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

TENDER NO. BHEL: NR(SCT): SURATGARH -6:BLR & MM:391

FOR

Erection, testing, commissioning and trial operation of Boiler Part - A and Part - B including Material Handling work for the entire plant packages of 1 x 250 MW coal based unit # 6, Stage – IV at Suratgarh Thermal Project (SSTPS), Distt. Sri Ganganagar, Rajasthan.

PART I – TECHNICAL BID

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

ISO 9001-2000, ISO 14001 and OHSAS 18001 certified company
SubContract and Purchase Deptt.

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
Plot No. 25 , Sector - 16A ,
Distt. Gautam Budh Nagar, NOIDA – 201 301(INDIA)
Phone: 0091-0120-2515476 / 2515464 / 2515479
Fax 091-0120-2515464 / 2515467
Email: sku@bhelpsnr.co.in / swapan@bhelpsnr.co.in

TENDER NO. BHEL: NR(SCT): SURATGARH -6:BLR & MM:391

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

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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 Boiler Part - A and Part - B including Material Handling work for the entire plant packages of 1 x 250 MW coal based unit # 6, Stage – IV at Suratgarh Thermal Project (SSTPS), Distt. Sri Ganganagar, Rajasthan.

TENDER NO. BHEL: NR(SCT): SURATGARH -6:BLR & MM:391

QUALIFYING REQUIREMENTS:

"Tenderers who wish to participate should fulfill following 'Qualifying Requirements";

1.0 FOR PART –'A'

1.1 "Completion of similar nature works, covered in this tender (For Boiler Part-A), for at least one boiler with its capacity of 300 TPH / 67.5MW Unit and above during last five years".

OR

"Should be executing similar nature works of Boiler Part-A, as covered in this tender, against direct BHEL's order for a Boiler of 195 MW or above rating."

1.2 Party should also have an average annual turnover of minimum of Rs. 4.30 crores (Rupees Four Crores thirty lacs only) during preceding three years (2003-04, 2004-05 & 2005-06)."

2.0 FOR PART –'B'

2.1 "Completion of similar nature works, covered in this tender(For Boiler Part-B), for at least one boiler with its capacity of 300 TPH / 67.5MW Unit and above during last five years".

OR

"Should be executing similar nature works of Boiler Part-B, as covered in this tender, against direct BHEL's order for a Boiler of 195 MW or above rating."

2.2 Party should also have an average annual turnover of minimum of Rs. 1.95 crores (Rupees one Crore ninety five lacs only) during preceding three years (2003-04, 2004-05 & 2005-06)."

NOTES:

(i) The Tender Documents comprise of following;

(a) Special Conditions of Contract (SCC),Tender Notice, Project Synopsis, etc.
(b) Rate Schedule – for PART-A
(c) Rate Schedule – for Part-B)

(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 26.02.2007*** 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 (Room No. 104) at the address given above **latest by 26.02.2007** before opening of technical bids commences. Technical bids shall **be opened at 15.30 Hrs. on 26.02.2007**. 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 this 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) Unsolicited rebate/discount shall not be accepted after bid opening.

(xi) Purchase Preference will be given to CPSUs as per Govt. Guidelines.

AGM/SCP

ISO 9001-2000, ISO 14001 and OHSAS 18001 certified company
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TENDER NOTICE - NEWSPAPER

LAST DATE OF SALE : 26.02.2007
DATE OF OPENING : 26.02.2007

NIT NO. / NAME OF WORK
TENDER NO. BHEL: NR(SCT): SURATGARH -6:BLR & MM:391 **Sealed tenders are invited from the contractors fulfilling qualifying requirements for the work of Erection, testing, commissioning and trial operation of Boiler Part - A and Part - B including Material Handling work for the entire plant packages of 1 x 250 MW coal based unit # 6, Stage – IV at Suratgarh Thermal Project (SSTPS), Distt. Sri Ganganagar, Rajasthan.**

NOTES:-

1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at www.bhel.com for complete details of the tender.

AGM/SCP

Bharat Heavy Electricals Limited
(A Govt. Of India Undertaking)
Power Sector – Northren Region,
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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. **Price bids for Part-A and Part-B including material handling Works must be in separate sealed covers indicating clearly the respective "Part of Work " and tender specification no. etc. on their covers.**

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. **Price bids for Part-A and Part-B including material handling Works must be in separate sealed covers indicating clearly the respective "PART OF Work" and tender specification no. etc. on their covers**. As such, if Tender quote for both **Part-A** as well as for **Part-B including material handling Works** , the Cover-II (Price Bid Cover) will contain two sealed covers of price bids indicating clearly the respective " Part of Work " and tender specification no. etc. on these covers.

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.

PROJECT SYNOPSIS

Rajasthan Rajya Vidyut Utpadan Nigam Limited has entrusted BHEL for Design, Engineering, Manufacturing, Supply, Installation, Testing and commissioning of Steam Generator, Turbine Generator packages along with their auxiliaries and Generator Transformer for 1 x 250 MW, Unit # 6, Stage – IV, SSTPS, Suratgarh, Distt.- Sri Ganganagar (Rajasthan).

Nearest railway siding is available at the plant. Suratgarh Railway station is about 30KM away from the project. Nearest highway no. 15 Bikaner-Ganganagar section is about 15 KMs from the project site.

SECTION - III `A'

SPECIAL CONDITIONS OF CONTRACT

INDEX

SECTION - III `A'

SPECIAL CONDITIONS OF CONTRACT

34.0 GENERAL

34.1 The intent of this specification is to provide services for execution of the 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 / lumpsum 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.

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 affected from contractor's bills towards expenditure incurred including BHEL's usual overhead charges.

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

a Provision, as required, of all types of labour, supervisors, engineers, watch and ward, tools & tackles, calibrated inspection, measuring and testing equipment as specified and otherwise required for the work, 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 performance of the equipment.

e Repair and rectification.

f Preservation / Re-conservation of all components during storage / erection / commissioning till handing over.

34.5 **BHEL-Power Sector (NR) is ISO 9001-2000, ISO 14001-1996 and OHSAS 18001-1999 certified company. Quality of work, to customer's satisfaction and system requirements are the essence of these certifications. The contractor in all respects will organize his work, systems, environment, process control documentation, tools, plant, inspection, measuring and testing equipment etc. as per instructions of BHEL engineer**.

34.6 In order to meet the environmental concerns it is expected that the contractor shall plant, protect and maintain at least **100 trees** each or equivalent in the vicinity of the project as per the available space and as per the advise of Engineers by contractor for Part A and Part B.

35.0 CIVIL WORKS, FOUNDATIONS AND GROUTING.

35.1 RRVUNL/ BHEL shall provide foundations for all the equipment and columns including their grouting and necessary other civil work. The contractor for their scope shall check the dimensions of the foundations, locations of pockets, pitch of anchor bolts and other

inserts as per drawings. Further, top elevation of foundations shall be checked with respect to benchmark etc. All minor adjustments of foundation level, dressing and chipping of foundation surfaces up to 50 mm, enlarging the pockets in foundations etc., as may be required for the erection of equipment / plants shall be carried out by the contractor.

35.2 Chipping & dressing of civil foundations up to a 25 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

35.3 The contractor shall ensure perfect matching of 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 equipment to the satisfaction of BHEL Engineer. 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 20 mm. The material required for this has to be arranged for by the contractor at his cost.

35.4 Except grouting for major rotating equipments i.e. Mills, ID, FD and PA fans entire grouting work of foundation bolt grouting, base plate grouting etc. including materials will be carried out by another agency of RRVUNL**. The grouting work of rotating equipments i.e. Mills, ID, FD and PA fans with material as per specifications shall be within the final accepted rates of this contract.** Contractor for subject work has to offer neat & clean foundations to the Civil Contractor to ensure perfect grouting. 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 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.

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

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), filler wires, 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, welding, cutting), 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. Steel, H&S, packers, shims, 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 and packing, 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 **Only TIG filler wire and welding electrodes for P 91 materials shall be supplied by BHEL mfg. Units free of cost**. if any other special filler wires are supplied by the manufacturing unit as a normal supplies shall also be issued free of charge for erection. Required quantity as arrived at by calculation / standards will only be supplied. It would be the contractors' responsibility to account for the consumption of these filler wires. Additional requirement beyond standard / calculated quantity will be at cost recovery basis only unless and otherwise accounted for. Surplus quantity of TIG filler wire, if any, shall be properly stored and returned to BHEL stores. **The contractor has to take care of above in their offer.**

36.5 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. 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 number, date of expiry etc and produce test certificate for each lot / batch with correlation of batch / lot number with respective test certificate. No electrode without a valid test certificate will to be used.

36.6 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.

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

36.8 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 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.

36.9 All lubricants and chemicals required for cleaning, pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL / BHEL's client. All services including labour 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. 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.

36.10 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. 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.

36.11 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 / IMTE's

37.1 T&P **/** IMTE's being provided by BHEL, **as per Annexure-II**, to sub-contractor free of hire charges shall be shared by other subcontractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.

37.2 Besides the T&P and IMTEs 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. Indicative lists of T&Ps and IMTEs to be arranged by the contractor are given **as per Annexure-III.** He 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.

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 The operation of all BHEL's T&P being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange, at his own cost, trained operators, fuel and other consumables for their operation. **(Operator for the 200/250 MT cranes will be provided by BHEL but one helper, fuel and other consumable shall be provided by contractor within the final accepted rates).** All lubricants for these cranes such as mobil oil, gear oil, brake oil, hydraulic oil, torque converter oil and grease will be provided by BHEL free of cost. The contractor will give the requirement well in advance

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 absolve the contractor of his responsibilities for proper and safe handling of equipment, consistent good performance of operators and regular performance evaluation of operators.

37.7 The day to day maintenance of BHEL's T&Ps should be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. 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. These 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.

The contractor at his own cost shall arrange all supervision and labour required for maintenance of cranes. For attending breakdowns, the contractor shall arrange for labour. Minimum one mechanic and two helpers shall be exclusively marked for the above work. However specialist's supervision, if required, for attending breakdowns shall be arranged by BHEL as assessed by BHEL Engineer

37.8 The contractor shall arrange at his cost all spares needed for upkeep of all T&Ps other than Cranes and Hydraulic Test Pumps supplied by BHEL. For cranes, replacement of filter and repair of batteries, self, dynamo shall be the responsibility of the contractor. ***(The cranes shall be fitted with a set of new batteries at the time of initial issue from the stores.)*** However, 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 the 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.

37.09 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. If required, contractor has to return the crane with original boom.

37.10 The area and infrastructure development of the area to be carried out by the 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 has to maintain a logbook and shall furnish regular maintenance and utilization report of the BHEL T & P's under his possession, as per requirement of BHEL.

37.13 Any loss / damage to any part of BHEL T&Ps and IMTEs 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 from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL store / place as intimated by Engineer in project site in good working conditions after use.

37.15 The contractor shall return BHEL T&Ps and IMTEs issued to him in good working condition as and when desired by BHEL (on completion or reduction of workload). If contractor delays return of T&P and IMTE, 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.

37.16 Replacement cost including BHEL overheads in respect of irreparable / completely damaged / non return of T&Ps and IMTEs shall be recovered from the contractor's

running / final bills

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. Fitness certificate of T&P shall have to be submitted before it is put in use. 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 testing equipment). The IMTEs shall have test / calibration certificates from authorized / Government 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 within 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. If any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item. It will be necessary for the contractor to deploy proper item. Any readings taken by the defective instrument will be recalled and repeat the readings taken by that instrument with a proper one. In case he fails to do so, BHEL may deploy IMTEs and retake the readings at contractor's cost.

37.20 BHEL shall have lien on all T&P, IMTEs and 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 / extended period. The contractor and / or his sub-contractors, without the prior written approval of the Engineer, shall remove no material brought to the site.

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.

37.22 **One CONSTRUCTION ELEVATOR / PASSENGER LIFT for boiler will be provided to the erection agency against Part-A of the contract. The total erection including dismantling, commissioning, maintenance, statutory clearances shall be in the scope of erection agency against Part-A of the contract, at no extra cost to BHEL. Necessary supervision of the supplier will be arranged for by BHEL.**

All day to day and routine maintenance and checking of the lift is to be carried out by the contractor as per the recommendations of the supplier. He should periodically check the brakes and carry out the all works to ensure the safety for all those using the hoist.

The hoist should never be overloaded as this can lead to serious accidents. Ensuring all safety aspects in operation of lift shall be responsibility of contractor. All the landing platforms are to be erected by him. They are to be provided with proper barricades and hand railings. No separate payment for the temporary jobs will be made. The contractor will have to dismantle such temporary works and return the material to the stores.

The construction and dismantling of the foundations required for the passenger lifts is excluded from the scope of the contractor.

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, sarangs, 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.

The contractor shall engage **separate Stores - Incharge** (Preferably Diploma holder) and other experienced supervisory staff and especially skilled labour e.g. crane operators, heavy-duty vehicle driver, sarangs, riggers, khalasis, etc. under this contract specially **for material handling work.** To execute material handling work and to assist Stores-Incharge for issue and receipt of Boiler, TG and other packages material, **minimum four qualified and experienced supervisors** shall have to be deployed **along with a qualified computer operator** for maintaining records. Contractor shall have to deploy other staff as per site requirement for the successful execution of material handling work. The contractor shall not divert the labour and staff deployed for material handling work to erection work area.

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. They should in general see and ensure 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 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 conforms to the dimensions and tolerances given in the drawings / documents / instructions given by BHEL Engineer from time to time.

38.5 The contractor shall deploy the necessary number of qualified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.

38.6 It is the responsibility of the contractor to engage his workmen in shifts 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 contractor's workmen to improve the progress. The expenses so incurred will be recovered from the contractor's bills with 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 / telephone poles, wire, trees or any other property or to any part of erected components, the contractor shall make the same good at his own expense. In default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses from any money due to the contractor. BHEL's decision will be final and binding.

38.9 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.

38.10 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.

39.0 MATERIAL HANDLING AND STORAGE FOR ETC

39.1 All the equipment furnished under this contract shall be received from the project stores, sheds / storage yards and transported to pre assembly area / erection site and 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 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.

39.12 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.

39.13 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.

39.14 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.

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

39.16 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.

40.0 PRESERVATION OF COMPONENTS

40.1 After taking delivery from BHEL / 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 blocked up at least six inches (6") off the ground

b) Motors, valves, electrical equipment, control equipment and instruments etc shall be stored indoors in a warehouse provided by contractor. 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), thinners, 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 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.

40.4 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 normal erection and assembly techniques necessary for completion of works under this specification and magnitude have to be carried out. It is not possible to specifically list out all of them. Absence of any specific reference will not absolve the contractor of his responsibility for the particular operation. These would include,

- Scaffolding and rigging operations,
- Machine / flame / electric cutting, grinding, welding, radiography and stress relieving
- Fitting, fettling, filing, straightening, chamfering chipping, scrapping, reaming, as cleaning, checking, leveling, blue matching, aligning and assembly.
- Machining, surface grinding, drilling, doweling, shaping
- Temporary erections for alignment, dismantling of certain equipment for checking, cleaning, servicing and site fabrication.

41.2 Any fixtures, scaffolding materials, approach ladder, concrete block supports, steel structures required for temporary supporting, pre-assembly or checking, welding, lifting

and handling during pre-assembly and erection shall be arranged by contractor at his cost.

41.3 No members of any 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.

41.4 The contractor shall erect scaffolding / temporary platforms for erection. These should be of adequate capacity and shall never be over loaded. These should be replaced when not found suitable during erection work and dismantled on work completion and removed from work site.

