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TENDER NO. BHEL: NR(SCT): RAMGARH CCPP : MM & HRSG: 691

**FOR**

**Erection, Testing, Commissioning and Trial Operation of 1 x 182 TPH HRSG (including 70 M high steel chimney) with related Auxiliaries and Material Handling work for the entire plant packages of 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Raja Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan**

**PART I – TECHNICAL BID**



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



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

**Bharat Heavy Electricals Limited**  
(A Govt. Of India Undertaking)  
**Power Sector – Northern Region,**  
Plot No. 25 , Sector - 16A ,  
Distt. Gautam Budh Nagar, NOIDA – 201 301.INDIA  
Phone: 0091-0120-2515476 / 2515464 / 2515479  
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**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-----  
  
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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 1 x 182 TPH HRSG (including 70 M high steel chimney) with related Auxiliaries and Material Handling work for the entire plant packages of 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan

**TENDER NO. BHEL: NR(SCT): RAMGARH CCPP : MM & HRSG: 691**

#### QUALIFYING REQUIREMENTS:

- 1.1 “Tenderer who wish to participate should have executed within the preceding seven (7) years period reckoned as on the date of bid opening, erection and commissioning work of at least one thermal VU 40 Boiler or alternately two HRSGs of 118 TPH or higher rating units. The term ‘Executed of Works’ shall mean to completion of Safety Valve Floating of concerned unit.”  
(Relevant document in support of above shall be submitted.)  
‘OR’
- 1.2 “Should be executing works of higher rating unit than indicated at cl. 1.1 (as above) against direct order of BHEL.”  
‘AND’
- 2.0 Tenderers should also have an average annual turnover of minimum of Rs. 350 lacs (Three hundred fifty lacs only) based on the audited accounts of last three financial years (2006-07, 2007-08 & 2008-09). Bidders shall submit audited annual accounts (balance sheets and profit & loss account) in support of this.

**Note:** If the qualifying work is completed in the seven (7) year period specified above, even if it has been started earlier, the same will also be considered meeting the qualifying requirements.

#### **NOTES:**

- (i) **The Tender Documents comprise of following;**
  - (a) General Conditions of Contract(GCC), Special Conditions of Contract (SCC), Tender Notice, Project Synopsis, etc.
  - (b) Rate Schedule

- (ii) Tender Documents with complete details are hosted on BHEL's web page www.bhel.com. Bidder(s) intending to participate may download the tender document from the web site. Bidder(s) downloading the tender documents from the web site, shall remit Rs.1000/- (Rupees One thousand only) in the form of crossed demand draft (non-refundable), in favour of BHEL, NOIDA along with their offer
- (iii) Bidder(s) can also purchase hard copy of tender documents from this office. Tender documents (non transferable) will be issued on all working days between 09.30 Hrs. to 12.30 Hrs within the sale period i.e **upto 21.05.2010** on payment of Rs.1,000/- (non-refundable) either in cash or by crossed demand draft in favour of BHEL, NOIDA. Request for issue of tender document should clearly indicate Tender No. and work.
- (iv) Tenders must be submitted to the undersigned 'OR' to Shri Kailash Arora, Sr. Asstt. 'OR' to Smt. Usha Kochhar, Sr. Asstt. in Room No. 104, PSNR, NOIDA latest by **15:00 Hrs. on 21.05.2010**. Technical bids shall be opened at **15.30 Hrs. on 21.05.2010**. Tenders received after the due date & time shall be liable to be summarily rejected.
- (v) Earnest Money Deposit (EMD): Refundable, Non-interest bearing **EMD of Rs 2,00,000/-** shall be deposited by Account Payee Pay Order 'OR' Demand Draft in favour of " Bharat Heavy Electricals Limited" payable at Delhi/NOIDA . Those bidders who have already deposited ' One Time 'EMD' of Rs. 2,00,000/- with BHEL, PSNR, NOIDA need not submit EMD with the present tender.
- (vi) Tenders not accompanied with Full Earnest Money Deposit, as indicated above, will not be considered.
- (vii) **All corrigenda, addenda, amendments and clarifications to this Tender will be hosted in the related web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.**
- (viii) BHEL reserves the right to accept or reject any or all tenders without assigning any reason whatsoever.
- (ix) BHEL takes no responsibility for any delay/loss of documents or correspondences sent by courier/post.
- (x) **BHEL reserves the right to go for a Reverse Auction instead of Opening the submitted sealed bid, which will be decided after technical evaluation. As such, the bidders should submit their best prices in the 'Sealed Price Bid'. However, bidders are required to confirm their acceptance of "General terms and conditions" governing RA specifically in their technical bid. The "General terms and conditions" governing RA are given in the SCC of the NIT. Bidders are also required to furnish following details in their techno-commercial bid, for this purpose (RA).**

