lagging & stitching of mattresses and welding of retainers**.**

b. **40%** of the Contract rate on fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screen fixing of cladding & completion of all jobs

c. **5%** of the Contract rate on Area cleaning

C. 85 % of Lump sum price (item No. 3.0 of rate schedule)

(Applicable on items covered under ANNEXURE – III)

STEAM TURBINE	1 x 15 %
Gear Box	1x5%
Deaerator	1x10%
GENERATOR	1 x 15 %
BOP Items(BFP's, FRP cooling tower, Cooling water pumps etc.)	40%
TOTAL	85%

NOTES:

1. The above break up is only for payment purposes and does not cover all equipment in the scope of the subject work. The total scope of work shall be as detailed in the tender specification.
2. Pro-rata payments shall be made every month in proportion to the work carried out by the contractor during the month, which shall be measured on the basis of percentages fixed above. The engineer shall carry out the assessment of the work for payment within the above percentages and it shall be final and binding on contractor. However, further percentage break up for payment against above clauses, will be mutually discussed and finalized at site

PROGRESSIVE PAYMENT ON PRO-RATA BASIS FOR MATERIAL HANDLING WORKS SHALL BE FOLLOWS:

D. 85 % OF UNIT RATE (ITEM NO 4.0 OF RATE SCHEDULE)

1 **50 %** of the applicable unit rate shall be paid after the materials are unloaded as per RR / LWB / loading advice / box packing slip subject to furnishing of following information along with the bills as per above clause.

a Material transporting vouchers stating work order and quantity of material for each consignment. Shortage report / open delivery taken w.r.t LWB, if any and acceptance thereof by way authorities/ transporters.

b Proof of claim lodged with railways/ transporters in respect of above shortage / open delivery. Material management forms duly filled and certified by the Engineer.

2 **35 %** of the applicable unit rate shall be paid as soon as the materials are duly shifted to desired location, stacked and verified by opening of cases / re-packing, wherever necessary (with contractor's own labour and T&P).

a Payment will be released on submission of the information, as per material management forms by the contractor immediately after verification of materials as certified by the Engineer. The Engineer at site would supply the requisite Performa.

b Contractor must ensure the stacking and verification of materials within 7 (seven) days from the date of unloading the materials in store, otherwise the same shall be done by engaging other agency on the risk and cost of contractor and decision of Engineer in this regard shall be final and binding on the contractor.

E. 85 % OF UNIT RATE (ITEM NO 5.1 OF RATE SCHEDULE)

1 **85 %** of the applicable unit rate shall be paid after the materials are unloaded, verified and stacked as per RR / LWB / loading advice / box packing slip subject to furnishing of following information along with the bills as per above clause.

a Material transporting vouchers stating work order and quantity of material for each consignment. Shortage report / open delivery taken w.r.t. LWB, if any and acceptance thereof by way authorities/ transporters.

b Proof of claim lodged with ways/ transporters in respect of above shortage / open delivery. Material management forms duly filled and certified by the Engineer.

F. PROGRESSIVE PAYMENT (FOR ITEM NO. 6.0 OF RATE SCHEDULE)

The Contractor shall be paid monthly running bill to a maximum of 85% of the value of the work actually executed on site provided the work has been executed to the satisfaction of the Engineer. **BHEL site in-charge, at his discretion can split this 85 % payment, to facilitate site operations**. The Engineer may after a measured bill allow & certify payment to the contractor on the basis of abstract measurement bill submitted by the contractor. Contractor will also submit the floppy / CD containing abstract & measurement sheets of the bill which will be returned to him after correction for further resubmission of bill. From this amount recovery such as advances, security deposit taxes etc. would be made. The certificate of the Engineer regarding such approval and passing of sums so payable shall be final and conclusive against the contractor.

G. 85 % OF UNIT RATE (FOR ITEM NO. 7.0 OF RATE SCHEDULE) –

(ITEMS/EQUIPMENTS AS PER ANNEXURE XIII B)

1.For Equipments/ Items (S. No. 1-80 & 107-121)

(i) 50% of item rate shall be payable on erection \ installation /cable laying
(ii) 15% of item rate on final alignment, welding, clamping, termination etc.
(iii) 15% of item rate on testing, pre-commissioning, charging
(iv) 3 % of item rate on final painting
(v) 2% of item rate on pending points clearance.

2.For equipment/items (S.no.81-106 & 122-124)

(vi) 20% of item rate on calibration and testing
(vii) 30% of item rate on erection, installation alignment and termination wherever involved.
(viii) 15% of item rate on individual device loop checking/hydro test/ charging of installation and panels.
(ix) 15% of item rate on system loop checks, pre-commissioning checks by simulation/ field calibration or with actual system operation.
(x) 5 % of item rate on pending points clearance.

H. MILESTONE PAYMENTS (8.0% of CV)

1. 2X0.5% of CV on completion of hydro test of the HRSG
2. 2X0.5% of CV on completion of ABO of the HRSG
3. 2X0.5% of CV on completion of steam blowing and SV Floating of HRSG.

4. 1.0% of CV on completion of completion of Oil flushing.

5. 1.0% of CV on completion of Barring gear

6. 1.0% of CV on completion of Steam rolling and synchronising

7. 2.0% of CV on completion of Completion of Trial operation

Notes:

If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site in-charge, at his discretion, after recording reasons for exercising such option, can split and release payment upto 50% of milestone payment on completion of work, to the extent possible, required for carrying out that particular milestone / commissioning activities.

I. FINAL PAINTING (2 % of CV)

2% of CV on successful completion of final finish painting including supply of paint (BHEL Site in charge at his discretion may split above and release payment on prorata basis for supply as well as for application of paints) .

J. 2.5% of CV shall be payable on handing over of the unit to BHEL's customer or 3 months after the contractor has discharged his responsibilities as stipulated in this contract whichever is earlier, if delay in handing over is not attributable to contractor. The unit shall be deemed to be handed over on completion of trial operation.

K**.** The balance **2.5% of contract value** will be payable on completion of all pending work, rework wherever required, reconciliation of materials, clearance of site and labour colony area in all respect and on submission and passing of final bill.

NOTE: Above payment against J & K shall be released after adjustment of the contract value based on actual work carried out against respective item of rate schedule.