41.5 It shall be the responsibility of the contractor to provide ladders on columns for initial work till such time stairways are completed. For this, the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL. In case it is absolutely necessary then the contractor shall cut the temporary structure and rectify the column as directed by the engineer.

41.6 The contractor is strictly prohibited in using the Boiler / ESP / Auxiliary Components for any temporary supporting or scaffolding works etc. In case of such misuse a sum of determined by Engineer will be recovered from contractor's bills.

41.7 Boiler auxiliary columns are plate formed box section and the erection joint is welded type where as the columns are butt type with HSFG bolted flange and partition plates, boiler main column are having flange with splice plates and bolted connections. However, the contractor has to carry out work at site as per drawing.

41.8 The material for platform section weight approx. 300-350 MT under PG-36 shall be supplied in running meters. These shall be cut to size / shape / fabricated to required size / shape and to be welded by contractor.

41.9 Certain adjustment in length may be necessary while erecting pipelines / ducts / casings etc. The contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified heat treatment procedures.

41.10 Economizer, super-heaters, re-heater coils, burner panels may have to be hydraulically tested individually, if required, before erection as instructed by BHEL Engineer within finally accepted rates.

41.11 Suspensions for ducting will be supplied in running lengths, which shall be cut to size and adjusted as required. Ducts / expansion bellows are dispatched to site in loose walls plates / pieces and these are to be assembled and welded at site along with stiffeners etc., before erection within the finally accepted rates. All joints connecting duct expansion piece and dampers shall be seal welded on inside as well as on outside.

41.12 Assistance in mechanical work associated with the power cylinders, valves, valve actuators etc., coming under various groups shall be provided by contractor within the finally accepted rates.

41.13 Hanger rods are shown in the pressure parts arrangement drawings for boiler. Any cutting / welding of these hangers rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of a torque wrench.

41.14 The headers are provided with hand holes. The contractor, shall as per requirement, carry out removal and re-fixing of hand hole plates within finally accepted rates.

41.15 Burner tilt mechanism will be checked for freeness, serviced and adjusted, if necessary to obtain optimum tilt before installation.

41.16 Skin casing sheet for covering the boiler roof panels, rear arch tube and other areas will be supplied by BHEL. Any cutting, addition and re-fabrication to suit the site conditions shall be carried out within the finally accepted rates.

41.17 ESP collecting electrodes may require straightening and repair due to minor transport damages before erection and spot heating in position to get correct alignment and same will be carried out by the contractor at no extra cost.

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

41.19 The contractor shall fabricate pipe, special bends etc., threading and welding as required for installing lube oil system and carry out the acid cleaning of the fabricated piping. The contractor shall also service the lube oil system, carrying out the hydraulic test of oil coolers etc.

41.20 Contractor shall carry out kerosene testing of all bearing housings 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 hydro test of SCAPH and other equipment as per BHEL engineer's instructions is included in the scope of work.

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

41.22 Certain rotating machinery after initial runs and commissioning of the equipment have to be hot aligned as per the instructions of BHEL engineer. Cleaning air pre-heater, fans, boiler 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.

41.23 Some of the rotating equipment and electrical motors are provided with protective greases only. Contractor shall arrange for cleaning of the same with kerosene or some other reagent. If necessary, dismantling some of the parts of the equipment would be necessary. He shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, at quoted rate. Lubricants will, however, be supplied free of cost by BHEL.

41.24 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.

41.25 Packer plates supplied may have to be machined to the correct dimensions. It may also be necessary to blue match the same with each other/ with equipment / with foundations as per BHEL instructions.

41.26 Contractor shall arrange changing of preservative oil in the gearboxes, 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 lube oil might have been made under regular dispatch-able unit (DU) number against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil should be drained and collected in drums provided by BHEL and returned to BHEL /

customer's stores.

41.27 The air-preheater rotor may be disturbed during the initial operation. This may change the original clearances. It requires rechecking and correction of seal clearances. Contractor shall carry out such checks and resetting of clearances as per the instructions of BHEL engineer. The resetting may have to be repeated till satisfactory results are obtained.

41.28 Checking of air gaps and adjustment of stator / rotor for magnetic center of HT motors shall be carried out as part of erection.

41.29 The fans, mills and other rotating machines shall be checked for clearances and 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.

41.30 Complete penetration of water wall (Panel to Panel) welding shall be achieved either by one side or both sides welding.

41.31 Whenever required the contractor shall arrange for pre-qualification of process task performers.

41.32 All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall be done by IBR / BHEL tested welders only.

41.33 All electrical cabling including proper glanding, termination, dressing etc., control and instrumentation works required for completion of Electrostatic Precipitator including its commissioning shall be part of this work. This will include erection of all electrical equipment such as rectifier, transformers, and power supply and control panel, laying of trays and cables and other associated equipment.

41.34 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary by dismantling and refitting before erection. If, in the opinion of Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.

41.35 All the shafts of rotating equipment shall be properly aligned to those of the matching equipment within design tolerances All bearings; shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.

41.36 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.

41.37 The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor if required shall carry out scraping of bearing housing. No extra claim for blue matching up to 1mm initial gap will be entertained.

41.38 The contractor at no extra cost to BHEL shall carry out servicing and realignment of skid mounted equipment.

41.39 Certain instruments like pressure gauges, pressure transmitters, temperature gauges, flow switches and indicators, etc., are received in assembled condition as integral part of equipment. Contractor shall be responsible for safe receipt, installation and custody of these instruments supplied mounted on skids / equipment. The calibration of skid / equipment mounted instruments shall be arranged by BHEL through other agency engaged for C&I. Contractor will be informed by BHEL engineer about the details of C&I agency. The contractor shall coordinate with the C&I agency for removal, calibration and re-installation of the instruments. Though C&I agency will remove and reinstall the instruments after calibration, the contractor for this package will maintain

the list of all the instruments removed & reinstalled. Instruments prior to removal and after reinstallation shall be considered in custody of the contractor for this package. All instruments such as pressure gauges / temperature gauges, switches etc. forming part of product group (PG) are under the erection scope of this contract and shall be installed and commissioned by the contractor of this package at no extra cost to BHEL. However the calibration of these instruments shall be done by C&I agency as above

41.40 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.

41.41 The contractor shall completely erect and test all the piping systems, covered in the specification including sampling lines up to and including sample coolers, hangers & supports, valves and accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, pre-heating, stress relieving, testing, cleaning and 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 sown on the drawings. All piping shall be erected true to the lines and elevation as indicated in the drawings.

41.42 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 65-mm nominal bore will have to be fabricated at site. Only cold cutting methods are to be employed for cutting of pipes and tubes irrespective of the size and material. Gas Cutting, if any, will be allowed only in CS LP piping

41.43 The contractor shall ensure lowering of pipes in position with adequate precautions as to avoid any damage to either material or men. Only the anchoring points earmarked for the purpose of lowering the pipes are to be used.

41.44 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.

41.45 Wherever piping erected by the contractor is connected to equipment / piping erected by the other agencies the joint at the connecting point shall be the responsibility of the contractor who is erecting the piping under this specifications.

41.46 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 and pipes within the scope of the work.

41.47 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.

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

41.49 Suspension for piping, etc., will be supplied in running lengths, which shall be cut to suitable sizes and adjusted as required.

41.50 The adjustment of all hangers & supports erected in both cold & hot conditions for maintaining the proper slopes towards the drain pots and application of cold pull in the

piping wherever required is also included in the scope of the contractor.

41.51 No temporary supports should be welded on the pressure parts and piping. In case of absolute necessity prior approval should be taken from BHEL Engineer. In such cases the contractor if required, shall carry out heat treatment.

41.52 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 arrests / locks etc., have to be carried out as and when required.

41.53 Contractor shall install piping in such a way that no excessive or destructive expansion forces exists in either the cold condition or under conditions of maximum temperature and pressure. All bends, flanges, orifices, expansion joints and any other special fittings necessary to take care of proper expansion shall be incorporated as per the advice of Engineer. During installation of expansion joints, anchors, care must be taken to see that full design movement is available at all times from maximum and minimum temperature.

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

41.55 Layout of small-bore piping in boiler, oil 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 pipelines even after completion of erection or from aesthetic point of view. Contractor at no extra cost should carry this out. As built drawing is to be submitted by the contractor after erection completion.

41.56 All the valves, including motorized 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 or jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the quoted rates.

41.57 Erection and welding of necessary instrumentation tapping points, thermocouple pads, thermo-wells, valves, battery of first root valves, condensing vessels, flow nozzles and control valves to be provided on, auxiliaries and pipe lines are covered within the scope of this specification. This will be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The welding of all the above items will be contractor's responsibility even if the:

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

b Items are supplied by any agency other than BHEL.

41.58 The contractor shall carry out the tightening of the field bolts on the equipment and piping covered under this specification by using either the calibrated torque wrench method or the turn of part method. The methods used the tools and the equipment deployed shall be subject to the approval of Engineer. The competent technicians shall carry out the bolting work.

41.59 The contractor shall assist BHEL in preparation of as built piping drawing.

41.60 Erection of power cylinders, motorised valves, valve actuators etc. coming under various groups is covered under the scope of this specification. However C&I calibration / commissioning for pneumatic valves & power cylinders shall be arranged by BHEL through C&I agency at no cost to the contractor for this package. The contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their

custody will be the contractors account. 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 contractor will however be responsible for drawing the materials from the stores and handing over to the agency that is to commission these. Any damage / loss in their custody will be the contractors account.

41.61 The erection of all pneumatic power cylinders for the burner-tilt mechanism and SADC is covered within the scope of this specification. BHEL will get these power cylinders for the burner-tilt mechanism and SADC calibrated & commissioned. The contractor for this scope of work shall assist and co-ordinate for the same with the agency engaged by BHEL to calibrate such pneumatic actuators.

41.62 The Erection, testing and commissioning of all electrically operated valves, actuators and dampers is covered within the scope of this specification.

42.0 WELDING HEAT TREATMENT, RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

42.1 The pressure parts, equipment and piping shall be erected in conformity with the provisions of Indian Boiler Regulation and as may be directed by BHEL as per any standard / 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.**

42.2 Welding of pressure parts, equipment, piping, high tensile structural steel shall be done by certified high pressure welders who posses valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The H.P. welder who possesses necessary certificate shall ensure re-validation as per relevant provisions 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 not be utilized for high-pressure works.

42.3 All welders including tack welders, structural and high pressure welder shall be tested as per ASME section IX / IBR and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification AND performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.

42.4 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welder's is having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.

42.5 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.

42.6 The contractor shall carry out the root run welding of all HP / LP piping, valves by TIG

welding method only. The contractor shall have to carry out full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. During the root runs of stainless steel joints, the contractor shall before and during welding have to purge the pipes with inert gas. All weld joints for temporary piping required for alkali flushing, acid cleaning and steam blowing should be got done by HP welders only. The root run should be done by TIG welding. All arrangements required for the above shall be the responsibility of the contractor at no additional cost. Argon Purging is to be done for TIG Run of SS Pipes

42.7 All expenses for testing of contractor's welders including destructive and nondestructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.

42.8 The regulators used on welding machines shall be calibrated before putting these into use for work. The Contractor at his cost shall also arrange periodic calibration for the same.

42.9 **Only BHEL approved electrodes and filler wire 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 should have a co-relation with the lot number / batch number given on electrode packets. No electrodes will be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven will be also calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards will be submitted to BHEL before putting the oven in use. The contractor shall also arrange periodical calibration for the same.

42.10 All butt / fillet welds shall be subject to dye penetration test/ other tests as per the instructions of the engineer at no additional cost.

42.11 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld. He has to 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 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.

42.12 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 should be done. Gas cutting will be allowed only wherever edge preparation otherwise is impractical. All slag / burrs shall be removed from the edge and all the hand cuts shall be ground smooth to the satisfaction of engineer.

42.13 All welds shall be painted with anticorrosive red oxide paint once radiography and stress reliving works are over. Necessary consumables and scaffolding etc including paints shall be provided by contractor at his own cost.

42.14 Pre-heating, radiography and other NDT 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. Contractor at his cost shall arrange all equipment and

consumables essential for carrying out the above process.

42.15 Contractor shall arrange all necessary stress relieving equipment with automatic recording devices. The contractor shall arrange for labour, heating elements, thermocouples, thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress-relieving operations. The contractor should take a note of the following,

- Temperature shall be measured by thermocouple and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL.
- 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 prior to the starting of SR operations.

42.16 The contractor shall also be equipped for carrying out other NDT like LPI / MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates. Ultrasonic testing, wherever required, will be arranged by BHEL. Necessary help in conducting the UT shall however be rendered by contractor.

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

42.18 The contractor for radiography work shall use iridium-192. The geometric un-sharpness shall not exceed 1.5 mm. The contractor should take adequate safety precautions while carrying out radiography. Contractor at his cost shall arrange necessary safe guards required for radiography (including personnel from BARC).

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

42.20 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetrameter as per ASME or ISO must be used for each exposure.

42.21 Lead numbers and letters are to be used (generally 6mm size) for identification of radiographs. Contract number, joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.

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

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

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

42.25 Radiography personnel with sufficient experience and certified by M/s BARC for conducting radiographic tests in accordance with safety rules laid down by Division of Radiological protection only have to be deployed. These personnel should also be registered with DRP / BARC for film badge service.

42.26 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.

42.27 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories.

42.28 Contractor shall note that 100% radiography will be done at the initial stages on all the piping 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 BHEL welding schedule / IBR / Customer's requirements. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Radiography on LP piping joints is not envisaged. However other NDT test as called for in the FQP including LPI, MPI and HT will have to be carried out.

42.29 All the Radiographs shall be properly preserved and shall become the property of BHEL. They are to be reconciled with the work done, joints radiographed and submitted to BHEL / customer.

42.30 Since radioisotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/ Customer shall be strictly followed. BARC / DRP certificate to be provided before taking up the work.

42.31 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 is to be replaced immediately.

42.32 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re- submitted for evaluation.

42.33 However, if the defect persists after first repair, further repair work followed with radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.

42.34 If the contractor does not carry out 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.

42.35 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, supervisors/ Engineer required for the work as per directions of BHEL.

42.36 The contractor shall assist BHEL Engineer in preparing 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. The contractor shall strictly adhere to such schedules.

42.37 For P91 & T 91 materials welding, clauses no. 54.0 of this tender will be applicable besides above-mentioned clauses.

43.0 APPLICATION of REFRACTORY and INSULATION

43.1 All attachment welding, including welding of hooks / supports as per pitch both on equipment and piping shall be done as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks to correct length without any extra cost to BHEL.

43.2 Contractor has to supply and apply heat resistant primer on welded portions before

application of insulation.

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

43.4 The number of layers / thickness of mineral wool / LRB mattresses for auxiliaries, pipe lines, valves and other vessels shall be as per various drawings and as directed by Engineer. For applying the mineral wool mattress, the required holding materials, if necessary by fabrication of rings/ hooks shall be fixed as directed and as per drawings and spec.

43.5 The contractor should ensure, proper finishing of surface of the insulation, sheeting and cementing

43.6 The contractor should ensure that the finished surface of the insulation works conforms to the dimensions and tolerances given in the drawings. Aesthetic finish and accuracy of work are most important.

43.7 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. Closed / semi closed sheds or any other arrangements required for this will be made by him 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 breakage or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.