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

- a. Name and Designation of official
  - b. Postal Address (Complete)
  - c. Telephone Nos. (Land line & Mobile both)
  - d. FAX No.
  - e. E-mail address
  - f. Name of Place/State/Country, wherefrom he will participate in the RA.
- (xi) Bids, once submitted, shall not be returned.
  - (xii) Unsolicited discount/rebate shall not be accepted after bid opening.
  - (xiii) Purchase Preference will be given to CPSU's as per Govt. Guidelines.

**Sr. DGM/ SCP**



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## TENDER NOTICE - NEWSPAPER

LAST DATE OF SALE : 21.05.2010  
DUE DATE OF SUBMISSION : 21.05.2010 (15:00 Hrs.)

### NIT NO. / NAME OF WORK

**TENDER NO. BHEL: NR(SCT): RAMGARH CCPP : MM & HRSG: 691**

Sealed tenders are invited from the contractors fulfilling qualifying requirements given in the detailed tender specifications for the work of "Erection, Testing, Commissioning and Trial Operation of 1 x 182 TPH HRSG (including 70 M high steel chimney) with related Auxiliaries and Material Handling work for the entire plant packages of 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan."

### NOTES

1. Purchase Preference will be given to CPSU as per Govt. Guidelines.
2. Please visit our website at [www.bhel.com](http://www.bhel.com) for complete details of the tender.
3. All corrigenda, addenda, amendments and clarifications to this Tender will be hosted on above web page and not in the newspaper. Bidders shall keep themselves updated with all such amendments.

Sr. DGM/SCP

## PROJECT SYNOPSIS

### 160 MW Ramgarh Combined Cycle Power Project

Rajasthan Vidyut Utpadan Nigam Limited (RRVUNL) is setting up 160 MW CCPP at Ramgarh. RVUNL has entrusted BHEL for Design, Engineering, Manufacturing, Supply, Transportation, Storage, Installation, Testing and commissioning of 1X 110 MW GTG, 1X50 MW STG, 1X182TPH HRSG packages along with their auxiliaries, 160 MW Combined Cycle Gas Based Thermal Power Plant, Stage-III, Ramgarh, Distt- Jaisalmer, Rajasthan.

The site location is 60 KM away from Jaisalmer on Jaisalmer-Ramgarh Road. Nearest Railway siding is available at Jaisalmer. Nearest Airport & Railhead is 60 KM.

Existing Units: Stage-1 GT-1 35.5MW and Stage-II GT-2 37.5 MW & STG 37.5MW.

All dispatches are expected by road, as there is no railway siding available near the plant.

Tenderers are advised to visit and acquaint themselves with site conditions before quoting. No compensation, whatsoever, shall be entertained on this account.