Annexure – I

SUMMARY OF WEIGHTS (IN MT)

A) TOTAL TENTATIVE WEIGHTS FOR ITEM NO 1.0 OF RATE SCHEDULE (HRSG & AUXILIARIES,CHIMNEY) 1204 MT

DETAILS OF ITEM COVERED UNDER "AA"

Wt. of Each HRSG : 542 MT
Wt. of Both HRSG : 1084
Wt. of each CHIMNEY : 60
Wt. of Both CHIMNEY : 120

PGMA	Description	Weight(inKgs)
1-04-116	BOILER DRUM WITH INTERNALS-HP	25,209.18
1-04-156	DRUM SLIDE BEARING PLATES	127
1-04-158	FASTENERS FOR DRUM SADDLE	36.24
1-04-176	BOILER DRUM WITH INTERNALS-LP	9,952.55
1-07-206	RISER PIPES-HP	1,453.04
1-07-208	RISER PIPES-LP	558.92
1-07-210	RISER LINKS-HP	1,281.12
1-07-211	RISER LINKS-LP	485.24
1-07-411	DOWN COMER SUSPENSION -HP	127.734
1-07-413	DOWN COMER SUSPENSION -LP	134.4
1-07-504	DISC SPRINGS FOR EVAP. MODULES	19.254
1-07-505	EVAPORATOR MODULE SUPPORTS - HP FRONT	671.3
1-07-506	EVAPORATOR MODULE SUPPORTS - HP REAR	535.62
1-07-507	EVAPORATOR MODULE SUPPORTS - LP FRONT	332.81
1-07-508	EVAPORATOR MODULE SUPPORTS - LP REAR	233.53
1-07-992	IMPORTED ELECTRODES	17.08
1-07-993	ERECTION MATERIALS	125.3
1-08-910	EXPANSION MOVEMENT MEASURING COMPONENT	175.7
1-12-850	SAT. STEAM CONNECTING LINKS(HP)	1,105.44
1-12-851	MAIN STEAM LINE (HP)	1,624.34
1-12-852	DE SUPERHEATER CONNECTING LINKS	1,726.07
1-12-853	MAIN STEAM LINE (LP)	716.65
1-12-856	SAT. STEAM CONNECTING LINKS(LP)	629.704
1-12-900	DE SUPERHEATER	8,365.34
1-12-912	SH MODULE SUPPORTS(HP)	600.22
1-12-913	SH MODULE SUPPORTS(LP)	72.9
1-12-992	IMPORTED ELECTRODES	9.98
1-12-993	ERECTION MATERIALS	151.86
1-19-101	WPH INLET LINE	276.937

1-19-102	WPH OUTLET LINE	163.04
1-19-850	ECONOMISER FEED PIPE (HP)	178.916
1-19-851	ECONOMISER LINK TO DRUM	396.99
1-19-852	ECO INTER CONNECTING LINKS(FRONT & MIDDL	184.238
1-19-853	ECO INTER CONNECTING LINKS(MIDDLE & REA	130.558
1-19-854	ECONOMISER FEED PIPE (LP)	83.102
1-19-901	ECONOMISER SUPPORTS & SUSPENSIONS (HP F	16.756
1-19-904	ECONOMISER SUPPORTS & SUSPENSIONS (LP F	16.756
1-19-908	SUPPORTS FOR WPH LINKS	97.048
1-19-911	WPH MODULE SUPPORTS	288.17
1-19-912	ECO MODULE SUPPORTS(FRONT)	259.51
1-19-913	ECO MODULE SUPPORTS(MIDDLE)	290.94
1-19-914	ECO.MODULE SUPPORTS(REAR)	290.94
1-19-992	IMPORTED ELECTRODES	3.885
1-19-993	ERECTION MATERIALS	133.82
1-24-200	TRIM PIPE & FITTING-LP	8,599.08
1-24-201	TRIM PIPE SUPPORT-LP	1,574.91
1-24-260	VALVES - LP	2,711.40
1-24-273	DIRECT WL GAUGE-LP	354.05
1-24-275	HDRS FOR TRIM PPG-LP	425.66
1-24-280	SAFETY VALVES-LP	114.9
1-24-460	VALVES - HP	4,882.00
1-24-473	DIRECT WL GAUGE-HP	354.05
1-24-475	HDRS FOR TRIM PPG-HP	583.844
1-24-480	SAFETY VALVES-HP	250
1-24-955	LAPPING TOOLS SAF.VAL	17.7
1-24-960	LAPPING TOOLS CON.VAL	30.18
1-24-225	SILENCER SUPPORTS - LP	3,737.90
1-24-285	SV SILENCERS - LP	981
1-24-290	SILENCER STARTUP - LP	1,525.00
1-24-420	SV ESCAPE PIPING-HP	1,800.69
1-24-425	SILENCER SUPPORTS - HP	4,662.65
1-24-485	SILENCER SAF.VALVES - HP	1,932.00
1-24-490	SILENCER-START UP-HP	1,525.00
1-24-989	COMG.SPAR CON.VALVES	25.01
1-28-700	CLADDING SHEET FIXING PINS, NUTS& WASHER	3,528.00
1-32-020	CLADDING SHEET BURNER DUCT	3,394.42
1-32-110	CLADDING SHEET - S1 TO S2	6,262.71
1-32-010	CLADDING SHEET INLET DUCT	4,827.29
1-32-055	EXTERNAL INSULATION -PIPING	1,952.62
1-32-810	CLADDING SHEET - OUTLET DUCT	684.984
1-32-993	ERECTION MATERIALS	989.82
1-33-021	CERAMIC WOOL	18,268.50
1-33-621	MINERAL WOOL FOR PIPING	9,240.00
1-33-970	WIRE MESH	320
1-33-975	SEALING COMPONENTS	100
1-35-010	BLR FNDN MATERIALS	6,661.96
1-35-110	MAIN COLUMNS LEFT	20,473.84