43.8 Aluminum sheet cladding will be fabricated to the sizes and shapes specified in drawings. Beading, swaging, beveling of sheets, crowning the sheets if necessary will be carried out by him. Two coats of anti-corrosive black bituminous paint are to be applied on inner surfaces of the cladding. Bitumen sealing compound on the joints if necessary is included in the scope of this work. **Contractor may note that they will also supply anti-corrosive black bituminous paint and bituminous sealing compound required for above works at his cost. However, if any material is received from the unit, the same shall be issued free of cost to the contractor**

43.9 Aluminum sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Cutting them to required size, grooving, fabricating bends, boxes etc., for proper covering is contractor's responsibility. Any cutting / bending / welding of fabricated skin casing sheets if required will also be covered within the scope of this contract.

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

43.11 Contractor is liable for the exact accounting of the material issued to him and he shall make any unaccountable losses good. Wastage allowance for the material issued are as below:

1. Wool / LRB mattresses and cladding sheets…… 2%
2. Insulation bricks and mortar…….. 2%
3. Castable refractory…….. 1%

43.12 The entire 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.

43.13 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.

43.14 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 re-application of insulation and sheet metal cladding, which shall be done by the contractor and the erection rate quoted shall be inclusive of such contingencies.

43.15 Removable type of insulation shall be provided for valves, fittings, expansion joints etc as per the drawings or as directed by BHEL Engineer.

43.16 All temporary pipelines required during testing, pre-commissioning and commissioning should be insulated as directed by BHEL at no extra cost to BHEL. However required insulation material shall be issued by BHEL free of cost.

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

43.18 Special type of Insulation wool used in pent house shall not be cut indiscriminately.

43.19 Contractor shall mix and 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. The contractor shall provide the required quantity of wire nails, planks for formwork and other materials for centering and grouting work.

43.20 Application of castable and pourable refractory between tubes, around burners, on ceiling and as directed by Engineer and as per detailed drawings and specifications.

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

43.22 Contractor shall observe all precautions for laying / curing of castable refractory. Any defective works found shall be re-laid by contractor at his cost.

43.23 Making structural supporting work for pourable insulation, laying pourable insulation, adhering to all specifications and instructions during application forms a part of this work.

43.24 Day to day cleaning of insulation debris and scraps to be ensured by the contractor. Excessive wastage will attract cost recovery.

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

44.1 The contractor shall carry out all the required tests and pre-commissioning and commissioning activities required for their successful and reliable operation. These would include hydraulic test of boiler, land flow test, clean air flow test, chemical cleaning of piping and boiler, water washing, oil flushing of oil system etc. as instructed by BHEL using contractors own consumables, labour and scaffoldings etc. 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 and defects etc.

All the chemicals required for carrying out these activities will be supplied by BHEL free of cost.

All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications.

Specialized test equipment, if any, shall be provided by BHEL / its client free of hire charges. However contractor has to take proper care of the equipment issued to him.

44.2 Commissioning of ESP shall involve required tests such as air leak test, gas distribution test, motor no load test, rapping mechanism trial runs, interlock tests, charging of transformer fields, commissioning of all electrical equipment / panels, heaters and their proper tuning etc. The contractor shall provide all consumables, labour, scaffoldings and items required for satisfactory testing.

44.3 After completion of erection of furnace, ducts and air heaters, a test shall be performed on the steam generator by the contractor to establish the tightness of the erected equipment from the outlet of FD fan through the steam generator up to stack.

44.4 All the tests may have to be repeated till all the equipment satisfy the requirement / obligation of BHEL at various stages. The contractor shall do all the repairs for site-welded joints arising out of the failure during testing.

44.5 The scope of pre-commissioning activities cover installation of all necessary equipment including temporary piping, supports, valves, blanking, pumps, tanks, with access platforms valves, along with accessories required for hydro test, chemical cleaning, steam blowing or for any other tests. The scope also covers the off site disposal of effluents.

44.6 All items / material required for conducting hydraulic test, alkali boil out, acid cleaning, steam blowing etc., will be supplied by BHEL / its customer. However, servicing, dismantling and returning of the same to stores is the responsibility of the contractor who is erecting the equipment / piping. The contractor may note that **no separate payment shall be released for any temporary works** that are to be carried out for conducting pre-commissioning and commissioning tests. Bidders are advised to include expenses on temporary works along with the rates being quoted by them. Broadly the work on temporary systems will be divided as under:

Boiler Part-A: Erection etc. of all temporary piping along with insulation and supports for steam blowing; chemical cleaning and affluent disposal are to be carried out as part of Boiler part-A work. However Installation and operation of all equipment including tanks and electrical switchgear along with their accessories shall be carried out by another agency. Contractor for Part-A work will be responsible for their operation and any servicing required till completion of his commissioning activities. He will also service the equipment and handover the equipment to the other agency for further erection/commissioning activities.

Boiler Part-B: Erection etc. of blowers and blanks and putty required for conducting air tightness test and GD Test are to be installed. (Putty to be procured by the contractor).

The above is only a broad breakup of the temporary works. The engineer at site will make final break up. His decision will be final and binding by all the parties.

Dismantling of the temporary equipment and piping will be done by the agency that has erected the equipment. He will also return the equipment to the stores.

44.7 Drum will be dispatched without fixing internals and internals will be sent separately. The internals have to be fixed as and when required. Dismantling and re-assembly to be done to suit various commissioning requirements.

44.8 Commissioning of the boiler will involve trial run of all the equipment erected. The boiler has to be lighted up for refractory drying, alkali boil out, acid cleaning, passivation, preservation, steam blowing and floating of safety valves. Flushing of all the lines by air, oil or steam as the case may be, trial run of the boiler, servicing of valves and any other works incidental to commissioning are to be carried out. 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.

44.9 It shall be the responsibility of the contractor to preserve the boiler as per BHEL's requirement.

44.10 It shall be the responsibility of the contractor to provide various category of workers in sufficient numbers along with Supervisors during Pre-commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.

44.11 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 contractors finally accepted rates should be inclusive of all these factors also.

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

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

44.14 The contractor shall make all necessary arrangements including making of temporary closures on piping / equipment for carrying out the hydro-static testing on all piping, equipment covered in the specification at no extra cost.

44.15 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.

44.16 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 at his cost 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.

44.17 All temporary supports shall be removed in such ways that pipe supports are not subjected to any sudden load. During hydraulic 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.

44.18 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. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer 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.

44.19 Cleaning and servicing of all the filters / strainers, toppings of oils coming in the system shall be done by the contractor within the accepted price.

44.20 At the time of each inspection, the contractor shall take note of the decisions / changes proposed by the Engineer and incorporate the same at no additional cost. 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

45.0 FINISH PAINTING

45.1 All exposed metal parts of the equipment, structure, auxiliaries, piping, 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.

45.2 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 and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour. 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.

45.3 After applying the primer paints, wherever required, all structure / equipment / items, shall be finish painted with paints as specified by BHEL engineer. 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.

45.4 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.

45.5 **Contractor at no extra cost to BHEL shall supply all paints; primers, tools and other consumables including scaffolding materials required for finish painting.** Paint is to be BHEL approved make only 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.

45.6 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 lumpsum price/rates.

45.7 The contractor shall provide legends with direction of flow on equipment and piping in size specified by Engineer. Letter writing shall be done in Hindi / English or in both languages.

45.8 The painters have to under go test and only qualified painters will be allowed to work.

46.0 PROGRESS REPORTING

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

46.2 Weekly progress review meetings will be held at site during which actual progress

during the week vis-à-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program 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.

46.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report and other reports as per Performa considered necessary by the Engineer.

46.4 The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any. This should 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 program and the slippage do not accumulate and effect the overall program.

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

47.0 DRAWINGS AND DOCUMENTS

47.1 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.

47.2 Necessary drawings 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.

47.3 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 drawings / data / documents and removal of obsolete ones from work place and returning to BHEL.

47.4 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.

47.5 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.

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

48.0 INCOME TAX, SERVICE TAX, WORKS TAX AND SALES TAX REGISTRATION

48.1 **TDS under Income Tax, Sales Tax, VAT 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.

48.2 **Price quoted shall be inclusive of all taxes except service tax.** The service tax, as legally leviable & 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.

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

48.3 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.

48.4 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 under this contract.

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 rework and which are totally unusual to normal erection work.

B Require rectification / modification for improvement in the design during commissioning,

C Requiring fresh fabrication of components in place of rejected / replaced components.

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 will be identified for certification of man-hours. This gang will not be utilized for any other work during the period that they are engaged in the extra-work. Logbook should be maintained and should be signed jointly by the contractor's representative and 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 that 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 PRICE VARIATION

50.1 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 = Gross 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 1982 =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 1982 =100) applicable for the month of opening of technical bid.

50.2 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 from the date of award. 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.**

50.3 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.

51.0 RATE SCHEDULE

51.1 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.

51.2 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.

Contractor's total quoted price as per rate schedule will be taken as tentative only. 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. The quantities may vary to any extent and no compensation will be payable in variation of quantity. However, in case of over all variation in Contract value (as indicted in LOI), **beyond (minus) 30%, the contractor will be eligible for compensation** as per the following provision:

"The total executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value"

Contractors are requested to take above into account while quoting. The contractor confirms that the rate quoted above takes care of such variation during execution stage.

51.3 **"THE TENDERER MAY QUOTE EITHER FOR PART-'A' OR PART-'B' INCLUSIVE OF ENTIRE MATERIALS HANDLING OR BOTH OF THEM. TENDERERS ARE REQUIRED TO SUBMIT BIDS FOR PART-'A' AND PART-'B' IN SEPARATE SEALED ENVELOPS AS PER RATE SCHEDULE. THE PRICE BIDS OF QUALIFIED BIDDERS SHALL BE OPENED AS FOLLOWS;**

" PRICE BID FOR PART-'A' SHALL BE OPENED FIRST FOLLOWED BY PART-'B' WITH A TIME GAP AS DECIDED BY BHEL. THE PRICE BID OF SUCCESSFUL BIDDER FOR PART-'A' WORK WILL NOT BE CONSIDERED DURING PRICE BID OPENING FOR PART-'B' WORK".

51.4 The tenderer is also required to quote for all OPTIONAL items of the rate schedule as the same may be operated according to site conditions and entirely at the discretion of BHEL during the execution of contract. No compensation for non-operation of these OPTIONAL items and getting work done through other agency for optional items, shall be payable to the contractor.

52.0 INSTRUCTIONS TO TENDERER

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

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

52.3 The tenderers are advised to actually visit the site and fully acquaint themselves with site conditions, location of stores, transportation routes, quantum of work etc. before quoting their rates for this work. BHEL shall not be responsible in any way for non-familiarization of the site conditions. Once the tenderer has quoted for the work, it is implied that he has ascertained various site conditions and NO CLAIM whatsoever will be entertained by BHEL on any such account.

52.4 The contractor in the event of this work being 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 communicated to the contractor's representative at site office, will be deemed to have been communicated to the contractor at his legal address.

52.5 **LIQUIDATED DAMAGES (LD)**

For delay in completion of work attributable to the contractor, the LD shall be applicable at the rate of ½% of the contract value per week of delay or part thereof limited to a ceiling of 10% of the contract value as mentioned under clause no.25.5 of the GCC of the tender.

52.6 **SECURITY DEPOSIT**

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 on Page No. 34(a) of 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.

52.7 OTHERS

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

52.7.2 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.

52.7.3 Unsolicited rebate / discount shall not be accepted after bid opening.

SECTION - III B

SPECIAL CONDITIONS OF CONTRACT

SECTION - III B

SPECIAL CONDITIONS OF CONTRACT

53.0 SCOPE OF WORK

53.1 BHEL has been awarded the work of Design, Manufacture, supply, installation, erection, testing & commissioning of 1 x 250 MW coal based unit # 6, Stage – IV at Suratgarh Thermal Project (SSTPS), Distt. Sri Ganganagar, Rajasthan. The unit shall consist Steam Generator, Electro-static precipitator, fans, milling systems, Steam Turbine Generator package including Gen. Transformer & Gen. Bus ducts, boilers feed pumps, piping along with the associated auxiliaries supports and controls.

The scope of work under this tender consists of:

- **Erection, testing & commissioning of Boiler Part - A.**
- **Erection, testing & commissioning of Boiler Part - B with Material Handling work for the entire plant packages of STG and Auxiliaries, Gen Transformer, bus-ducts and boiler and auxiliaries etc.**

The scope these specifications for **Erection, testing & commissioning of Boiler Part - A and Part - B including Material Handling work for the entire plant packages** 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, machining and grouting.**
- **Carrying out of Special processes as per clause 54.0 & 55.0**
- **Welding, heat treatment, radiography, UT and other non-destructive tests wherever required**
- **Hydraulic testing, air leak test, land flow test, clean air flow test and other pre commissioning tests,**
- **Insulation 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,**
- **Unit trial operation, resolving any deficiencies observed and handing**

over of 1 x 250 MW Boiler Unit No. 6 of Suratgarh Thermal Project (SSTPS).

General idea of equipments to be supplied by BHEL:

BHEL shall mainly supply following major equipments for1 x 250 MW Boiler Unit No. 6 of Suratgarh Thermal Project (SSTPS).

1.0 STEAM TURBINE

Steam Turbine consists of HP, IP and LP Turbines including all associated equipments, piping and auxiliaries.