**Bharat Heavy Electricals Limited**  
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**PROCEDURE FOR SUBMISSION OF SEALED TENDERS:**

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

**TECHNICAL BID (COVER-I)**

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

**PRICE BID (COVER-II)**

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

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

**SECTION-III (PART-A)**

**SPECIAL CONDITIONS OF CONTRACT**

INDEX

<b>Clause</b>	<b>Description</b>
34.	General
35.	Civil works, foundation and grouting
36.	Consumables
37.	Tools & Plants / IMTE's
38.	Supervisory staff & workmen
39.	Material handling and storage
40.	Preservation of components
41.	Erection
42.	Drum lifting and PP Module assy. erection
43.	Welding HT, RG & NDT
44.	Application of insulation
45.	Testing, Pre-commg., commg. & post-commg.
46.	Progress reporting
47.	Drawings & documents
48.	Extra work
49.	Taxes & Duties.
50.	Price variation
51.	Rate schedule
52.	Instructions to tenderers.

**SECTION-III (PART-A)**

**SPECIAL CONDITIONS OF CONTRACT**

**34.0 GENERAL**

- 34.1 The intent of this specification is to provide services for execution of project according to most modern and proven techniques and codes. The omission of specific reference to any method, equipment or material necessary for the proper and efficient services towards installation of the plant shall not relieve the contractor of the responsibility of providing such services / facilities to complete the work or portion of work awarded to him. The quoted / accepted rates / lump sum price shall deem to be inclusive of all such contingencies.
- 34.2 The contractor shall carry out the work in accordance with standard practices / codes/ instructions /drawings/ documents/ specification supplied by BHEL from time to time to the satisfaction of owner of the project.
- 34.3 The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost failing which the job will be carried out by BHEL by engaging other agencies/ departmentally and recoveries will be effected from contractor's bills towards expenditure incurred including BHEL's applicable overhead charges.
- 34.4 Following shall be the responsibility of contractor and have to be provided within finally accepted rates / prices:
- (a) Provision of all types of labour, supervisors, Engineers, watch and ward as required, tools & tackles, calibrated inspection, measuring and test equipment as specified and otherwise required for the work and consumables for erection, testing and commissioning including material handling.
  - (b) Proper out-turn as per BHEL plan and commitment.
  - (c) Completion of work as per BHEL Schedule.
  - (d) Good quality and accurate workmanship for proper performances of equipment.
  - (e) Repair and rectification.
  - (f) Re-conservation / preservation of all components during storage / erection till handing over.
  - (g) Keeping all the erection area neat and clean.
- 34.5 **BHEL-Power Sector(NR) is ISO 9001, ISO 14001, OHSAS 18001, BS 7799 and SA-8000 certified company. Quality of work, to customer's satisfaction and system requirements is the essence of these certifications. The contractor in all respects will organise his work, systems, environment, process control documentation, T&P, inspection, measuring and testing equipment etc. as per instructions of BHEL engineer. Contractor have also to comply with the applicable legislation and regulations with regard to their scope of work**

including health, safety and environment (HSE) aspects of minimising risk arising from occupational health, safety hazards, controlling pollution and wastage's. Besides above the technical clearance from respective statutory bodies for above shall be obtained by contractor at their cost to meet regulatory/ statutory requirements.

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

### **34.6 Contractor shall ensure following towards HSE & Social Accountability :**

34.6.1 Contractor shall ensure **deployment of certified Safety Officer** at site. The Contractor shall be fully responsible for accidents caused due to him or his 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 & SA 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.

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

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

- For work in confined space use 24 V lamp fitting & use tools with air motors or electric tools with max. 24 V.

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

**34.6.4 Contractor shall ensure following :**

- (A) Contractor has to maintain contact with local hospital having scanning & other ultra modern medical facilities required during emergency.
- (B) Contractor has to ensure pre employment medical check for all staff & workers.
- (C) Contractor has to ensure that adequate First Aid facilities are available at work site for emergency purpose. This emergency set-up should include, but not limited to, the following

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

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

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

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

**34.7** The customer M/s. RRVUNL may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works at no extra cost to BHEL. Any defect in quality of work or deviations

from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.

Tenderer may note that as the place of work is inside RRVUNL premises, being manned by their Security 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.