1-35-120	MAIN COLUMNS RIGHT	20,473.84
1-35-131	INLET DUCT SUPPORTS	22,997.70
1-35-140	AUXILIARY COLUMNS	1,505.53
1-35-220	BLR CEILING STR ROLL	2,872.69
8-35-391	MODULE TRANSPORTING STRUCTURE	13,001.12
8-35-392	SINGLE MODULE LIFTING FRAME	1,136.31
8-35-393	MODULE UPRIGHTING FRAME	3,356.65
1-35-520	AUX COLUMNBRACING	1,842.20
1-35-591	BOTTOM BRACING BEAM	4,077.88
1-35-592	TOP BRACING BEAM	5,427.00
1-35-593	BASE BEAMS	2,074.51
1-35-594	STIFFENER BEAMS	7,960.29
1-35-595	LATERAL SUPP BEAM FR	1,994.55
1-35-596	LATERAL SUPP BEAM RR	5,273.60
1-35-597	PR.PART SUPPORT	5,575.55
1-35-610	BOILER ROOF STRUCTUR	14,048.91
1-35-611	BOILER ROOF SHEETING	1,877.40
1-36-210	MAIN FLOOR 1ST LEVEL	1,892.79
1-36-220	MAIN FLOOR 2 LEVEL	1,361.27
1-36-230	MAIN FLOOR 3RD LEVEL	3,765.14
1-36-240	MAIN FLOOR 4TH LEVEL	5,756.27
1-36-390	MISCELLANEOUS PLATFO	1,701.82
1-36-810	FLOORGRILLS AND GUA	8,386.39
1-36-820	STAIRS AND LADDERS	3,642.44
1-36-850	HANDRAILS AND POSTS	5,688.66
1-37-810	OUTER CASING SHEET -PIPING	2,412.50
1-41-130	DUCT BURNER ASSY.	8486.38
1-42-155	PIPING, OPRG FLOOR-IGNITOR GAS	185.452
1-42-156	PIPING, OPRG FLOOR-FUEL GAS	1092.71
1-43-002	SCANNER COOLING AIR SYSTEM	717.477
1-43-008	PURGE & SEAL / AUG AIR SYSTEM	1341.87
1-48-422	HRSG INLET DUCT	20,099.46
1-48-452	DUCT BOILER OUTLET	3,108.59
1-48-482	DISTRIBUTION GRID	1,251.75
1-48-700	BULKED BPS COMPONENTS	80.25
1-48-993	ERECTION MATERIALS	1,061.35
1-80-145	BDT EXHAUSTS & VENTS	2,240.97
1-80-600	HP DOSING PIPING	442.532
1-87-010	FOUNDATION MATERIAL	2,679.47
1-48-200	INSTRUMENT TAPPINGS	612.038
1-HL-101	EVAPORATOR MODULE ASSY.-HP FRONT	16,098.88
1-HL-102	EVAPORATOR MODULE ASSY.-HP REAR	37,822.68
1-HL-121	EVAPORATOR MODULE ASSY.-LP FRONT	6,320.16
1-HL-122	EVAPORATOR MODULE ASSY.-LP REAR	12,618.71
1-HL-501	SIDE CASING S1 - S2	2,863.43
1-HL-502	SIDE CASING S2-S3	2,807.71
1-HL-503	SIDE CASING S3 - S4	2,825.29
1-HL-504	SIDE CASING S4 - S5	2,852.63

1-HL-505	SIDE CASING S5 û S6	2,852.63
1-HL-601	TOP & BOTTOM CASING S1 - S2	2,203.48
1-HL-602	TOP & BOTTOM CASING S2- S3	1,497.21
1-HL-603	TOP & BOTTOM CASING S3 - S4	1,593.46
1-HL-604	TOP & BOTTOM CASING S4 - S5	1,431.08
1-HL-605	TOP & BOTTOM CASING S5 û S6	2,033.98
1-HL-098	LOOSE COMPONENTS- DUCT	3,803.54
1-HL-131	SH-II (HP)MODULE ASSY	6,253.59
1-HL-132	SH-I (HP)MODULE ASSY	6,243.46
1-HL-141	LPSH MODULE ASSY	1,550.25
1-HL-151	ECO MODULE ASSY(FRONT)	9,482.72
1-HL-152	ECO MODULE ASSY (MIDDLE)	12,645.04
1-HL-153	ECO. MODULE ASSY(REAR)	12,645.16
1-HL-171	WPH MODULE ASSY.	12,233.20
1-HL-201	LINKS FOR EVAPORATOR - HP FRONT	440.39
1-HL-202	LINKS FOR EVAPORATOR - HP REAR	3,271.40
1-HL-221	LINKS FOR EVAPORATOR - LP FRONT	108.86
1-HL-222	LINKS FOR EVAPORATOR - LP REAR	1,603.90
1-HL-231	SH-II (HP)MODULE LINKS	703.682
1-HL-232	SH-I (HP)MODULE LINKS	694.74
1-HL-251	ECO MODULE LINKS (FRONT)	198.402
1-HL-252	ECO MODULE LINKS (MIDDLE)	187.68
1-HL-253	ECO.MODULE LINKS(REAR)	394.096
1-HL-271	LINKS FOR WPH MODULES	476.631
1-HL-301	MODULE COMP. FOR EVAPORATOR-HP REAR	1,733.17
1-HL-321	MODULE COMP. FOR EVAPORATOR-LP REAR	1,704.89
1-HL-331	SH MODULE COMPONENTS	1,242.65
1-HL-351	ECO MODULE COMPONENTS(FRONT)	1,777.66
1-HL-371	MODULE COMP. FOR WPH	1,206.37
	TOTAL WEIGHT/HRSG(In KG)	**5,42,007.42**
	Approx. WEIGHT / HRSG	**542 MT**

CHIMNEY			WT. IN KG
1	87010	Foundation materials	2679
2	87100	Chimney shells	31722
3	87150	Chimney strakes	10679
4	87200	Painter's trolley(Stainless steel)	996
5	87300	Platform&Ladders	8135
6	87930	Aviation lamps&Lighting arrester	499
7	87950	Chimney insulation	3784
8	87960	Chimney insulation-Fixing componets	1687
TOTAL WEIGHT-			**60181**

NOTE:

a) Above details are only to give a general idea to the contractor to quote the rates as per rate schedule. Besides PGMAs indicated above, there is likelihood of addition/ deletion of PGMAs for release of some items integral to Boiler. Contractor is required to carryout such PGMAs also within their applicable tonnage rate. The decision of BHEL regarding inclusion of new / additional PGMA in HRSG will be final & binding on the contractor. Such items are also to be erected as per tonnage rates & as directed by BHEL. No extra claim shall be entertained on this account.