Waste Oil Tank (1 m3) and Leakage Oil Tank (1 m3) along with Return Oil Pump, Unit Oil purifier (Centrifuge type) 1, Central Oil Purifier (Identical to Unit Oil Purifier) 1, Flow Measuring Device required for conducting PG Test, Turbine Oil and FRF for HP governing system, Thermal Insulation, One set of Special tools & tackles for maintenance of steam turbine, turbine integral instrumentation & control, cables,

Condenser, Feed Heating Plant comprising - LP Heaters -3 Nos., Drain Cooler- 1, Gland Steam Condenser, Fan Exhausters for GSC, Deaerator, HP Heaters (2 Nos), Vacuum Pumps (3), Turbine Oil Cooler (2), Pumps comprising- Condensate Extraction Pumps and Drives –3, Boiler Feed Pumps and Drives -3

2.0 GENERATOR, EXCITER, MECHANICAL AUXILIARIES, SEAL OIL, GAS, WASTE GAS AND OIL SYSTEMS AND C&I

3.0 GENERATOR TRANSFORMER AND BUS-DUCTS.

4.0 BOILER & AUXILLIARIES

The scope of supply for the main steam generator and auxiliaries will be as below:

A) **Mechanical**:

i) Complete boiler pressure part system, Boiler drum with drum internals, Water-cooled welded wall furnace system with headers and extended side wall etc., Complete circulation system including connecting piping and down comers, Superheater/ Reheater system including headers, connecting pipes, Economiser system including connecting pipes, headers and recirculation system, Desuperheaters for superheater system and emergency desuperheater for reheater system including spray control valves/ piping.

ii) Complete boiler integral piping, valves and fittings as per schematics/ details including the drain and vent piping, safety valve exhaust piping, drain pans, drain piping to ground level, silencers for first spring loaded

safety valve at drum and superheater outlet, electromatic safety valves and start up vent of SH. Silencers for first spring loaded safety valves and electromatic relief valves at RH outlet. Sample coolers and sampling pipes as per scheme.

iii) Complete raw coal piping from bunkers to feeders and from feeders to mills with necessary gates, coupling and supports, etc., one number diverter chute piece per boiler for use in bunker emptying.

iv) Pulverised fuel pipings from pulverisers to bunker windbox including necessary couplings, supports, hangers and gates.

v) Six numbers raw coal gravimetric feeders and drives.

vi) **Three numbers Tube Mills** including classifier and drives.

vii) 2 nos. seal air fans per mill with drives, filters, piping and supports.

viii) Burner windbox of tilting tangential type with linkages, burner tilt power cylinders including coal burners and air-cooled oil guns.

ix) Fuel oil pumping unit for HFO 2x100% (unit system for # 6) with necessary strainers, valves and fitting & Steam tracing system as per schematics, drain oil line from Pump/ strainer to oil sump near Pump House.

x) Fuel oil heating unit for HFO 2x100%(unit system for #6) with necessary strainers, valves & fittings. The heating unit is envisaged to be located within the Fuel Oil Pump House. Piping from Pump House upto Burner and return line upto Pump House will be supplied. HFO piping shall be provided with steam tracing system.

xi) Light oil pumping unit 2x100% (unit system for #6) with necessary strainers, valves and fittings, piping from Pump House upto burner will be supplied. Drain oil line from pump/strainer to oil sump near pump house.

xii) Complete boiler front fuel oil for HFO, light oil, auxiliary steam, compressed air, steam tracing system with necessary piping, valves, fittings, supports etc., and return line upto terminal point.

xiii) BHELSPARK HEA ignitors.

xiv) Scanners and scanner cooling air system including fans, drives, filters, air piping and supports.

xv) Two Nos. Axial reaction FD fans with drives, silencers and suction filters.

xvi) Two Nos. Axial reaction PA fans with drives, silencers and suction filters.

xvii) Two Nos., Radial ID fans with Inlet Damper and hydraulic coupling system.

xviii) Two Nos., Trisector Regenerative airheaters with one electric drive & one air motor drive including lubrication system, soot blowing systems, provision for off load water washing and fire fighting system, rotor stoppage alarm, fire sensing device (thermocouple type) and elements handling arrangements.

xix) Two Nos. Steam Coil Air Preheater for Secondary air located in bypass duct.

xx) Handling arrangement (electrical) for tube mill and mill motor including runway beams and monorail. Electrically operated lifting tackles for fans and Regenerative airheaters as detailed elsewhere in this specification.

xxi) Boiler steam soot blowing system complete with blowers, piping, valves and fittings as per schematic.

xxii) Two Nos., Start up temperature probes.

xxiii) Complete boiler and auxiliaries supporting structural steel, stairways, platforms and walkways, handrails, complete foundation bolts, anchor channels, for all the equipment and columns. Structural steel material and purlins for boiler roof, weather covering at drum level and burner operating floors. Metapoly sheet covering at fireman's floor and boiler roof.

xxiv) Interconnecting platforms

xxv) Pent house ventilation system.

xxvi) Complete buck stays and tie bars for the boiler.

xxvi) Complete outer sheet Ribbed aluminium casing for boiler and plain aluminium sheet casing for equipments and ductwork. Boiler inner casing wherever necessary.

xxviii) Complete air and gas ducts with necessary expansion joints, dampers/ gates and supports upto chimney inner flue bottom flange.

xxix) Complete refractory and insulating material along with the required fixing materials and reinforcements for equipment included under Boiler package.

xxx) Complete electrostatic precipitator dust collecting system.

xxxi) Boiler rough mountings including access doors, inspection doors and peepholes.

xxxii) Special tools required for boiler and auxiliaries maintenance.

xxxiii) Interconnection piping and valves as detailed in Section XX (Aux steam piping, fuel oil main lines, cooling water piping, service water piping, compressed air/ instrument air piping).

xxxiv) Initial fill of lubricants, Matching flanges & connecting materials for equipments supplied by BHEL.

xxxvii) HP Bypass system valves.

xxxviii) Vibration Isolation system for ID fans.

B. Electricals, Controls and Instrumentation:

i) Pressure, Temperature and Draft tapings and test pockets, Local Vibration monitoring system for ID, FD & PA fan and HT motors accessible bearings (Dual axis), Secondary air and primary air flow measurement, Differential Pressure & temperature switches. Micro-processor based controls for Burner Management System, Secondary Air Control system, Soot Blower Control system, HP Bypass Control, APRDS control, Gravimetric Control System & Electromatic Relief valve control.

ii) Control panels, cubicles, motor control centres, drives and cables for boiler.

iii) All controls instrumentation equipments cabling for TG and Generator area.

C. Others:

- CW Piping from inlet & outlet of Condenser upto Terminal Point (i.e. 'A' row of STG Building) including RE Joints, BF Valves.
- ACW Piping upto Terminal point.
- Condensate Reserve storage tank.
- Power Cycle Piping and valves covering main steam, Cold Reheat, Hot Reheat, Boiler Feed & Condensate System to make system complete within the terminal points.
- Thermal insulation for equipment and piping.
- Dosing systems - LP Dosing (Ammonia & Hydrazine) system, HP Dosing (Phosphate) system.

- Central Lube Oil Storage & Transfer System.
- Steam Washing System

53.2 **The PG wise break up of boiler Part A, boiler Part B , piping and materials handling is tentative as indicated under Annexure-I.** Certain **PGs have been indicated under both the Packages to have faster systems readiness. In case of dispute regarding the tonnage indicated, the decision of the BHEL Engineer with respect to scope, and keeping the work suitability, quality and time schedule will be final and binding on the contractor.** However the basic division of work between Boiler part-A and Part-B shall be as under:

Part 'A' of Boiler is up to BOF (Boiler Outlet Flange). It includes main boiler / furnace, structures, pressure parts, air heaters, associated ducts (including ducts between air heater and FD/PA fans), burners, Pulverised coal piping, oil system, integral piping, Power Cycle Piping (as specified) elevator structures along with dust proof cladding etc., painting and insulation on items covered under Part-A. **Final connection at boiler outlet flanges (whether bolted / welded or both) with ducting, coal pipes with mills, or any other connection to Part B will be in the scope of Part 'A' contract.**

Part 'B' of boiler is mainly from BOF to chimney. It includes fans (ID/FD/PA), tubular mills, feeders, ESP, associated ducts, structures etc.

Painting and insulation shall be covered for both Part B and Part B.

Approx. weight **to be erected for the Boiler** & Auxiliaries shall be **15500MT** (consisting of **7,400 MT** of boiler components under **Part A, 750 MT for piping** systems and **7,200 MT for boiler Part-B** work as indicated in Annexure-I). The contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete their work and commission above boiler and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage 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. **However, in case of overall reduction in contract value beyond 30%, the contractor will be eligible for compensation as per the following provision:**

"The actual executed value shall be raised by 10 % subject to the condition that the total value of work executed plus increase as above shall be limited to 70 % of the awarded contract value"

Contractors shall take above into account while quoting the unit rates quoted as per Rate Schedule so as to take care of such variation during execution stage

53.3 **MATERIAL HANDLING**: Entire material being supplied by BHEL or its vendors for the project under the scope of various packages awarded to BHEL for Suratgarh TPS project shall be under the scope of material handling work along with part B contract however, some major packages to be handled are as under:

- Boiler and its auxiliaries including ESP package.
- Turbine, turbo-generator and their auxiliaries
- Boiler controls & instrumentation and accessories.
- TG controls and instrumentation and accessories.
- Electrical and C&I package
- Generator protection relay panels and auxiliaries.
- CW System package.
- Bus Duct and auxiliaries package
- Power cycle and TG cycle piping, tanks, vessels etc.
- Thermal insulation package
- Other BHEL supplied (Manufactured /Bought out items) packages.
- Construction & Testing equipments of BHEL (Excepting High Capacity cranes sent in dismantled condition) and other items received from other sites/locations.
- Oil, gases, chemicals etc

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 & preservation etc shall not relieve the contractor of the responsibility of providing such facilities to complete the work without any extra compensation.

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.

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.

53.4 Approximately **18000 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 and Railways. All material entering the project premises shall have to go through security checks at entry gate. Contractor has to co-ordinate / make all arrangements for entry of vehicles carrying material inside project premises, including initiating request for entry of material / vehicle within the finally quoted rates.

53.5 Brief descriptions of items; their unit weight and size are indicated under Annexure-I. 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. Though most of the material is being planned to be made available at site well in time for erection requiring proper handling, verification and storage, however certain items may be delayed, requiring direct delivery at site for erection. In such cases where material is received, unloaded and verified by erection agency, contractor for subject work will not be eligible for any payment. Besides above BHEL, entirely at its discretion may get unloaded / handled items like, BOILER DRUM, HP-IP Module, LP Rotor, Generator stator, Generator rotor, Feed storage tank, water wall panels, headers, Air Pre heater and any other materials. 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 contractor will be eligible for compensation as per provision mentioned at cl 53.2.

53.6 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.

53.7 The HP-IP MODULE and LP Rotor shall be transported to site by road/railway. Unloading of this module is to be carried out manually/EOT Crane and is to be placed at a suitable location.

53.8 The Boiler Drum will be transported to site by road/ railways. It is to be unloaded at the site near boiler area as directed by BHEL under part A contract Suitable mobile crane can be provided at site, free of hire charges, subject to availability.

53.9 The Generator Stator and Rotor shall be transported to site by road / rail and are to be unloaded near respective area as directed by BHEL. Suitable crane can be provided at site, free of hire charges, subject to availability.

53.10 **RVUNL shall provide free of all costs an operational railway siding within plant area with suitable capacity shunter and operator for the purpose of bringing material to site.** For materials coming by rail, the contractor is responsible for shifting of the material / rakes from the Railway exchange point to the Plant siding and back to the exchange point after unloading. For this the Loco of the Customer will be provided, but the contractor has to ensure that the same is optimally used. Any charges arising out of loco operation, time loss and resource mismanagement will be attributable to the contractor and recovered

from him.

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

53.12 **The contractor shall provide services for materials management (operation of computerized materials management system – feeding data, updating, generation of status reports etc.) and to issue of materials for erection.**

53.13 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.

53.14 BHEL will provide free of cost all necessary preservatives, paints, thinners, rust preventives, grease, lubricants and end caps to contractor for preservation of components. All tools & tackles and other 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. **Minimum 1000 numbers sleepers shall also be deployed** by the contractor within finally accepted rate / price for handling / stacking / storage of material.

53.15 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.

53.16 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 RR, LWB, date of collection of the materials from road transport agencies / lorries and date of stacking them at storage yard of BHEL.

53.17 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

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.

53.18 Payment of all demurrage / wharfages 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 / wharfages along with freight, the amount so paid as demurrage / wharfages, for the reasons stated above, shall be paid by the contractor forthwith or would be recovered from bills of the contractor.

53.19 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/ wharfages charges. Whenever such demurrages/ wharfages become payable 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.

53.20 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.

53.21 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.

53.22 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.

53.23 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.

53.24 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.

53.25 Unloading from trailer at storage area / work site stacking and re-stacking of heavy sophisticated equipment like boiler drums, water wall panels, heavy motors, heavy bearings, generators, 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.

53.26 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.

53.27 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.

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

53.29 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 **ten days** and report shall be submitted as a documentary proof.

53.30 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.

53.31 It is possible that certain heavy items / consignments will require fabrication of a suitable shed over it. These sheds will be covered with suitable sheets or tarpaulin. The contractor will be required to fabricate such sheds. All materials

required for this will be provided by BHEL. However all expenses towards manpower, T&P, consumables etc will be borne by the contractor. After the completion of the work the contractor will dismantle the same and return these materials back to the stores. The contractor will be paid **@ Rs. 3500/- per MT** for such works.

53.32 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, Fork Lift etc.

53.33 For checking / verification of the components / packages with packing slips GR/ LWB/ RR /etc., sufficient experienced persons and other facilities shall be provided by the contractor as and when required by the Engineer.

53.34 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. This also includes excess/redundant materials returned to stores by other agencies.

53.35 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.

53.36 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.

53.37 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 or from his security deposit or any other money due.

53.38 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).

53.39 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 wharfages / demurrage leviable by carriers. Receipt of payment and proof of taking delivery of consignment shall be submitted to BHEL by the contractor.

53.40 In case some materials are required to be dispatched from Suratgarh 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.

53.41 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.

53.42 Some of the plant and civil package material has already received at Suratgarh site before start of this contract. The contractor as per the instruction of MM Incharge BHEL may have to shift this material. Entire scope of material handling shall be applicable to this material except its unloading work at the rates applicable to this category of work.

53.43 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

be 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.

- Daily allowances @ Rs.100/- per day and @ Rs.150/- per day for lodging.
- Postal / telegraphic / telephones charges, if any, subject to production of proof of having incurred such expenditure.
- Freight and other charges, if any, paid on production of actual receipts.

Payment for the above will be made by BHEL within a month from the date of submission 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.

53.44 Tenderer may note that as the place of work is inside the POWER PROJECT and being manned by Security Force of RRVUNL, 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.

53.45 The contractor for **Part B** shall also provide **free of cost services** of skilled persons for a total period of **180 Man-months** exclusively for use by BHEL. This manpower will be required for following services

- Qualified computer operators for office work. (23 man months)
- Qualified persons for maintaining store record and posting stock ledgers and secretarial work. (69 man months)
- Skilled workers for working in store, office and colony. (42 manmonths)
- Unskilled workers for working in store, office and colony. (46 manmonths)

The contractor for **Part - A** shall also provide **free of cost services** of unskilled persons for working in office and colony for a total period of **46 Man-months** exclusively for use by BHEL.

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

53.46 The scope of work will also include **providing free of cost services of qualified Supervisors** by boiler **Part A** contractor for direct supervision of various works other than the scope covered under this tender exclusively for use by BHEL. These qualified Supervisors shall be provided for **fifty (50) man-months** as per site conditions. The

supervisors shall possess a minimum qualification of a mechanical / electrical engineering diploma. They shall be deployed in all areas covered under various specifications as well as other related areas as may be deemed essential based upon work requirements, though not specified. They shall be guided by BHEL Engineers to ensure smooth work progress as and when /where required /deployed. No separate payment shall be paid for providing the services as per this clause. The contractor shall provide these free of cost services within the quoted rates as per Rate Schedule.

In case contractor fails to provide above-mentioned manpower as desired by BHEL, the latter shall have the right to hire such services from other agencies at the risk and cost of the contractor. However, if BHEL does not utilize the manmonths as per above provision, fully or partly, recovery at the rate of Rs.20000/- against each Supervisor,s man-months will be made from the final bill of the contractor.

53.47 The customer M/s. RVUNL and / or their Consultant (M/s DCPL) 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

53.48 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.

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.
- No photography/ Videography allowed without permission
- Risk factor in construction is approximately 3 times the manufacturing sector.
- 85% of the workforce is drawn from rural background. They lack technical perspective & relevant industrial common sense. Safety awareness to be developed among these workers employed by Sub-contractors.
- Infrastructure to be developed for carrying out jobs properly in a safe manner.
- All Site supervisors & engineers (including subcontractor's) must be imparted structured training on construction safety before start of the job & record to be maintained.
- Availability of qualified & trained Site Engineer at site during all working hours.
- Site Safety training to be imparted to all workers & plan to be made to cover every

worker.