## **35.0 FOUNDATIONS AND GROUTING**

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

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

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

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

**35.4** The contractor shall arrange for grouting of foundation bolt holes of structure / equipment including complete encasing of equipment bases as specified in the drawings / specification or as advised by Engineer after preparing foundation top surface for grouting. Rotating auxiliaries foundation bolts / bases to be grouted by Convextra GP 2 / Pedigrout M10 or equivalent as specified by BHEL. Static equipment foundation bolt and base to be grouted by Portland cement. All the arrangement required for grouting including supply of convextra GP2/ Pedigrout M10/ portland cement, sand, pea gravel and any other material required for grouting, shuttering, nails, wires etc., shall be arranged by the contractor at his cost. The grouting material shall be got approved by the contractor from BHEL Engineer.

- 35.5 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. any other temporary supports shall also be the contractor's responsibility. For these civil works all materials including cement and required facilities will have to be arranged by contractor at his own cost.
- 35.6 All the matching joints which are not to be grouted shall be kept free from the grouting mixture by applying tape or any other alternative method approved by Engineer.
- 35.7 The contractor shall prepare the required test pieces / cubes to ensure the strength of the grout and get the same tested in laboratory at his cost as directed by BHEL Engineer before grouting. Test cubes shall also be taken during grouting for testing in the laboratory and shall be tested at Contractor's cost.
- 35.8 After the grouting, the foundations are to be cure by contractor to the satisfaction of Engineer. The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.
- 35.7 The contractor shall check and verify the alignment of equipment, alignment of shafts of rotating machinery, the slopes of all bearing pedestals, centering of rotors with respect to their sealing bores, couplings etc. as applicable and the like items to ensure that no displacement had taken place during grouting. The values recorded prior to grouting shall be used during post grouting check up and verifications. Such pre and post grout records of alignment details shall be maintained by the contractor in a manner acceptable to the Engineer.

### **36.0 CONSUMABLES**

- 36.1 The contractor shall provide within finally accepted price / rates, all consumables like all welding electrodes (including alloy steel and stainless steel), gaskets for temporary work, gland packing, 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 gases, welding gases and cutting gases), soldering material, dye penetrants, radiography films. Other erection consumables such as tapes, jointing compound, grease, mobile oil, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. 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 which go finally as part of equipment shall be supplied by BHEL free of cost.
- 36.3 It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of consumables. Non availability of any consumable materials or equivalent suggested by BHEL cannot be considered as reason for not attaining the required progress or for additional claim.
- 36.4 It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of electrodes etc. before procurement of welding electrodes / TIG wires. On receipt of electrodes at site these shall be subjected to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch No. date of expiry etc. and produce test certificate for each lot / batch with correlation of batch / lot no. with respective test certificate. No electrode will be allowed to be used without valid test certificate.
- 36.5 BHEL reserves the right to reject the use of any consumable including electrodes, gases, lubricants / special consumables if it is not found to be of the required standard / make / purity or when shelf life has expired. Contractor shall ensure display of shelf life on consumable wherever required and records maintained.
- 36.6 Storage of all consumables including welding electrodes shall be done as per requirement / instruction of the Engineer by the contractor at his cost including arrangements for the same.
- 36.7 In case of improper arrangement for procurement of any consumable, BHEL reserves the right to procure the same from any source and recover the cost from the Contractor's first / subsequent bill at market value plus the departmental charges of BHEL as applicable from time to time (30% at present). Postponement of such recovery is normally not permitted. The decision of Engineer in this regard shall be final and binding on the Contractor.
- 36.8 **All lubricant and chemicals required for cleaning, pre-commissioning, commissioning, testing, preservation and lubricants for trial runs of the equipment shall be supplied by BHEL.** All services including labor and T&P will be provided by the contractor for handling, filling, emptying, refilling etc. The consumption of lubricants / chemicals shall be properly accounted for and surplus material if any shall be properly stacked and returned to BHEL/ CUSTOMER stores at no extra cost to BHEL. Recoveries shall be affected for wastage by the contractor.
- 36.9 Transportation of oil drums, from stores, filling of oil and filling of oil for flushing, first filling of oil and subsequent changeover or topping / making up till the unit is fully commissioned and handed over to customer is included in scope of this contract within the awarded value. Wights for such lubricants shall not be payable and contractor shall take care of such aspects in their offer. The contractor shall have to return all the empty drums to BHEL/ BHEL's client store at no extra cost. Any loss / damage to above drums shall be to contractor's account.
- 36.10 All charges on account of Octroi, terminal or sales tax and other duties on materials obtained for the works from any source shall be borne by the contractor.