Annexure -II

PIPINGS & AUXILIARIES:

Tentative weight of piping system

Carbon steel Piping	170 MT
Alloy Steel Piping	44 MT
SS Piping	15 MT
Insulation	70 MT

PIPING SYSTEM:

Steam piping between HRSG's & steam turbine
Condensate piping system between air cooled condenser & condensate pre heater
Condensate piping between condensate pre heater & deaerator
Feed water piping between deaerator & HRSG
Extraction steam piping
Makeup water piping
Drain & vent piping
Instrument air, Plant air & Nitrogen piping
Natural gas piping for HRSG

NOTE:

a) All the above systems of piping include the erection of pipes, bends, valves, fittings, impulse piping and including root valves, sampling lines, drains, hangers and supports & other accessories so as to make the systems complete in all respect.

b) Above system of piping can be regrouped / renamed or any addition / deletion in the system can be made in order to make system complete as per requirement. No extra cost shall be entertained on this account.

c) The piping systems mentioned above are only indicative and does not cover all the piping systems to be erected / commissioned. Contractors are however required to erect commission all piping systems shown in drawings & other documents which may be necessary for erection, completion & overall commissioning of plant at the accepted unit rates.

d) Piping systems required for commissioning of HRSG have to be completed to suit BHEL requirements.

e) Pipes are supplied in standard commercial lengths without edge preparation.

f) Bidders may note above while quoting / accepting tonnage rates for subject work.

Annexure – III

1x17.5 MW STEAM TURBINE & AUXILIARIES :

SL.No.	ITEM DESCRIPTION	QTY.	DIMENSIONS (mm) LxWxH (Approximate)	TOTAL WEIGHT (Kgs)
1.	Steam turbine	1	4500X4000X4500	28000
2.	Gear Box	1	2250X2400X2600	13000
3.	Lube oil tank	1	3400x2500x2750	4750
	Over head oil tank	1	Dia2500	2000
4.	Lube oil pump	2	2200x750x750	1200
5.	Emergency Lube oil pump	1	2000x750x750	2000
6.	Jacking oil pump	1	1800x725x500	1800
7.	Duplex filter	1	2000x900x1750	2000
8.	Oil centrifuge	1	1600x1500x1200	1600
9.	Lube oil accumulator	1	600x600x2200	600

10	***Gland Steam Condenser***			
a.	Complete Assly.	1	2900 x 1300x 1500	1000
11	***ST oil Cooler***			
	Per Cooler	2	Ø 700 x H 3400	3200
12	***STG Air Cooler***			
	Per cooler	4	L 4300 x W 700 x H 450	960
13	***Spray cum Tray Deaerator***			
a.	Header	1	L 5500 x W 2350 x H 2650	7400
b.	Feed Storage Tank	1	L 11250 x W 2700 x H 3200	11400
	TOTAL WT. OF STG & AUX.		**IN KGS**	**57600**

Generator PKG. :

(B) 17.5 MW S.T.G

S.NO	DESCRIPTION EQUIPMENT	Qty.	OVERALL DIMENSIONS IN MM			Weight in Kgs
			LENGTH	BREADTH	HEIGHT	
1	GENERATOR PKG.	1	6000	3100	3150	49000
2	Generator control panel	1000x1000x2300				1000
3	Generator relay panel	1000x1000x2300				1500
4	Phase side terminal Box	1300x1000x2300				1200
5	Neutral side terminal Box	1300x1000x2300				1200
6	NG cubicle	1500x2500x1500				1500
7	FOUNDATION ITMES	LOOSE ITEMS				7000
8	Air cooler Duct	LOOSE ITEMS				2000
TOTAL WT.						**99500**

BOP Items:

S.N.	Description of Equipment	Dimensions(mm) Length xBreadth x Height	Unit Weight (kg)	Total Qty. (No.)	Total Weight (kg)
1	BFP -HP	4000x1000x1100	7000	3	**21000**
2	BFP-LP	1650 x 1200 x 950	4000	3	**12000**
3	FRP Cooloing tower	11000 x 7000 x 600	25000	2	**25000**
4	Cooling water pump & piping	6000x4000x4000	10000	2	**20000**
5	Dosing skid for aux. cooling water system	4000x4000X5000	5000	1	**5000**
6	ACW pump	2000x1000x1000	3000	2	**6000**
7	LP dosing skids	3000x2000x4000	5000	2	**10000**
8	Mono rail for BFOP		3000	2	**6000**
	TOTAL WT.				**105000**

Annexure-IV

General idea of weights to be handled

Approx. total weight of material 2026 MT

1.	**Approx. Weight of HRSG & Auxiliaries**	**1204 MT (detail as per Annex.I)**
2.	**Approx. Weight of Piping Systems**	**299 MT (detail as per Annex.II)**
3.	**Approx. Weight of STG, aux. &BOP**	**293 MT (detail as per Annex.III)**
4.	**Approx. Weight of Electrical & C&I**	**230 MT**

Detail of major items to be handled

Sl.No.	Document	BOQ (Approx)	Dimension (aprox) / Pc (L X B X H)	Unit weight(Kgs)	Aprox.Gross Weight(Kgs)
A	**E**				
1	Generator Transformer , 11/11.5kV,25MVA	1	7500x7800x6000	60000	60000
2	SAT,11/0.433 kV,2.5MVA	3	3000x3500x3300	8000	24000
3	Boiler Drum-HP	1			25209
4	Boiler Drum-LP	1			9952
5	Steam Turbine				28000
6	Gear Box				13000
7	BFP	3		7000	21000
8	Battery charger	1	2500X830X2000	2000	2000
9	LT Switchgear	11	10000x2000x4000		63000
10	11 kV Switch Board	3	820x2660x2500	900	2700
11	C& I Panels	29	800X800X2415	1200	34800

NOTE: Above details are only to give a general idea regarding the tentative details of equipments for Material handling. Contractor is required to carryout materials handling for all such items also within their applicable tonnage rate. Above system can regrouped / renamed or any addition / deletion can be made to make system complete. No extra claim shall be entertained on this account.