- Tools box talk (5-15 minutes) by supervisor prior to commencement of any job.
- All accident / incidents (Near Miss) to be reported & investigated.(formats & procedure should be finalized)
- Daily Safety Checking by Each Site Engineer along with Safety engineer.
- Weekly co-ordination meeting of all Safety engineers with BHEL safety officer.
- Monthly safety meeting with Site In-charges.
- Reports: Weekly/monthly/annual SHE report format should be finalized.
- All Safety equipment must be ISI marked & checked by Safety officer before use.
- Tag system for erection & use of scaffoldings.
- Bamboo/wooden Scaffolding material not allowed.
- 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.
- For confined space entry Gas test must be done before & at regular intervals.
- Checking & tag of equipment like grinding machine, welding machine, gas cutting set etc. by supervisors before use.

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.

53.49 Contractor shall make necessary arrangements to ensure that the atmosphere in working area (under the scope of work in this tender) and on roads is free from particulate matter like dust, sand etc. by keeping the top surface wet for ease in breathing. Provision of required tanker with spraying arrangement has to be ensured by contractor within the quoted rates, at no extra cost to BHEL

Contractor shall ensure following:

1. Contractor has to maintain contact with local hospital having ambulance facility , scanning & other ultra modern medical facilities required during emergency.

2. Contractor has to ensure pre employment medical check for all staff &

workers.

3. Contractor has to ensure that adequate First Aid facilities with trained nurse are available at work site for emergency purpose. This emergency set-up should include, but not limited to, following;

- Male nurse (in shifts)
- Oxygen set up
- Breathing apparatus
- Eye wash facility
- Stretcher
- Trauma blanket
- Medicines.

An ambulance is required to be arranged and maintained at site and for entire contract period for subject work by successful bidder for Part– 'A' 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 extra cost to BHEL and its sub-contractors. In case , under unavoidable circumstances , if the ambulance is not available , the contractor will have to arrange for the same as under clause 53.49.1.

53.50 Contractor shall make necessary arrangements to ensure following:

1. **Contractor for Part 'A' work shall ensure deployment of qualified level-2 Engineer for NDT services at site.**
2. **Contractors for part – A & part - B shall ensure deployment of Qualified & Experienced Safety Engineer / Officer 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.

54.0 **(SPECIAL PROCESS) For Piping Systems, P91 materials is envisaged for PGMA 80-300 , 80-301, 80-302 and 80-304 . Special care is essential for carrying out the installation of this system and strict quality norms and welding procedure will have to be followed at site. The Contractor is advised to get familiarized with the work procedure. In addition to the general clauses for Welding, HT and NDT given under clause 42 of this tender, the following clauses will be applicable. This welding is to be carried out strictly under the supervision of BHEL Engineer and all repairs etc will be carried out as per the laid out procedure.**

The details mentioned hereunder comprise of the major requirements for the process. The Contractor has to provide all services and consumables required for completion of the work.

Erection, welding, heat treatment and NDE works or as specified by the BHEL during execution of **PIPING OF P91 MATERIAL** and for the combination of materials like P-22 with P-91, X-22 with P-91 or other combinations of alloy steels shall be the part of contract. Some of the salient details in regards to P91 material are being indicated in the clauses mentioned below however the erection, welding and NDT process are to be done as per the procedure /specifications to be furnished by BHEL / as per the instructions by site engineer.

54.1 Prior to erection, supplied pipes shall be inspected thoroughly and if any defect like crack, lamination, and deposit noticed, the same shall be confirmed by Liquid Penetrant Inspection (LPI). If confirmed, it shall be referred to BHEL.

54.2 Cutting of P-91 material shall be done by bandsaw / hacksaw /machining / grinding only.

54.3 Edge preparation shall be done only by machining/ by chamfering machine. In extreme cases, edge can be prepared by grinding with prior approval of BHEL.

54.4 During edge preparation care should be taken to avoid excessive pressure to prevent heating up of the pipe edges.

54.5 All edge preparation done at site shall be checked by Liquid Penetration Test. **Weld built-up on edge preparation is prohibited.**

54.6 The **pipe fit-up** for welds shall be carried out properly, as per drawing specifications, by **using temporary pipe clamps** arranged by the contractor to ensure proper alignment and root gap. Use of site manufactured clamps for fit-up is acceptable. **Neither tack welds nor bridge piece shall be used to secure alignment**. Partial root weld of minimum 20mm length by GTAW may be allowed with the prior permission of BHEL engineers.

54.7 Suitable reference punch marks shall be made on both the pipes (at about 200 mm from the EP) at least on four axis to facilitate U. T on weld joint.

54.8 Provide Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.

54.9 No pre-heating is required for **fixing Thermocouples** (of Ni-Cr / Ni – Al of 0.5 mm gauge size) **with resistance spot welding**.

54.10 Argon gas to be used both for purging as well as shielding shall be of 99.99 purity levels conforming to IS 5760-1998. Dry Argon gas with requisite quality shall be used for purging the root side of weld. The gas flow rate to be maintained during purging is 10 to 25 liters / minute and for shielding during GTAW is 8 to 14 liters / minute

54.11 The purging dam (blank) shall be fixed on either side of the weld bevel prior to Pre-heating. The dam shall be fixed inside the pipe and it shall be located away from the heating zone. Purging is to be done for root welding (GTAW) followed by two filler passes of SMAW in case of butt welds.

54.12 Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.

54.13 Wherever possible, solid purging gas chambers are to be used which can be removed after welding. If not possible, only water-soluble paper is to be used.

54.14 Purging is not required in case of nozzle and attachment welds, when they are not full penetration joints.

54.15 Start purging from inside of pipe when root temperature reaches 220 deg. Centigrade. Provide continuous and adequate Argon gas to ensure complete purging in the root area. The minimum preflushing time for purging before start of welding shall be 5 minutes, irrespective of the pipe size.

54.16 Preheating: Prior to start of pre-heating ensure that surfaces are clean and free from grease, oil and dirt. Pre-heating temperature shall be maintained at 220 deg. Centigrade by using induction heating. The temperature shall be ensured by using a calibrated autographic recorder and two calibrated thermocouples fixed at 0 and 180 degree positions on both pipes 50 mm away from the edge. The thermocouples shall be welded with spot welding machine. The pre-heating arrangement shall be inspected and approved by BHEL engineer. Alternate arrangements shall be made during power failure. Two numbers additional square thermocouple are to be fixed for emergency use. Gas burners shall be employed to maintain the temperature until the power resumes.

54.17 Welding: Root welding shall be done using GTAW process (as per WPS) five minutes after the start of Argon purging. Filler wires shall be clean and free from rust or oil. Argon purging shall be continued minimum two filler passes of SMAW.

54.18 Post Weld Heat Treatment: Heating shall be done by Induction heating only as per the procedure / specifications provided by the BHEL engineers. Generally the PWHT temperatures for P-91 with P- 91 material shall be 760 + 10 Deg. C and the soaking time shall be 2.5 minutes per mm of weld thickness, subject to a minimum of two hours. The rate of Heating / Cooling is to be strictly maintained.

54.19 The PWHT temperature shall not deviate from the values specified in the chart range since any deviations to the specified holding temperature range, will adversely affect the mechanical properties of the weldment and may lead to rejection of the weldment. The weld joints should be kept dry. Under no circumstances any water / liquid is allowed to come in contact with weld as well as preheated portion of the pipe

54.20 The recording of time and temperature shall be continuously monitored with a calibrated recorder right from pre-heating. This shall be ensured at every one hour by site-authorized personnel.

54.21 The width of the thermal insulation beyond the heating band shall be at least two times the heating bandwidth on either side of the weldment.

54.22 All equipment like recorder, thermocouple, compensating cable, oven, thermostat etc. should have valid calibration carried at BHEL approved labs. The calibrated reports should be reviewed and accepted by calibration In-charge at site prior to use.

54.23 Same procedures of welding and heat treatments shall be followed for the weld joints repairs. The NDE shall be conducted for the entire weld joint.

54.24 All the NDE i.e. LPI, MPI, UT and hardness shall be performed on the weld joints as per the standards/ specifications / direction of BHEL. The maximum allowable hardness at weld and parent metal shall be 300 HV10. Joints having hardness above 300 HV shall be re-heat treated and hardness shall be checked again.

54.25 Welders qualified as per ASME Section – IX and IBR on P-91 material shall only be engaged for the welding of P91 materials. Welders shall have to undergo all the training for above. **The welders shall have to be tested and qualified by BHEL site**. Contractor shall arrange for the same and entire expenditure towards this shall be borne by the Contractor.

54.26 **Contractor shall deploy exclusive Engineer and Supervisor who will be responsible for the completion of all activities from weld fit-up to final clearance of weld joints after satisfactory NDE and acceptance by BHEL / Customer / IBR.**

54.27 No interruption is allowed during preheating, welding and PWHT. Hence all equipment for the purpose of power supply, welding, heating etc. hence all alternative arrangements, (Diesel generator for providing power to the welding and heating equipment, reserve thermocouple connections, gas burner arrangement for maintaining temperature etc.) shall be arranged by the contractor within the normal scope of this contract. All the preventions / procedures to be ensured to avoid abruption to on going heating / cooling process. Before start of erection, welding and heat treatment process for P 91 materials all the associated persons shall acquire complete knowledge on the subject from BHEL site engineers to avoid metallurgical failures.

54.28 The Induction heating equipment shall be drawn from BHEL stores, transported, installed and commissioned wherever required at site. For routine and breakdown maintenance,

Contractor shall have to deploy sufficient Manpower, Tools & Plants within his quoted rate. The contractor shall provide electrical cables and switches required. All the equipment shall be protected by providing covers or sheds at site by the contractor within the quoted rate. Any loss / damage of equipment / tools by the contractor shall be recovered from the contractor.

54.29 All the **consumables to carry out the work for the P91 materials** required for welding and heating process i.e. K type thermocouples fiberglass insulated with heavy duty T/C connector, heating elements (annealing cables), compensating cables, insulating materials (glass fiber cloth temperature rating 1260 o C, glass fiber cord dia 3 mm (twisted) temp rating 1260 o C, ceramic fiber blanket RT grade density 96 kg / cub M- temp rating 1260 o C, ceramic fiber rope fiber glass 12 mm dia.- temp rating 1260 o C), gas burner arrangement, all gases, purging dams, blanks, welding electrodes, filler wires, etc. except those consumables supplied by BHEL units if any shall be in the scope of contractor.

Consumables like Welding electrodes and filler wires for P 91 materials supplied by BHEL mfg units shall be issued free of cost for erection.

For carrying out the installation, the following items are being provided by BHEL free of cost:

a) Induction Heating Machine with Outgoing Cables

b) Suitable Power BackUp (DG Set)

c) Spot welding Machine for Fixing of Thermocouples

d) Calibrated Thermocouples

e) Calibrated temperature Recorder

f) Contact Type calibrated temperature Gauge.

g) UT Testing and Hardness testing

The contractor shall be issued the above in line with the General Conditions of Contract Clause 37.

The following will have to be provided by the Contractor:

a) Qualified operator for Induction Machine and DG Set

b) All cables for connecting Induction Machine and DG Set to Main Supply along with Changeover System.

c) Welder Qualified as per ASME IX and IBR for P91 Materials. Site Welder Qualification tests will be conducted also.

d) Exclusive Trained Welding Engineer for Supervising P91 Welding and Heat Treatment

e) Qualified NDE Engineer (Level -II) and welding Supervisor (Level-I)

f) Required GTAW and SMAW machines

g) Welding Machine for Demagnetizing along with cable and Residual Field Indicator

h) Providing Enclosure for Welding area suitable for guarding against cold draught, water and dust at all welding locations.

i) Providing of Argon purging for the welding operation (including supply of consumables eg Water Soluble Paper / Aluminiun Dam arrangement.)

j) Providing of Heating by Gas Burner as Standby Arrangement.

k) Providing of Baking ovens and portable ovens

l) Providing Band Saw/ hacksaw/ Grinder for Cutting with tools.

m) Providing machining for Edge preparation

n) Providing of LPI and MPI Facility as specified in the Welding process, including supply of all consumables.

o) Providing and applying insulation band as specified in the welding procedure.

The above comprise of the major requirements for the process. The Contractor has to provide all services and consumables (Except for electrodes and fillers) for completion of the work.

54.30 DG set for backup power supply, provided by BHEL is to be operated by the contractor bi-weekly / as specified by the supplier to ensure its healthiness during excegencies of power failure for heating processes of P91 materials on account of power failures. Cables and switches, required fuels and other consumables & its operations and maintenance shall be in the scope of contractor within the awarded value.

54.31 The contractor shall arrange welding Machine for Demagnetizing material along with cable and Residual Field Indicator.

54.32 Welding in T91 materials is envisaged in the Reheater of the Boiler. The Contractor has to carry out the work for the same including supply of all consumables for completing the process .The HT, RG and NDT will have to be carried out by the contractor as per welding specifications

55.0 BOILER DRUM LIFTING (SPECIAL PROCESS)

55.1 The Boiler drum lifting is to be done by Strand Jack Arrangement. BHEL shall provide this arrangement with required manpower for the equipment assembly, installation and smooth operation of the same to lift the Boiler drum through other service provider.

55.2 All preparatory works required for boiler drum lifting are under the scope of this contract.

55.3 The contractor has to provide necessary support by using BHEL, s and his own available **cranes** including operation and maintenance with **consumables and T & P** with all necessary **manpower** for the handling, positioning, assembly, erection & dismantling and loading of the strand jack equipments and its accessories arranged by BHEL through other sources for the boiler drum lifting work.

55.4 Arrangement of required platforms, scaffoldings and jacking supports, temporary lighting at site and electric power point of 220/ 415 V supply for the entire operation of boiler drum lifting with the strand jack mechanism shall be in the scope of this contract. The contractor has to make all infrastructures for the utilization of construction power for the strand jack mechanism. **To assist by providing required T & P like welding machine, grinding m/c, gas-cutting torches etc free of charge to the other agency deployed by BHEL with strand jack arrangement, during the entire activity,** if required.

55.5 Boiler drum is to be shifted, dragged, positioned & aligned below the strand jack lifting arrangement prior to lifting process.

55.6 The contractor at site will fabricate and install the required drum-lifting structures for the strand jack mechanism. Fabrication, lifting, positioning, & welding of cathead structure is under the scope of this contract. The contractor at his cost shall arrange necessary steel and other consumable. The contractor, at his own cost, shall carry out fabrication, erection and complete installation of drum lifting structure. After completion of drum erection and alignment, the contractor shall dismantle the drum lifting arrangements. Required T&P given to contractor for drum lifting shall be returned to BHEL stores in good condition and to the satisfaction of the Engineer. No payment shall be made for erection and dismantling of temporary bracing.

55.7 Drum lifting shall be allowed after completion of main structural work and all the bracing including the bracing for all the columns and horizontal boiler level platforms. **Contractor shall carry out the lifting and positioning, fixing and tightening of 'U'- rod supports for boiler drum. Boiler drum alignment is under the scope of contractor.**

55.8 HSFG Bolts are to be tightened by calibrated torque wrench as per the instructions of the Engineer. These should be check tightened / re-tightened by torque wrenches before guirder lifting / as instructed by the Engineer.

56.0 CHEMICAL CLEANING

56.1 **Chemical Cleaning** will be carried by a separate agency deployed by BHEL. While the work of installation of tanks, Pumps, Piping and operation of the system is in the scope of that agency, the Contractor has to extend all assistance (including providing of welding power point) and complete interface requirements for the completion of the work.

57.0 FACILITIES TO BE PROVIDED BY BHEL/ CONTRACTOR

57.1 BHEL / RRVUNL shall provide adequate storage sheds and open space for temporary storage / fabrication, free of all costs, to contractor with drainage, drinking water, electricity and sanitation facilities 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.