Annexure – V

LIST OF T&P BEING PROVIDED BY BHEL ON FREE OF HIRE CHARGES AND ON SHARING BASIS			
Sl. No.	**Equipment**	Capacity	**Qty.**
1	**Crawler crane**	100/150/200 T	1 No.
2	**Hydro test pump set**	250 / 400 kg	1 No

NOTES:

1. Any other special T&P if supplied by Manufacturer will also be provided free of hire charges as and when made available. These special tools & tackles are to be used only for the purpose for which these are meant and are to be required to be returned in good condition as and when required by BHEL.

2. Other terms & conditions regarding above items shall be as per clause no 37 (T & P / IMTE's).

3. BHEL crane will be made available for lifting of only those equipments which are beyond the capacity of cranes to be deployed by contractor.

Annexure-VI

AA) LIST OF MINIMUM MAJOR T&P TO BE ARRANGED BY CONTRACTOR AT HIS COST

Sl. No.	Equipment	Capacity	Qty.
1	Tyre mounted mobile crane (telescopic boom)	50 MT	1 No.
2	Tyre mounted mobile crane	18/ 20 MT	1 No.
3	Hydra Crane	12 / 15 MT	2 No.
4	Tractor trailer unit 15 MT or higher capacity		2 No.
5	Welding M/cs Sets		APR
6	Hydraulic Pipe bending M/c		1 No.
7	Power drilling machine		1 No.
8	Air Compressor	250 CFM	1 No.
9	Hydraulic Jacks	10/20/50 MT	As per requirement
10	Torque Wrench		02 set
11	Electric Winch 2/3/5 MT	2/3/5 MT	As per requirement
12	Heat treatment and Stress reliving arrangment		As per requirement
13	Plasma cutting M/c		1 No.
	ELECTRICAL WORKS		
1	Oil Filteration Machine for HT Transformer with oil tank	Suitable capacity	APR
2	Hydraulic crimping tool		2 Nos.
3	Hand crimping tools		Adequate Nos
4	Gas cutting set		Adequate Nos.
5	Grinders		Adequate Nos.
6	Pedestal mounted Drill Machine		1 No.
7	Industrial Vacuum Cleaner		1 No.

NOTE:

1. The above list specifies only major T&P (may not be complete) to be deployed by the contractor). All other additional T&P which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rates.
2. Sleepers, rails, jacks, slings, D shackles etc required for unloading to be arranged by contractor at his own cost. However in such cases BHEL may extend limited assistance by way of issuing such T & Ps that may be available in their stores, free of hire charges. These will have to be returned after use. Any damages / losses / to these will have to be borne by the contractor and cost / repair charges plus applicable overheads recoverable from him. No claim whatsoever will be entertained on non-availability of these items

3. Required Fire extinguishers are to be provided and fitted at suitable locations in the storage area. These are to be kept charged before the expiry of their consumable fillers. The record of validity/ usable period must be exhibited on the extinguishers.

Annexure-VII

Indicative list of IMTEs to be arranged by the **CONTRACTOR** for **ELECTRICAL AND C&I WORK**

Sl.No.	EQUIPMENT	QTY
1.	500 V / 1000V, (Hand operated) megger	1 No.
2.	2.5/5 KV (Motor operated megger)	1 No.
3.	Transformer Oil Testing Kit (Motor operated) 0-100 KV	1 Set
4.	HV Test Kit 0 to 60 KV (100mA leakage current)	1 Set
5.	Digital Multimeters with current probe	6 Nos
6.	Primary Injection Kit	1 Set
7.	Secondary Injection Kit	1 Set
8.	Relay Testing Kit	1 Set
9.	Tong Testers (various ranges) including mA Range	3 Sets
10.	Micro ohm meter with 100Amps DC Source	1 Set
11.	Kelvine double bridge (for low resistance measurement)	1 No.
12.	PPM Measuring Kit	1 No.
13.	Mill volt drop test kit with 100 Amps source	1 No.
14.	Analog Multimeters	2 Nos
15.	Single / three phase variac	1 Each
16.	Motor checker	1 No

For The Calibration of Instrumentation equipments:

S.NO.	DESCRIPTION	RANGE	ACCURACY	QTY
1.	Dead Weight Tester	0-600Kg/cm2	LC-0.5Kg/cm2	01 Set
2.	Comparison test set (With Sub-standard Pressure gauges) Set	0-1 Kg/cm2	±0.25% Lc-0.02Kg/cm2	01
		0-4 k g/cm2	-----do----------	
		0-6 Kg/cm2	-----do----------	
		0-10kg/cm2	-----do----------	
		0-25Kg/cm2	+0.25%Lc-0.25 Kg/cm2	
		0-60Kg/cm2	1±0.25%Lc-1.0 Kg/cm2	
		0-250Kg/cm2	±0.25%Lc-2.5 Kg/cm2	
		0- 400Kg/cm2	±0.25%Lc-2.5 Kg/cm2	
3.	Variable DC regulated No with digital indication).	0-30V DC	0.2% (Electronic voltage source	1

4.	Oil bath with thermostat, Stirrer and sub-standard Glass Thermometers in Multiple ranges	0-300 Degree Cel.		1 set.
5.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement.	0-760 mm		APR
6.	Glass U tube mercury mano-meter with standard steel Scale having leveling arrangement.	0-1000 mm		APR
7.	mA/mV source with Digital display.	0-200 mA/200mV		01 No.
8.	Rehostat	100 Ohm, 10 A		03 Nos.
9.	Precision Digital Multimeter	4-1/2 Digits		01 No.
10.	Digital multimeters	3-1/2 Digits		04 Nos
11	High temp. instrument Calibration kit	upto 600 deg.		01 No
12	Decade Resistance box	upto 10 L ohms		01 No
13	500 V / 1000V, (Hand operated) megger			01 No
14	Single phase variac	15 A		01 No.
15	Hydraulic test pump	upto 250 Kg/mm2	+0.25 %	01 No.
16	Continuity testers			APR
17	Intercom / telephone set for loop checking		.	APR

Notes:

1. The above list of testing instruments / equipment required for testing / commissioning is only for guidance to contractor and not complete. Any other / additional testing instruments / equipment required for timely and satisfactory completion of job will also be arranged by contractor at his own cost.
2. Contractor must re-ascertain /recheck range and accuracy of each IMTE from BHEL Engineer well in advance before arranging calibration / deployment of IMTE's
3. Other terms and conditions regarding above items shall be as per clause no. 37 (Tools & plants / IMT

Annexure—VIII

CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS

We,…… Hereby declare and confirm that we have visited the project site under the subject namely, ……and acquired full knowledge and information about the ***site conditions, wage structure, Industrial climate and total work involved***. We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site condition.

Tenderers Name and Address

Place: (Signature of the Tenderers with stamp)

Date:

ANNEXURE-IX

NON DISCLOSURE AGREEMENT
Memorandum of Understanding

BHEL PSNR is committed to Information Security Management System as per Information Security Policy.

M/s……, providing……..service to BHEL PSNR, Noida hereby undertake to comply with the following in line with Information Security Policy of BHEL PSNR;

- To maintain confidentiality of documents & information which shall be used during the execution of the Contract.

- The documents & information shall not be revealed to or shared with third party which shall not be in the business interest of BHEL PSNR.

( )	( )
M/s. BHEL, PSNR	M/s……..

Annexure – X

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)

Against this enquiry for the subject item / system with detailed scope of supply as per our tender specification, BHEL-PSNR, NOIDA may resort to "REVERSE AUCTION PROCEDURE" i.e. **ONLINE BIDDING on INTERNET.**

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. In case BHEL decides to conduct reverse auction, BHEL's service provider shall contact the vendor directly and impart them the training.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. **Total Price quoted shall be inclusive of all taxes except service tax in line with the NIT conditions for the subject work in Indian Rupees (INR), which is to be worked out as per the BOQ (Rate Schedule) given in tender enquiry and subsequent changes made, if any. EXCEL Sheet shall be provided, if applicable.**
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider after completion of event on the same day preferably.
10. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.

ANNEXURE - XI

FORMAT OF UNDERTAKING
(To be submitted in the bidder's letter head)

REF: **Dt.**

Bharat Heavy Electricals Limited
Power Sector – Northern Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar,
NOIDA – 201 301(INDIA)

Sub. "Erection, Testing, Commissioning and Trial Operation of All Mechanical, ,Electrical, C&I, Balance of Plant & Material Handling Work of 1x17.5 MW STG & 2x75 TPH HRSG at M/s Maruti Suzuki India Ltd(MSIL) , Gurgaon, Haryana."

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited **Gurgaon, Haryana** site before submission of our offer and noted the job content & site conditions etc.

We also confirm that we have not changed / modified the tender documents as appeared in the website and in case of observance at any stage, it shall be treated as null and void. We hereby confirm that we have not taken any deviation from tender clauses together with other references as enumerated in the above referred NIT and confirm our acceptance to reverse auctioning process and we hereby convey our unqualified acceptance to all terms and conditions as stipulated in the tender and NIT. In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null & void.

We confirm to have submitted offer strictly in accordance with tender instructions.

Thanking you,

Yours faithfully,

(Signature, date & seal of authorized representative of the bidder)

ANNEXURE – XII

Authorization of representative who will participate in the on line Reverse Auction Process;

1	NAME & DESIGNATION OF OFFICIAL	
2	POSTAL ADDRESS (COMPLETE)	
3	TELEPHONE NOS. (LAND LINE & MOBILE BOTH)	
4	FAX NO.	
5	E-MAIL ADDRESS	
6	NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION	

ANNEXURE- XIII

RATE SCHEDULE

Sl. No	DESCRIPTION OF WORK	Rate in Rupees (In figures and words)	TOTAL VALUE in Rupees (In figures and words)
1.0	Rate in Rupees per MT for complete work of Erection, Testing, Commissioning, Trial operation and handing over, of 2X75 TPH HRSG and Auxiliaries, 30 M Chimney etc as per tender specifications. (**Approximate Weight is 1204 MT as per Annexure- I)**		
2.0	Erection, Testing, Commissioning, Trial operation and handing over of Piping and their insulation of various piping systems of all types of materials such as AS, CS, SS etc. along with Insulation as indicated under Annexure - II of tender specifications.		
2.1	Carbon steel Piping(Approx. 170 MT)		
2.2	Alloy steel Piping(Approx. 44 MT)		
2.3	Alloy steel Piping(Approx. 15 MT)		
2.4	**Rate in Rs / MT** for complete work as per tender specification for application of insulation of piping system (Approximately 70 MT)		
3.0	**Lumppsum price** for complete scope of work as per tender specification for items indicated under Annexure-III for 1 x 17.5 MW STG(including auxiliaries & BOP equipments) (**Items as per Annexure- III.)**		
	MATERIALS HANDLING		
4.0	**Rate in Rupees per MT** for entire scope of work as defined in this tender in respect of **ALL Items/Equipments from Trucks/Trailers** other vehicles directly coming to site/store sheds/storage yard **(Approx. tonnage to be handled 2026 MT)**		

5.0	Lump sum price for entire scope of work as defined in this Tender Specification in respect of following items from Trailers, **directly coming to site & unloaded MANUALLY (by sleeper & Jack method)**		
5.1	**LUMPSUM PRICE FOR Generator transformer** Approximate weight**: 60 MT** Approx. Dimensions: 7.5X7.8x6.6 M Quantity - 1 (One No.).	**LS**	
6.	**TOTAL RATE FOR ALL STRUCTURAL STEEL ITEMs(AS PER ANNEXURE-A1)**	**UNIT RATES AS PER ANNEXURE-A1**	
7.	**TOTAL RATE FOR ALL ELECTRICAL ,C&I ITEMS (AS PER ANNEXURE-B1)**	**UNIT RATES AS PER ANNEXURE-B1**	
	GRAND TOTAL AMOUNT IN (Rs.)		