57.2 RVUNL / BHEL shall provide **area for labour colony** on **free of rental charges** at a distance of about 1.5 Km from the project site. For labour colony the RVUNL shall provide connection for drinking water and electricity connection points as decided by BHEL / RVUNL and sanitation & drainage facilities, further distribution is to be made by the contractor. The **water shall be provided free of charges** however the **electricity**

consumption shall be chargeable at standard rates applicable. Contractor shall install calibrated energy meter for metering electricity consumption.

57.3 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.

57.4 **Construction power, for construction purposes will be provided free of cost** at one point for boiler Part-A, and Part-B near erection site (at a distance upto 500 meters) from supply point The contractor shall submit to the Engineer his electrical power requirements. 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

NOTE:

- The contractor will be provided construction power free of charge.
- They will however ensure that there is no wastage. Periodical audits will be held to ensure that these resources are being optimally used. For this the contractor has to provide an energy meter at his end.
- In case any wastage is observed bhel reserves the right to recover any charges / penalty as deemed fit.
- Contractor will have to provide proper insulated cables for power distribution and joints, if any, will be done with proper jointing kits .

57.5 **RVUNL/ BHEL shall supply free of charge water through pipe connection at suitable points for construction and electricity** at required voltage (415V, 3 phase and 230 V single phase max. upto 1000 kVA) **for construction**, operation of EOT cranes, plant start-up, pre-commissioning, commissioning activities including testing. Electricity for construction power and light will be brought by RVUNL / BHEL at one point. Contractor shall arrange further distribution of water for construction purposes.

57.6 RVUNL shall provide and maintain all station illumination at site. Till such time such arrangements are made, the contractor at his cost should arrange for temporary lighting in and around his work area. However adequate lighting facilities such as flood lamps, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.

57.7 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.

57.8 Provision of distribution lines of both electrical power and water from the central 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/ Copper / Brass clamps, copper conductor, change over switches pipes etc. 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 own cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.

57.9 The contractor while drawing construction power supply from Distribution Board should strictly adhere to following points.

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

b) All distribution Boards installed by the contractor should be constructed with fireproof materials viz. Steel frames, Bakelite sheets etc.

c) Connection for single phase should be taken from phase and neutral. Nowhere the connection should be taken with earth as neutral.

d) Contractors have to make their own arrangement for their equipment/ DB earthing

e) 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.

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.

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

57.10 ELCB will be tested once in a week or as directed by BHEL by actually simulating the earth leakage for all installations and the same shall be recorded in the logbook to be maintained by the contractor.

57.11 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.

57.12 RVUNL shall provide a suitable platform with proper lighting arrangement so that unloading operation can be carried out through out the day and night however adequate lighting facilities such as floodlights, hand lamps and area lighting shall be arranged by the contractor at the site of construction, contractor's material storage area etc as well in labour colony.

57.13 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 instructions of BHEL, by the contractor at his cost. In the event of his failure to do so, the Engineer will get it done and expanses incurred shall be recovered from the contractor along with prevailing overheads. The decision of BHEL Engineer in this regard shall be final.

57.14 RVUNL shall provide free of all costs within an agreed schedule, an operational **railway siding** within 1 to 1.5 km of the work area with suitable capacity shunter with operator for the purpose of bringing materials to the site and also provide necessary assistance to BHEL / Contractor to enable obtain necessary clearance from the railway to consign the equipment to the siding along with Leveled and consolidated platforms at railway siding with cranable approach road from siding to storage yard, proper general lighting at

railway siding, on approach roads and inside storage area and facility / permission of unloading at railway siding through out the day of 24 hours.

57.15 RVUNL / BHEL shall provide required chemicals for the purpose of chemical cleaning of Boiler.

57.16 Compressed air required for construction purposes shall be arranged by Contractor. However, compressed air required for the instrumentation, start-up and plant operation purposes shall be provided by the owner as per the requirement and specifications indicated by the contractor

57.17 **Erection and dismantling of construction elevator / passenger lift including any civil works is in the scope of the contactor. However BHEL will assist in commissioning of the same. The periodic upkeep and maintenance of the elevator is to be carried out by the contractor. Required spare parts other than rubber items and consumables shall be given by BHEL free of cost.**

57.18 **Contractor should install a PC ALONG WITH MODEM to connect with our server (LAN) AT SITE**

58.0 TIME SCHEDULE

58.1 The contractor is required **to commence the work within 15 days from the date of issue of letter of intent** unless BHEL decides to fix any other later date.

58.2 Entire scope of work as detailed in tender specification **shall be completed within 23 months** from the scheduled date of start of work as per the programs / milestones indicated by BHEL from time to time. Contractor has to mobilise adequate resources to meet BHEL's commitments to their customer as indicated from time to time. **In case due to reasons not attributable to the contractor, the work gets delayed and additional manpower / resources have to be mobilized so as to expedite the work to meet various milestones, same shall be done within the quoted rates as per Rate Schedule, at no extra cost to BHEL. In the event the contractor fails to respond to these requirements, BHEL shall take appropriate actions to meet customer's commitments in line with the provisions of General Conditions of Contract**.

58.3 The various mile stone dates to be achieved, for BOILER # 6, as per the current status of contract are as below:

MILE STONES	MONTH
Start of Erection	15 days from issue of LOI
Drum lifting	4th Month
Hydro Test	14th Month
Light up & ABO completion	18th Month
Acid cleaning completion & restoration	19th Month
Steam Blowing completion & SVF	20th Month
Coal Firing & Synchronisation	12 days from SVF
Trial operation & handing over	23rd Month

Note: Irrespective of start of work, contractor for Boiler Part-'B' has to organize his work to achieve above milestones.

58.4 The work under the scope of this contract is deemed to be completed in all respects, only when the contractor has discharged all the responsibilities laid down in the contract. The decision of BHEL on completion date shall be final and binding on the contractor.

59.0 OVER RUN

59.1 In case due to reasons not attributable to the contractor, the work gets delayed and the 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.80, 000/- per month (Rupees eighty thousand only) for Part-A and @ Rs.50, 000/- per month (Rupees fifty thousand only) for Part-B including complete Material Handling work 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) Contractor achieves the targets fixed during the over run period.

59.2 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.

59.3 The contractor shall maintain sufficient workforce (both skilled and unskilled) and other resources required for completion of the job expeditiously for the entire contractual period including total extended period.

60.0 TERMS OF PAYMENT

60.1 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.

60.2 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.

60.3 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.

I.A PROGRESSIVE PAYMENT on pro-rata basis

I-AA **For Part – A: 0.5% of the awarded contract value** on start of pre assembly work by deploying one number of 75 T crane and at least one number 10/12 MT Hydra OR 18/20 T crane in working condition at site.

For Part – B: 0.5% of the awarded contract value on start of pre assembly work by deploying one number of **36 / 40 MT** crane and at least one number 10/12 MT Hydra OR 18/20 T crane in working condition at site.

I-AB **0.5 % of the awarded contract value** on start of erection work of Main Boiler/ESP

column after checking its trueness on certification by BHEL Engineer.

I.B PROGRESSIVE PAYMENT on pro-rata basis for Sl. No. 1 & 2 of Part –A & Sl No. 1 of Part-B

(80% of unit rates)

(Applicable for installation of all items except Insulation work)

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

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.

2 50% 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.

I.C PROGRESSIVE PAYMENT on pro-rata basis for Sl. No. 1 & 2 of Part –A & Sl No. 1 of Part-B

(80% of unit rates)

(Applicable for INSULATION AND REFRACTORY work)

1 65% of the applicable contract unit rate on fabrication/fixing of retainers, lagging & stitching of mattresses and welding of retainers, fixing of casing supports, fabrication, beading, sealing, bitumen painting, installation and screw fixing of cladding & completion of all jobs as per specifications. The above work includes transportation of required material on location and its proper protection

2 15% of the applicable contract unit rate payable on system completion and area cleaning.

I.D PROGRESSIVE PAYMENT on pro-rata basis

(80% of unit rates)

FOR SL. NO. 3 OF RATE SCHEDULE OF PART A

80% of the item rate will be paid on acceptance of the joint after RG and NDT

NOTE: BHEL site in charge, at his discretion can split / re-group above payment schedule, to facilitate site operations.

I.E (PROGRESSIVE PAYMENT on pro-rata basis for MATERIAL HANDLING WORK)

Under PART B

(80% of unit rates)

I.E.A **FOR Sl. No. 2 & 3 OF PART - B RATE SCHEDULE (FOR MATERIAL HANDLING WORK) MAIN RATES- (80% of unit rates)**

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

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.

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

2 **30 %** 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).

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.

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.

I.E.B **FOR Sl. No. 4 OF RATE SCHEDULE II (FOR MATERIAL HANDLING WORK) MAIN RATES- (80% of unit rates)**

80 % of the applicable unit rate shall be paid for the entire scope of work is done involving the work for materials shifting, stacking and rearranged as per the instructions BHEL.

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.

I.E.C **FOR Sl. No. 5.1, 5.2 & 5.3 OF RATE SCHEDULE II (FOR MATERIAL HANDLING WORK) MAIN RATES - (80% of unit rates)**

1 **80 %** of the applicable unit rate shall be paid after the materials are unloaded and verified as per RR / LWB / loading advice / box packing slip subject to furnishing of following information along with the bills as per above clause.

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.

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

I.E.D **FOR SL NO. 6, 7, AND 8 OF RATE SCHEDULE B, OPTIONAL ITEMS RATE FOR MATERIAL HANDLING WORK - (80% of unit rates)**

1 **80 %** of the applicable unit rate shall be paid on completion of particular item.

NOTE: **BHEL site incharge, at his discretion can split / re-group above payments schedule, to facilitate site operations.**

II.A **An amount limited to 1.0 % of the awarded contract value shall be payable in one or more installments,** solely at the discretion of Construction Manager/ BHEL at different stages of the contract execution to facilitate resource augmentation or to meet any exigency of work. In case of its non utilization 'OR' its part utilization, the entire/balance payment against this category shall be released along with commissioning of boiler Safety Valve Floating for Part –A and coal firing for Part – B.

II.A **MILESTONE PAYMENTS for Part-A (11% of CV)**

1 0.5 % of CV on successful completion of hydro test of the boiler.

2 1.0 % of CV on successful completion of air and gas tightness test of furnace / APH and ducts required for Boiler Light Up.

3 2.0 % of CV on successful completion of boiler light up and alkali boil out.

4 2.0 % of CV on successful completion of acid cleaning and passivation of boiler.

5 2.0 % of CV value on successful completion of steam blowing and SVF.

6 2.0 % of CV on coal firing operation.

7 1.5 % of CV on successful achieving full load and completion of trial operations.

II.B **MILESTONE PAYMENTS for Part-B including Material Handling (10% of CV)**

1 2 x 1.0 % of CV on successful completion of mechanical work of each pass of ESP

2 2 x 0.5 % of CV on successful completion of electrical work of pass of ESP

3 1.0 % of CV on successful completion of air tightness test of all Ducts.

4 6 X 0.2 % of CV on successful completion of trial run of ID, FD & PA fans

5 3 x 0.4 % of CV on successful completion of all the milling system and its clean air flow test

6 1.0 % of contract value on coal firing.

7 0.6 % of CV on completion and commissioning of hoists and handling equipment for FD/ID/PA/MILLS

8 2.0 of CV on successful completion of full load operation with commissioning of all mills.

NOTE:

If the commissioning activities could not be carried out due to no fault of contractor, BHEL Site incharge, 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 activity. Milestone Payments can be further split and released after ensuring consumerate completion and recoding reason.

III **Providing and applying PAINTING-Payment on Prorata basis**

3.0 % of awarded CV for Part-A work including piping system and

4.0 % of awarded CV for Part-B work including Material handling**.**

IV **1.5 % of contract value will be payable on handing over of the boiler to BHEL's Customer** or 3 months after contractor has discharged his responsibilities as stipulated in this contract, whichever is earlier, if delay in handing over is not attributable to contractor. The boiler shall be considered as handed over on completion of trial operation.

V **The balance 2.5% CV shall be payable on completion of all pending work, rework wherever required, area cleaning, reconciliation of materials, fulfillment of contractual obligations, and on submission and passing of Final Bill.**

NOTE: Payments at IV & V shall be released after adjustment of the CV based on actual work carried out.

ETC OF BOILER PART – A AND BOILER PART – B (INCLUDING ENTIRE MATERIAL HANDLING WORK) AT 1 X 250 MW SURATGARH TPS UNIT # 6

WEIGHT SCHEDULE

SUMMARY OF WEIGHTS

- **Tentative weight for ETC of boiler**:

  1. Boiler Part – A Package: 7,400MT
  2. Boiler Part – B Package: 7,200 MT
  3. Piping for part A Package: 750 MT

- **Approximate weight under the scope of material handling: 18,000 MT (scope under part B Package)**

AA: Product Group (PG) Wise tentative WEIGHTS FOR ERECTION, TESTING & COMMISIONING OF BOILER PART - A & PART - B

AA 01: Product Group (PG) Wise tentative Weights For ETC of BOILER

Sl.No.	PG	DESCRIPTION	TOTAL MT	PART – A (MT)	PART –B (MT)
1	4	Boiler drum	151	151	0
2	5	Water wall headers and lower drums	64	64	0
3	6	Water wall panels	292	292	0
4	7	Circulation system components	280	280	0
5	8	Buck stays & framing	244	244	0
6	9	Seal Boxes	8	8	0
7	10	Super heater headers	88	88	0
8	11	Super heater coils and walls	588	588	0
9	12	Super heater components	164	164	0
10	15	Reheater Header	21	21	0
11	16	Reheater and coils and walls	136	136	0
12	17	Reheater components	28	28	0
13	18	Roof skin casing	13	10	0
14	19	Economiser headers, coils & supports	316	316	0
15	20	Soot blowers	34	34	0
16	21	Soot blowers & soot blowing system	14	14	0
17	22	HP & LP bypass system	4	4	0
18	24	Boiler integral trim piping	187	187	0
19	28	Manholes & furnace openings	5	5	0
20	30	Fixing components for main boiler lining & Insul.	84	84	**0**
21	31	Boiler skin casing	10	10	0
22	32	Fixing components for boiler aux. insulation	149	30	**119**
23	33	Lining and insulation material	564	324	**240**
24	35	Boiler supporting structure	1821	1821	0
25	36	Boiler galleries & stairways	759	759	0

26	37	Boiler outer casing	115	115	0
27	38	Inter connecting walk ways	104	75	29
28	39	External structure	601	0	601
29	41	Oil system components	2	2	0
30	42	Oil piping, pump & filter (excluding C&I items)	33	33	0
31	43	Scanner fan and ppg	30	10	20
32	45	Wind box	66	66	0
33	47	Pulverized fuel piping	272	272	0
34	48	Ducts Dampers & expansion joints	1041	500	541
35	50	SCAPH	6	6	0
36	52	Air preheater	600	600	0
37	55	Axial fans	131	0	131
38	56	Radial fans	120	0	120
39	62	Tube mills	1500	0	1500
40	65 &67	Coal feeders & Coal valves	58	0	58
41	78	Electrostatic precipitator	3800	0	3800
42	81	Tanks and vessels	34	34	0
43	89	Galleries & stairs for ESP	56	0	56
44	99	Lifting tackles & other handling equipment	18	3	15
	TOTAL		**14611**	**7378**	**7220**

AA 02: DETAILS OF PG 81 GROUP MATERAILS (included above)

WEIGHT SCHEDULE
(PIPING SYSTEMS)

BB : PRODUCT GROUP (PG) WISE TENTATIVE WEIGHTS FOR ERECTION, TESTING & COMMISIONING OF PIPING SYSTEMS : 750 MT (APPX.)