(Seal and Signature of Tenderer)

BOQ CUM RATE SHEDULE FOR STRUCTURAL STEEL

Annexure-A1

1	STRUCTURAL STEEL	UNIT	QTY.	Rate in Rupees	Amount in Rupees
1.01	Supplying**, fabricating** using approved quality electrodes of 6013 or low hydrogen 7018 for plate thickness above 20 mm, pre-heating, packing and delivering at the stores or at site of the following categories of Structural **Steelwork** including cost of steel,all necessary bolts, nuts & washers with a shop coat of approved Inorganic Zinc Silicate coating of 65-75 micron DFT after cleaning with manual / power tool cleaning to grade St-2 / St-3 of SIS 05 5900 or cl. 7.2.1.1 & 7.2.1.2 of IS:1477 (part-1)etc. all complete as per drawings and specifications.				
	Steel work consisting of **portal frames**, laced & plated columns, beams, farbricated with standard rolled sections, plates , flats, angles pipes etc.	M.T.	220		
1.02	Erection of structural steel as described in 6.1 including grouting under bases using ordinary/non-shrink grouts ,with necessary erection bolts, nuts & washers, welding electrodes of 6013 or low Hydrogen electrodes of 7018 grade, wherever required, etc all complete as drawings and specifications. (Permanant bolts and Grouting will be paid for under separte items)	M.T	220		
1.04	Supplying and erecting hot dip galvanised Heavy Duty **GI floor gratings** with minimum coating of 710 gms per sq.m. , staircase steps as per dwg including all fasteners, painting with two coats of aluminium paint at the places of site welding etc all complete as per specifications.	M.T	20		
1.05	Supplying, fabricating, fixing in position 32NB **MS pipe handrails** at various elevation including cost of materials, consummables, labour, painting with **synthetic enamel paint** etc. all complete as per drawing and specifications.(Length of finished Railing only will be measured for payment)	R.M.	100		
1.06	Providing complete **Proctective coating system to Stuctural Steel** with one coat of Inorganic Zinc Silicate primer as touchup paint at all damagedsurfaces,65 microns DFT+ two coats of Chlorinated Rubber Zinc Phosphate Primer,40 microns DFT each coat + two coats of Chlorinated Rubber finish paint,40 microns DFT each coat , with all materials, consumables and scaffoldings complete as per EIL specifications and drawings.	M.T	220		
1.07	Supplying and fixing in position of high strength structural bolts, **HSFG/HT bolts (of property grade 8.8 and product grade "C" as per IS: 1367 and conforming to IS: 3757 and high strenght structural hardened and tempered nuts (of property class"8" as per IS"1367) conforming to IS:6623 with hardened and tempered washeres as per IS:6649** etc upto and inclusive of 39mm diameter and upto 300mm long for structural steel work complete as per specification, drwaings and instructions of engineer.	Quintal	5		

NOTE-

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3. The quantities indicated against each item above are tentative and are liable to vary depending upon the site requirement. The contractor has to supply / install actual quantities as per advice of BHEL Engineer and accordingly the final contract price shall be worked out.
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BOQ CUM RATE SHEDULE FOR ETC of ELECTRICALS, C&I EQUIPMENT PACKAGE

Annexure- B1

SL NO	ITEM DESCRIPTION	UNIT	QTY	Rate in Rupees	Amount in Rupees
	HT/LT TRANSFORMERS:				
1	11/11.5kV,20/25MVA,ONAN,GENERATOR TRANSFORMER Total Weight 60MT 7500x6800x 6600mm Oil Qty. 14000 ltr.	NO.	1		
2	11/0.433kV,2MVA,ONAN,STATION SERVICE TRANSFORMER Total Weight 8MT 3000X3500X3300 Oil Qty. 1400 ltr.	NO.	3		
3	Neutral Grounding Resistor(11kV) for Gen. transformer Earthing 1500X1000X1500	SET	01		
	HT SWITCHGEAR				
4	11kV Board#201 consists of approx. 3 panels , Approx. dimensions of each panel 820X2660X2500 mm	SET	1		
	LT BUS DUCT,				
5	CR Enclosure,3200A,415V,NPSB 5000X1200X800 mm	NO.	3		
6	Isolation Breaker panels(11kV) 820X2660X2500	NO.	1		
	LT SWITCHGEAR				
7	415 V, PMCC-1 (9600x1754x2430)	No.	1		
8	415 V, PMCC-2 (14400x1754x2430)	No.	1		
9	STG MCC1 (8000x1350x2430)	No.	1		
10	415V BOP MCC-1 (10500x1350x2430)	No.	1		
11	HRSG MCC-1&2 (6200x1350x2430)	No.	2		

12	110V, UPS DB (12000x900x2430)	No.	1		
13	110V, STATION DCDB (3200x900x2430)	No.	2		
14	415V, ACDB (1600x900x2430)	No.	2		
15	Start/Stop PB stations 180X285X125	No.	90		
16	Emergency Stop PB 145X245X116	No.	10		
	BATTERY SYSTEM				
17	110 V STATION BATTERY Chargers (2500x830x2000)	Set	1		
18	110 V STATION Battery System (Ni-Cd) 800Ah,88 cells, (4370x830x2500)	Set	1		
	LTPOWERCABLES LAYING,DRESSING,CLAMPING & TERMINATION				
	1.1kV ,Armoured, Al Conductor ,PVC insulated FRLS outer-sheathed				
19	4CX16 SQ MM	Mtr	500		
20	4CX6 SQ MM	Mtr	500		
21	3.5C X 300 SQ MM	Mtr	1000		
22	3.5C X 185 SQ MM	Mtr	1500		
23	3.5C X 120 SQ MM	Mtr	500		
24	3.5C X 95 SQ MM	Mtr	500		
25	3C X 400 SQ MM	Mtr	960		
26	3C X 300 SQ MM	Mtr	1000		
27	3C X 185 SQ MM	Mtr	500		
28	3C X 120 SQ MM	Mtr	1500		
29	3C X 70 SQ MM	Mtr	500		
30	3C X 50 SQ MM	Mtr	960		
31	3C X 35 SQ MM	Mtr	1500		
32	3CX16 SQ MM	Mtr	500		
33	3C X 10 SQ MM	Mtr	1000		
34	3CX6 SQ MM	Mtr	3840		
35	3CX4 SQ MM	Mtr	19200		
	CONTROL/SIGNAL/ CABLES LAYING,DRESSING, CLAMPING & TERMINATION				
36	16CX2.5 SQ MM	Mtr	1500		
37	12CX2.5 SQ MM	Mtr	4800		