1	81-003	CBD Expander - 1500	2.400	
2	81-009	IBD Expander - 2500	6.500	
3	81-318	FIXCOM-misc. ppg insulation	2.000	
4	81-327	LY bd minl wool matl	16.000	
5	81-341	Sealing Compound	.100	
6	81-350	Aluminum sheets	5.200	
7	81-411	Direct Gauges-SL	.50	
8	81-414	Direct Gauges-NSL	1.200	
		Total **PG 81 wt (MT)**	**33.500**	

SL NO	PGMA	DESCRIPTION	WT / kgs	IBR
1	80-300	MS UPTO STOP VALVE	20,000	P91 -IBR
2	80-301	MS FROM BOILER STOP VALVE TO ESV	81,000	P91 -IBR
3	80-302	MS FROM ESV TO TURBINE		P91- IBR
4	80-303	MS HEADER TO AUX PRDS	8,700	
5	80-304	MS HEADER TO HPBP VALVE	6,300	P91-IBR
6	80-307	HP AND LP BYPASS WARM UP	1,100	
7	80-310	HRH FROM REHEATER TO INTERCEPTOR VALVE	125,500	IBR
8	80-320	CRH FROM TURBINE TO REHEATER	60,200	IBR
9	80-321	HPBP VALVE TO CRH PIPING	5,200	IBR
10	80-324	CRH HEADER TO AUX.PRDS	1000	
11	80-340	AUX STEAM HEADER	1200	
12	80-341	AUX STEAM INTER CONNECTION BETWEEN UNITS	33000	
13	80-342	AUX STEAM TO SCAPH	3,200	IBR
14	80-343	AS TO SOOT BLOWERS	1600	
15	80-344	AS TO FO PH TANK HEAT	10000	
16	80-345	AUX STEAM TO DEAERATING HEATER	1400	
17	80-346	AUX STEAM TO SJAE - SG SCOPE	1,000	
18	80-348	AUX STEAM TO GLAND SEALS - SG SCOPE	500	
19	80-351	AUX STEAM TO UNLISTED USERS - SG SCOPE	5000	IBR
20	80-355	FO STEAM TRACE	3000	
21	80-364	CBD TANK VENT TO SYSTEM	1,500	---
22	80-365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	600	---
23	80-366	IBD TANK VENT TO ATMOSPHERE	7,300	IBR
24	80-373	AUX STEAM HEADER SV EXHAUST	1200	
25	80-395	AUX STEAM ATOMISING	400	IBR
26	81-415	TEST THERMOWELLS	400	
27	81-416	PERFORMANCE GUARANTEE TEST MATERIALS	600	
28	80-418	ERECTION MATERIALS FOR INSTRUMENTS	200	
29	80-425	BFD FROM FINAL HPH TO SG TP	63,500	IBR
30	80-430	SPRAY WATER TO HPBP	1,300	
31	80-431	SPRAY WATER TO AUX PRDS	2,300	
32	80-432	SPRAY WATER TO BOILER DESH UPTO SG TP	3,100	
33	80-450	CBD AND EMERGENCY DRUM DRAIN	5,500	IBR
34	80-451	BOILER INTEGRAL PIPING DRAINS	1,300	IBR
35	80-452	HP PIPING DRAINS - SG SCOPE	3000	IBR
36	80-453	LP PIPING DRAINS - SG SCOPE	2,000	---
37	80-454	SCAPH DRAINS	900	---
38	80-455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	1,800	---
39	80-460	SG AUX COOLING WATER UNIT SYSTEM	26,500	---
40	80-471	BOILER WATER WASH TO & FROM UNIT	3,900	---
41	80-480	FIRE WATER-OTHER AREAS	3,500	---
42	80-600	HIGH PRESSURE DOSING PIPING	600	
43	80-612	SERVICE AIR UNIT	6000	---
44	80-616	INSTRUMENT AIR UNIT	8000	---
45	80-650	F O SUPPLY & RETURN LINE	18000	
46	80-673	LUBE OIL PIPING SYSTEM	4,300	
47	80-901	SUB DELIVERY VALVES FOR LIGHT UP	1,000	---
48	80-905	BHEL VALVES FOR LIGHT UP	6,200	---
49	80-907	BHEL VALVES FOR ST	1,500	---
50	80-908	BHEL VALVES FOR FUEL OIL SYSTEM	2000	
51	80-921	H&S FOR LIGHT UP STEAM LINE	32,000	---
52	80-922	H&S FOR LIGHT UP - NON STEAM LINES	18,000	---
53	80-923	H&S FOR STEAM BLOWING	140,000	---
54	80-924	H&S FOR SYNCHRONISATION-STEAM LINES	5000	---
55	80-925	H AND S FOR SYNCHRONISATION-NON STEAM LINES	8,000	

BB 01: CONSUMABLES NOT PAYABLE

1	80-992	Imported Electrodes	250	Kgs

NOTE:

a) Above details are only to give a general idea to the contractor to quote the rates as per rate schedule. Besides PGs indicated above, there is likelihood of addition/ deletion of PGs for release of some items integral to Boiler. Contractor is required to carryout such PGs also within their applicable tonnage rate. The decision of BHEL regarding inclusion of new / additional PG in Part-A or Part-B will be final & binding on the contractor. Certain items like insulation material, cladding, valves etc. may / may / may not be supplied by other suppliers / BHEL units like PEM etc. as per PGMA applicable for Boiler system by other units e.g PEM etc.. Such items are also to be erected as per tonnage rates & as directed by BHEL. No extra claim shall be entertained on this account.

b) 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, orifices & other accessories etc. so as to make the systems complete in all respect.

c) 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.

d) 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 Cogeneration plant at the accepted unit rates.

e) The tonnages indicated are tentative only and may vary during execution of work. The contractor is required to erect / commission all piping systems shown in drawings and documents, which may be necessary for overall commissioning of BOILER. Payment shall be released on the basis of actual work executed as per final accepted rates.

f) Tentative weights of power cycle piping of Stainless Steel, Alloy Steel and carbon steel piping shall be 4.0 MT, 250 MT, and 500 MT respectively which may very as per final engg and supplies.

g) The Tonnages indicated against Part A and Materials handling shall form the scope of contract for Part A and Tonnage indicated against Part B shall be considered against the scope of Part- B contract.

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

CC: GENERAL IDEA OF WEIGHTS FOR MATERIAL HANDLING WORK

The information given below is very tentative and not complete. Only a few of the typical components are listed below to give a general idea to the bidder. The weights and sizes indicated below are only approximate and are liable to vary. No increase in quoted / accepted rate rates / prices shall be allowed due to change in weights and dimensions of the equipment / material.

	Approximate total weight for entire Material Handling scope.		**18,000 MT**
CC 01	**General idea of some major components to be handled under Boiler package.**		
SL.No	**Description**	**Appx. gross Wt.(MT)**	**Approx. dimensions of Pkgs (L x W x H)**
1	**Boiler drum**	**133**	**16300 x 2200 x 2800**
2.	Column	2	12000 x 1900 x 600
3.	Ceiling girder	24	11900 x 1800 x 3800
4.	Water Wall panel	5	24000 x 1700 x 400
5.	APH Module	17	4000 x 2400 x 2550
6.	Water Wall Header	10	24000 x 1700 x 400
7.	APH Centre Section	22	10000 x 3400 x 1250
8.	S. H. Header	16	16000 x 1100 x 1100
9.	R. H. Header	11	17000 x 1300 x 900
10.	Wind Box	16	10500 x 2800 x 2500
11.	Mill motor	15	2500 x 2500 x 2200
12.	Mill body (in two pcs)	35	OD 5200 x 4800
13.	Separator body	15	OD 3500 x 3000

CC 02	General idea of some major components to be handled for Electrical and TG C&I

S.No.	Package No.	Description of package	Dimensions of package (mm)	Weight in KG
01	801	Turbine Instruments Racks	2750x1000x800	858
02	802	Turbine Instruments Racks	2300x750x750	765
03	803	Impulse Pipes (CS)	6900x650x650	1585
04	804	Press. Transmitters, Switches and Gauges	2800x1250x1250	825
05	805	Transmitters & J.B. of Bearings	600x400x400	180
06	806	Impulse Pipes (Alloy Steel)	6900x300x300	400
07	10001	Starting cabinet for DC Seal Oil	1000X800x2200	425
08	10002	Generator Instrumentation cabinet	Do---	450
09	10003	Loose Items	Petty Box	150
10	10004	Loose Items	Petty Box	150
11	10005	Starter Cabinet for DC JOP	1000X800x2200	450
12	10006	Starter Cabinet for DC EOP	1000X800x2200	425
13		**Generator Transformer**	**7850X3600X4100**	**180000**
14		Busducts		15000

CC 02A	GENERAL IDEA OF WEIGHTS OF SOME PG'S TO BE HANDLED FOR BOILER C&I

1	95	FSSS, Mills & Feeders Instts	75.205		
2	96	Bear. Vib. Monitoring – elect. Items, cables, etc.	10.425		
3	97	Other C & I and misc. items	12.180		

CC 03	GENERAL IDEA OF SOME PG'S OF PIPINTG MATERIAL TO BE HANDLED FOR OTHER PKG UNDER MATERIAL HANDLING SCOPE.

80-400	CONDENSATE SUCTION	3,200
80-401	CD FROM PUMP TO LPH1/DC INLET TEE AND RE	10,000
80-402	CD FROM LPH1/DC INLET TEE TO TG TP	6,300
80-407	CONDENSATE FOR SEALING OF VACUUM	1,300
80-408	CONDENSATE DUMP FROM HEADER	2,200
80-411	CONDENSATE/MAKE-UP TO CONDENSER	2,000
80-413	UNLISTED CONDENSATE	1,100
80-420	BOILER FEED PUMP SUCTION	8,500
80-421	BOILER FEED PUMP RECIRCULATION	7,600
80-423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	43,100
80-424	BFD BETWEEN HTRS AND GROUP PROTECTION	17,500
80-446	DEAERATING HEATER OVER FLOW AND DRAIN	2,900
80-463	TG AUX COOLING WATER	44,000
80-468	MAIN CIRCULATION WATER PIPING	20,000
80-601	LOW PRESSURE DOSING PIPING	1,000
80-933	H AND S FOR LP PIPING	22,000
80-311	HRH FROM INTERCEPTOR VALVE TO TURBINE	11,700

80-312	LPBP VALVE UP-STREAM AND DOWN-STREAM	28,900
80-322	CRH PIPING TO DEAERATING HEATER	5,000
80-330	EXTRACTION STEAM TO LP HEATER-1	6,800
80-331	EXTRACTION STEAM TO LP HEATER-2	3,400
80-332	EXTRACTION STEAM TO LP HEATER-3	4,600
80-335	EXTRACTION STEAM TO DEAERATING HEATER	12,900
80-336	EXTRACTION STEAM TO HP HEATER NO.1	2,900
80-337	EXTRACTION STEAM TO HP HEATER-2	1,600
80-369	HP DRAIN FLASH TANK VENT TO SYSTEM	1,600
80-375	UNLISTED SV EXHAUSTS - TG SCOPE	4,600
80-381	HP HEATER VENTS - TG SCOPE	900
80-382	LP HEATER VENTS	1,500
80-385	VENT FROM UNLISTED PPG/EQPT TO COND	2,300
80-387	CONDENSATE PUMP VENT	1,100
80-388	CONDENSER AIR EVACUATION PIPING	3,300
80-398	TURBINE WASHING STEAM	3,700
80-440	CONDENSER DRAINS	200
80-442	GLAND STEAM COOLER DRAINS	300
80-443	LP HEATER-1 TO CONDENSER	1,500
80-444	LP HEATER-2/3/4/5 DRAINS AND DRIP PUMP I	3,000
80-447	HP HEATER DRAINS	9,200
80-449	TG CYCLE PIPING DRAINS AND VENTS	7,300

CC 04	**GENERAL IDEA OF WT'S AND DIMENSIONS OF SOME MAJOR COMPONENTS TO BE HANDLED FOR TURBINE, TURBO - GENERATOR AND AUXILIARIES PACKAGE**

SL. No.	DESCRIPTION	DIMENSIONS (LxBxH)	NET WT	GROSS WT
		(mm x mm x mm)	(MT)	(kg)
1	**HP Module**	**4500 x 3500 x 3500**	**60**	
2	**IP Module**	**4500 x 3600 x 3600**	**65**	
3	**LP Rotor**	**7160 x 3300 x 3300**	**57**	
4	Main Oil Tank	5180 x 3260 x 2650	09	
5	LP Front Wall	6820 x 3750 x 910	10	
6	LPC Upper / Middle part	4570 x 3230 x 980	03	
7	LPC Inner – Outer casing	6720 x 3150 x 2325	22	
8	LPC Inner Casing LH	6760 x 3150 x 2785	31	
9	LPC Upper Casing	7060 x 1480 x 2760	08	
10	Longitudinal Girder	6800 x 1820 x 1570	15	
11	Front Water Box	8600 x 3500 x 1920	15	
12	Rear Water Box	5610 x 3500 x 1650	14	
13	LP Heater	6400 x 2000 x 2000	14	
14	**HP Heater 5**	**10850 x1850 x2275**	**45**	
15	**HP Heater 6**	**12350 x1850 x2275**	**55**	
16	Deaerator (FST)	9300 X4000 X4300	23	
17	BFPs	2500 X2400 X2200	6	
18	BFP Drive Motors	3790 x 2792 x 3090	15	
19	Condensate Pumps	Od 711 X 4774	2	
20	CEP Drive	1840 X1390 X2170	4	
21	BFP Foundation Couplings	1400 X1700 X2000	3	
22	BFP Foundation Frame	11000 x3500 x2000	11	

23	Vacuum Pumps 3 nos		21	
24	Foundation items of Generator	3550x 715x 880	4.306	4656
25	Foundation items of Generator	2240x 940x 1220	2.535	2880
26	Consumables for foundation	500x 500x 200	.005	15
27	**Generator Stator**	**7520x 4200x 4770**	**218. 0**	218000
28	**Generator Rotor**	**10550x 1560x 1660**	**43.230**	47742
29	End shield (TE) lower half	3640x 1140x 2000	5.050	6020
30	End shield (EE) lower half	3640x 1140x 2000	5.050	6020
31	H. V. Bushing	2000x 950x 600	.480	590
32	Loose items of Wound Stator	1500x 1200x 1000	.860	1010
33	Generator Accessories	2140x 1240x 1040	1.046	1546
34	Generator Accessories (Terminal Bushing Box)	3500x 1800x 1250	3.325	4075
35	Gas Baffle Ring, Insert Cover etc	3700x 3500x 1340	2.388	4364
36	Bearing Shells	1100x 835x 950	.782	953
37	End shield (EE) upper half	3640x 1140x 2000	4.650	5620
38	End shield (TE) upper half	3640x 1140x 2000	4.650	5620
39	Seal rings	600x 600x 200	.048	73
40	Device for Rotor insertion into Stator	2240x 940x 1220	.691	1036
41	Erection devices	2550x 1180x 1140	.535	997
42	Wire ropes	1800x 1450x 200	.102	201
43	Dry Air Blower	1350x 1250x 800	.040	190
44	Terminal connectors	1840x 660x 400	.186	506
45	Consumables	500x 600x 300	.030	45
46	Brushless Exciter Set	5670x 2390x 2810	20.047	22386
47	Exciter front cover	4310x 2950x 2950	1.487	4122
48	RR WHL. cover & sealing wall DE for Exciter	1800x 1600x 1600	.770	970
49	Exciter rear cover	4330x 3050x 2950	1.881	3909
50	Exciter bed plate accessories	5500x 1050x 800	2.430	3212
51	Exciter accessories	2000x 500x 500	.150	350
52	Cooler rack assembly for Exciter	3000x 1800x 1100	.801	1551
53	Seal Oil Unit-I	3550x 2900x 3700	7.660	9160
54	Seal Oil Storage Tank	3500x 1300x 1280	1.025	1460
55	Gas Unit	2550x 1790x 2560	.572	1150
56	Hydrogen Distributor	3480x 1540x 440	.150	333
57	Co_2 Distributor	2770x 1240x 440	.116	247
58	Seal Oil Unit-Ii	3610x 2040x 1850	2.263	3263
59	Liquid Detector Rack	1700x 900x 1800	.238	450
60	Loose Valves	2000x 1000x 1000	.759	959
61	Loose Instruments	1000x 1000x 500	.030	80
62	Co_2 Vaporiser	1520x 640x 840	.145	225
63	Generator Piping (Appx. Wt)	6500x 1200x 1000	6.174	6374
64	Generator Piping (Appx. Wt)	6500x 700x 700	1.626	1926
65	Generator Piping (Appx. Wt)	1900x 1500x 600	1.365	1615
	Total		**855.678**	

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Annexure-II

LIST OF T&Ps & IMTEs BEING PROVIDED BY BHEL FOR USE OF CONTRACTOR FREE OF HIRE CHARGES ON SHARING BASIS.

SL NO	EQUIPMENT	QUANTITY	
		Part A	Part B
1	Crawler Crane 200 MT/ 250 MT Capacity	01 no. sharing basis	Sharing basis
2	Crawler Crane 75 MT		01 no. Sharing basis
3	Crawler Crane 18/20 MT	01 no. sharing basis	Sharing basis
4	EOT Crane in TG hall 125 / 30 MT	01 no. sharing basis	Sharing basis
5	Strand Jack Lifting Arrangement (only for boiler drum lifting operation)	By BHEL agency	
6	Induction heating machine (for P91 materials only)	02 sets.	
7	DG set for backup power supply for use during abruption of construction power supply (while P91 materials heating processes are in vogue)	01 no.	
8	Motorised Hydraulic Test Pump	01 no.	
9	Construction Elevator	01 no.	
10	Huck Bolting Machine		02no.
11	Aneometer 0-15 M / Sec		01 no.
12	Pitot Tube		01 no.
13	mV / mA Source (0-200 mV, mA)		01 no.
14	Chemical cleaning setup by EDTA cleaning process	By BHEL agency	

NOTE:

1. Any other special T&P if supplied by the manufacturer will also be provided to the contractor free of hire charges as and when made available for work. Special tools and tackles are to be used only for the purpose for which these are meant and to be returned in good condition.
2. The operation and maintenance of 200T/250 T crane shall be carried out by BHEL however required maintenance crew and fuel for operation of crane shall be provided by the contractor at his cost. The lubricant will be issued free by BHEL. 200 / 250 T crane is for erection of 4th & 5th tier of boiler columns and ceiling girders. However, BHEL entirely at its dissertation can allow use of this crane in other areas / works also on the same terms and conditions.
3. It is solely at the discretion of Construction Manager/ BHEL at different stages of the contract execution to facilitate resource augmentation or to meet any exigency of work may allow use of 75 T crane for part A of contract on sharing basis.
4. Any other special IMTE's if supplied by the manufacturer will also be provided to the contractor free of hire charges as and when made available. Special IMTE's are to be used only for the purpose for which these are meant and to be returned in good condition.
5. Contractor has to facilitate the boiler drum lifting as per SCC Cl no.55.
6. DG set for backup power supply, provided by BHEL is to be operated by the contractor bi-weekly or more times to ensure its healthiness during excegencies for heating processes of P91 materials on account of power failures. Besides the equipments and accessories provided by BHEL all other cables and switches, required fuels and other

consumables & its operations and maintenance shall be in the scope of contractor within the awarded value.

7. Other terms and conditions regarding above items shall be as per Clause No.37 (T&P/IMTE's).

INDICATIVE LIST OF MAJOR T&P AND IMTE'S TO BE PROVIDED BY CONTRACTOR FOR EXECUTION OF TENDERED WORKS FOR MOST DURATION OF THE CONTRACT UNLESS OTHERWISE SPECIFIED.

SL NO	EQUIPMENT	QUANTITY	
		Part A	Part B
1	Crawler Crane 75 MT	1 no	
2	Tyre / Truck Mounted Crane 36 / 40 MT		1 no
3	Mobile Crane 18 / 20 MT	1 no	2 no
4	Hydra Crane 10 / 12 MT	2 no	2 no
5	Trailer with pulling unit 20 / 30 MT	1 no	2 no
6	Trailer with pulling unit 15 MT	1 no	2 no
7	Low Bed Trailer 40 MT		1 no (as per requirement)
8	Electric Winch 2/3/5 MT	15 no	5 nos
9	Welding sets with accessories and adequate ovens for welding electrodes backing and holding	30no	12 nos
10	Hand Operated Megger 500 / 1000 V	As per requirement	
11	Tong Tester 10, 20 Or 50 Amp + / - 3 % Accuracy	As per requirement	
12	Digital and Analogue Millimetres	As per requirement	
13	U Tube Manometer 0-2000 mm Water Column	As per requirement	
14	Inclined Manometer 0-50 mm Water Column	As per requirement	
15	Bolt Tension Calibrator	As per requirement for part A	
16	AIR COMPRESSOR 250 CFM	As per requirement for part A	

NOTE:

1. The above list specifies only major T&P & IMTE's (may not be complete) to be deployed by the contractor as per the work requirement. All additional IMTE's / other tools and plants including suitable capacity D shackles, slings, rails, sleepers (minimum 1000 nos), hydraulic / mechanical jacks etc which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted rate / price.

2. Tyre mounted 18T / 20T / 36T / 40T cranes must be with 360 degree rotational swing mechanism to facilitate unloading and placement of material at identified locations.

3. Sleepers, rails, jacks, winches etc required for unloading of heavy consignment such as Boiler drum, Generator stator and Generator Transformer etc are also to be arranged by contractor at his own cost. However in such cases BHEL may extend limited assistance by way of issuing such T & P 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 born 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.

4. Other terms and conditions regarding above items shall be as per clause no 37 (Tools & Plants/IMTE).

TENTATIVE DETAILS OF WELD JOINTS

1 The material for weld joints may be of from any of material specifications listed below or specified later as per engg. i.e. SA 209 T1, SA 210 Gr A1, SA 210 Gr A2, SA 210 Gr A3, SA 213 T 12, SA 213 T 22, SA 106 Gr B , SA 106 Gr C, SA 335 P12, SA 335 P22 , SA 335 P22 and P91 etc. **Approximate numbers of pipe weld joints of P91 material shall be 135 nos.,** which shall cover entire Main Steam Line from Boiler to Turbine and HP by pass upstream lines. Welding of all the joints of P91 to P91 and with dissimilar materials is in the scope of this contract. BHEL shall provide T & P to carryout welding of P91 material as listed in the list of T & P to be provided by BHEL and remaining T & P shall be under the scope of contractor.

2 Welding of joints shall be as per welding schedules / site requirements. Welding, heat treatments and NDT for P91 shall be done as per the details indicated in the tender, specification to be provided during execution and as per the engineer's instructions.

3 Radiography and Stress Relieving shall be done as per weld schedules/ drawings or the instruction of BHEL site engineer.

4 Material specification, sizes and no of weld joints may very as per detailed engineering specifications / site conditions.

5 Connection and welding of terminal points are under the scope of this contract.

TERMINAL POINTS

SYSTEM	TERMINAL POINTS
• Main Steam piping	HP Turbine inlet
• Hot Reheat piping	Interceptor Valve inlet
• Cold Reheat piping	Outlet of HP Turbine
• Aux Steam Piping	TG Seal steam Inlet header
• Feed Water Piping-	final out let of HPH 6 feed line.

- AUXILIARY COOLING WATER

  Passivated DM cooling water for Boiler Auxiliaries

  a) Supply — One terminal at 1st row of Boiler Col.

  b) Return — One terminal at 1st row of Boiler Col.

- DM WATER

Initial fill to boiler	Inlet of Non-return valve in boiler Filling line and inlet of Deaerator.
Boiler Hydraulic Testing	Inlet of Non-return valve in boiler hydraulic test line.

- AIR

Instrumentation air & Service air	One terminal on TG house row 'A'. One terminal at Boiler front row.
Combustion air	Inlet of FD / PA Silencer.

- AUXILIARY STEAM — One point near P & H outlet.

- DRAIN & VENTS

Relief Valve discharge	a) Outside TG Hall for Steam lines. b) Local for water lines.
Steam, feed water and condensate	Local to drain funnel/drain Pit/channel
System drain & vents.	As decided Inside T/G Building.
Drains (SG)	All high pressure drains to respective drain header. All low pressure drains are terminated at station drain/canal.

- FUELS

Coal	Outlet flange of raw coalbunker.
Heavy oil Supply line/ Return line Drain.	Inlet/ Outlet of Pump house.
Light Diesel Oil	Inlet of Pump house.

- FLUE GAS — Bottom of chimney inner flue.

- ASH

- Furnace bottom ASH — Furnace bottom hopper with stainless steel seal plates.

- Fly Ash — Outlet flange of duct hoppers below economizer. Outlet flange of duct hoppers below AH. Outlet flange of duct hoppers below EP.

10.0 MISCELLANEOUS

- Sampling lines (for Boiler integral only) — Upto sample coolers (of Boiler integral only) located in the Operating floor.
- Nitrogen filling — Inlet of Isolating valve on equipment.
- Safety valve exhausts and vents (SG) — To atmosphere at 1.0 m above the roof.

ANNEXURE-V

EXCLUSIONS

The scope is limited to those equipments and systems, which are specifically, described in the drawing and specifications all other equipment and systems are deemed to have been excluded. However the major exclusions are as detailed below:

1. AUXILIARY COOLING WATER SYSTEM

   a) ACW booster pumps, Filters/Screens, piping & valves beyond BHEL Terminal Point.

   b) Water / Water heat exchangers, ACW pumps, Filters / Screens, dosing system for passivation of DM water system, ACW overload tank if any and piping and valves beyond BHEL Terminal Point.

2. COOLING WATER SYSTEM

   a) Cooling towers

   b) Cooling water pumps

   c) Debris filter

   d) CW Piping / duct beyond BHEL Terminal Point

   e) Cathodic protection

   f) Condenser Onload Tube Cleaning System

3. COMPRESSED AIR SYSTEM

   a) Compressed air plant, air receivers,

   b) Driers

   c) Compressed air piping & valves beyond BHEL Terminal Point.

4. D.M.MAKE UP WATER SYSTEM

   a) DM Plant

   b) DM Water Storage tanks

c) DM Water transfer and make up pumps.

5. Condensate polishing unit.

6. Auxiliary boiler

7. EOT Cranes, chain pulley blocks, lifting hoists and all other material handling equipments, lifting beams.

8. Service and potable water system

9. Sump pumps

10. Plant drainage system

11. Effluent treatment system

12. Fire fighting system including fire extinguishers

13. Hydrazine and phosphate storage and transfer system, bulk Ammonia storage cum Transfer system.

14. CIVIL WORKS

a) All civil works including foundations, buildings/enclosures, structures, channels, inserts, pipe sleeves, embedment, pipe trenches, cable trays, operational/ approach platforms local to equipment, Piping trestles chequered plates ladders etc., covering sheets for TG deck. All civil designs for above.

b) All staircases, columns & beams required for critical piping support between Boiler & TG Hall.

c) Rails for transformer handling.

d) Rails for HP & LP heaters.

e) Shock absorbers/ vibration isolators for any equipment **except for ID fans.**

f) Mono rails other than specifically included in the Scope.

g) All Grouting (Supply & Application) **except for major rotating equipment – TG, BFP, Mill, ID Fan, FD Fan, PA Fan** only.

15. All oils and lubricants after trial run of unit.

16. All Power, signal cables except group cables.

17. All Ventilation and Air conditioning system.

18. Coal handling, Coal weighers, ash handling system beyond BHEL terminal points, water impounded hoppers, slag crushers etc.

19. Dry Air Preservation system.

20. Erection tools/tackles including sling, shackles, eyebolts and other tools & tackles, testing instruments other than listed in proposal

21. All statutory clearances / approvals including payment of statutory fees towards IBR, electrical / inspections etc.

22. Any services like Supervision/ inspection of equipments/ O&M etc., after commissioning of each Unit.

23. All lab instruments.

24. All power & Instrument cables (other than specifically included) cable Trays/ supports/ erection materials.

25. All earthing systems/lightning protection system (Underground & over ground).

26. All starters, MCC, Switchgears, Plant illumination and lighting installations except SBMCC & ESP MCC.

27. All power system including UPS, 230 V AC.

28. Analog signals, contacts (change over type) required for hooking up with EHC, ATRS from system other than Turbine.

29. All remote instrumentation, controls (except those specifically included) UCR Panels, interlocks, protection and Online measurements, Alarm annunciation system, DAS and Lab equipments.

30. All generator Electrical Protection including rotor earth fault relays, Generator bus ducts including CT's & PT's, Drip plate, Neutral grounding transformer/ cubicle.

31. Complete electrical system including Transformers, DG sets, Communication equipment.

32. All mechanical auxiliary equipment such as DM Plant, HVAC, CHLORINATION Plant, Hydrogen Plant, Workshop equipment waste water treatment/ disposal, Fuel oil tanks/ dykes, etc.

33. Mill bay structures, columns, bunkers, mill bay column interconnecting beams for supporting mill maintenance platform, structural arrangement/ runway beams for mill maintenance and beams for Fuel pipe support.

34. Passenger and Goods elevators and elevator columns and all interconnecting platforms between elevators and building.

35. All types of spares except commissioning spares.

36. Interconnection platforms, supports, beam, etc., with the buildings. Interconnections between EP control room and EP Platforms and stairways.

37. Chimney

38. Fuel oil tanks & Dry tanks, transfer pumps etc., light oil tanks, transfer pumps etc., and oil pipe tressels for all oil system lines from tank to pump house and from pump house to boiler front.

39. Silencer for spring-loaded safety valves except specifically mentioned.

40. Conductance of flow model study at our laboratory on the final ducting layout, starting from air heater outlet duct to ID fan inlet duct including ESP.

41. Pent House for ESP.

42. Contact closure inputs required from Purchaser for FSSS.

43. Complete analyzer system for flue gas, steam and water system.

44. RH Protection trip logic (logic by BHEL), Fuel oil flow meter and flow Elements.

45. Connection to H_2 generating plant including H_2 generation plant.

46. Ultrasonic coal flow detector at feeder inlet.

47. Nitrogen cylinders except for preservation of steam generator required during pre commissioning activities.

48. Main steam ejectors.

49. Interconnecting platform with existing unit # 5

50. Furnace maintenance platform.

51. Furnace maintenance cradle.

52. VIS for TG.

ANNEXURE-VI

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 Tenderer with stamp)

Date:

ANNEXURE-VII

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……..