38	7CX2.5 SQ MM	Mtr	3000		
39	7CX1.5 SQ MM	Mtr	9600		
40	5CX2.5 SQ MM	Mtr	1500		
41	3CX2.5 SQ MM	Mtr	10000		
42	2CX2.5 SQ MM	Mtr	2400		
43	2CX1.5 SQ MM	Mtr	1920		
44	1PX1.5 SQ MM	Mtr	21000		
45	2PX1.5 SQ MM	Mtr	1760		
46	6PX0.5 SQ MM	Mtr	31000		
47	12PX0.5 SQ MM	Mtr	32000		
48	12PX1.5 SQ MM	Mtr	1000		
49	1TX1.5 SQ MM	Mtr	2300		
50	8TX1.5 SQ MM	Mtr	6500		
51	Scanner cables	Mtr	3840		
	CABLE TRAYS ERECTION INCLUDING SUPPORT & COVERS FABRICATION				
52	Ladder/ Perforated type Cable tray, W=600mm	Mtr	2000		
53	Ladder/ Perforated type Cable tray, W=300mm	Mtr	1500		
54	Perforated type cable tray, W=150mm	Mtr	600		
55	Perforated type cable tray , W=50mm	Mtr	250		
	CABLE TRAY ACCESSORIES				
	Ladder/ Perforated type Horizontal 90 deg bend-900/600 mm radius, Vertical Up/Down-900/600 mm radius, Tees -900/600 mm radius,				
56	900 MM Wide	No.	100		
57	600 MM Wide	No.	80		
	REDUCERS LADDER/ PERFORATED TYPE (50%LHS/50%RHS)				
58	600MM - 300MM	No.	20		
59	300MM - 150MM	No.	20		
	INSTALLATION & FABRICATION OF STRUCTURE STEEL				
	Channel , Angles, Flats etc.	MT	10		
	EQUIPMENT EARTHING / LIGHTNING PROTECTION SYSTEM				
60	GI STRIP FLAT 75 X 10 mm	Mtr	400		
61	GI STRIP FLAT 50 X 6 mm	Mtr	400		
62	GI STRIP FLAT 25 X 6 mm	Mtr	150		
63	8 SWG GI WIRE SOLID	Mtr	150		
64	16 SWG GI WIRE SOLID	Mtr	150		
	PLANT ILLUMINATION SYSTEM				
65	Bulk head luminaire suitable for 110V DC, 100W GLS incandescent lamps	Nos	10		

66	Well glass luminaire along with non integral control gear box suitable for use with HPMV 125W lamp (IP65)	Nos	150		
67	125W HPMV	Nos	280		
68	100W GLS Lamps	Nos	15		
69	3 meter/2 meter pole	Nos	150		
70	Industrial metal clad type 5/15A socket with switch	Nos	10		
71	63A TPN welding receptacles (Safe area)	Nos	8		
72	6/12 AC Outdoor Lighting Panels	Nos	5		
	CONTROL PANELS/RACKS/CONSOLES				
73	DAVR Panel 1200X1200X2324 mm	No.	01		
74	DCS Panel 750X750X2415	No.	27		
75	Network panel 800X800X2415	No.	01		
76	LOCAL BURNER PANEL 1000X900X2430	No.	02		
77	BMS Panel 800X800X2415	No.	02		
78	max OPC Station, 24'' TFT Monitor	No.	06		
79	Printers(Colour laser, mono laser, Dot Matrix)with Printer Table & Accessories 482X451X325 mm	No.	03		
80	Network switches 750X750X2415	No.	01		
	INSTALLATION,CALIBRATION&COMMISSIOING OF LOCAL / FIELD INSTRUMENTATION / EQUIPMENT				
81	Flow Nozzles	Nos	12		
82	Temp. Transmitter/Pressure Transmitter /Differential Pressure Transmitter	Nos	210		
83	Level Gauge/ Level Switch /Radar Level instruments/ Level transmitters	Nos	18		
84	Solenoid Valves	Nos	06		
85	Pressure Gauges/ Temp. Gauges/Diff. Pressure Gauges	Nos	200		
86	Pressure Switch/Temp. Switch	Nos	26		
87	Limit Switch	Nos	50		
88	Air Filter Regulators	Nos	280		
89	Electric Heater	Nos	04		
90	MTM THERMOCOUPLE	Nos	76		
91	Thermocouple/Temperature Element (RTD)	Nos	114		
92	Vibration/Axial Disp./Velocity probes	Nos	16		
93	Speed measuring Loop	Nos	6		
94	Aviation lamp	Nos	06		
95	Lightning protection	Nos	02		
96	EWLI	Set	04		
98	SWAS system	SET	01		
99	ANALYSER(SMOKE DENSITY / Sox/ Nox/CO/HC/pH ANALYSER)	SET	28		

100	Thermometers(Bimettalic)	Nos	11		
101	Flame Scanner Assy.	Nos	10		
102	Flame intensity meter	Nos	10		
103	THERMOWELLS	Nos	68		
104	Hand Held Communicator	Nos	01		
105	PA System	Set	01		
106	Master Clock System	Set	01		
107	Local gauge rack/Board 1700X1600	Nos	25		
108	GI pipe 1”	Mtrs	200		
	IMPULSE PIPES/ TUBES ALONG WITH FITTINGS				
109	SS TUBE 1/2”	MTRS	150		
110	SS TUBE ¼’’	MTRS	300		
111	Cu TUBE 1/4”	MTRS	200		
112	SS PIPE 1/2”	MTRS	500		
113	SS PIPE >1”	MTRS	100		
114	SS PIPE 1/4”	MTRS	300		
115	SS PIPE> 3/4”	MTRS	800		
116	CS PIPE> 3/4”	MTRS	350		
117	AS PIPE> 3/4”	MTRS	200		
118	SS Pipes 1” for Instrument air	MTRS	50		
119	**JUNCTION BOXES/INDICATION BOXES**				
120	Junction Box up to 24WAYS	Nos.	80		
121	Explosion Proof Junction Boxes	Nos.	55		
	COMMISSIONING/CALIBRATION OF MOTORISED/PNEUMATIC ACTUATOR/GATE/CONTROL VALVES				
122	Commissioning of Motorised Valves /Actuators	No.	43		
123	Control Valves/ On-Off Control Valves	No.	26		
124	Safety Relief valves/ Temperature Safety Valve/ Pressure Safety Valve/ On-Off Control Valves	Nos	05		

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