**37.0 TOOLS AND PLANTS / IMTES**

- 37.1 T&P being provided by BHEL, as per Annexure-II, to sub-contractor free of hire charges shall be shared by other sub contractors working for BHEL at site and the allotment done by BHEL Engineer shall be final and binding.
- 37.2 Besides the T&P being made available to contractor free of hire charges by BHEL, all other T&Ps and IMTEs which are required for successful and timely execution of the work covered within the scope of this tender, shall be arranged and provided by the contractor at his own cost. Contractor should ensure that these are in good working condition. In the event of the failure of contractor to bring necessary and sufficient T&Ps and IMTEs, BHEL will be at liberty to arrange the same and hire charges as applicable shall be deducted from contractor's bill. Decision of BHEL in this regard shall be final and binding on contractor. Indicative lists of T&Ps and IMTEs to be arranged by the contractor are given as per Annexure-III.
- 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 and IMTE including cranes 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 the operation. All lubricants for these cranes such as mobile oil, gear oil, brake oil, hydraulic oil, torque converter oil and grease will be provided by BHEL free of cost. The **operation** of all BHEL's cranes (**Except for 200/250 MT cranes**) being provided free of hire charges shall be in the scope of the contractor. The contractor shall arrange, at his own cost, trained operators and fuel and other minor consumables (i. e. cotton cloth / cotton waste etc.) for their operation. (**Operator only for 200/250 MT cranes will be provided by BHEL**). **Further, Helpers and fuel for operation of all BHEL cranes shall be provided by contractor within the final accepted rates**).
- 37.6 The contractor shall engage trained and experienced operators for the operation of BHEL's T&Ps. Their skill / performance will be checked by BHEL Engineer before they are allowed to operate the same. However checking of skills by BHEL does not absolves contractor of his responsibilities for proper and safe handling of equipment. Consistent good performance of operators and regular performance evaluation of operators shall be ensured by the contractor.
- 37.7 The day to day and routine maintenance of BHEL's T&Ps should be carried out by contractor as per manufacturer's / BHEL's maintenance schedule at his cost. However, Service Engineer of manufacturer shall be available on routine inspection/ maintenance of BHEL T&P, as per BHEL's directions. These shall be maintained in good working condition during the entire period of use. T&Ps in defective / damaged condition shall be rectified promptly to the full satisfaction of BHEL Engineer. Contractor shall maintain records for maintenance of major T&Ps, which shall be made available for Inspection whenever required. In case of any lapses on the part of the contractor BHEL at its own discretion get the servicing / repair of equipment done at the risk and cost of the contractor with BHEL overheads. Further, if there are breakdowns / damages due to negligence of the

contractor, the complete service / repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.

- 37.8 Repair of self, dynamo, battery and electric wiring of BHEL's T&P's shall be the responsibility of the contractor. The charges of the replacement of the other damaged / worn out parts of BHEL cranes will be borne by BHEL, provided the damage is not due to negligence of the contractor. However, if there are breakdowns / damages due to negligence of the contractor, the complete service/ repair charges and cost of all the spares damaged with BHEL overheads shall be recovered from contractor's RA bills.
- 37.9 Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting contractor at his cost. All necessary manpower, tools, support, consumables, illumination etc. will have to be arranged by contractor at his cost.
- 37.10 The area and infrastructure development of area to be carried out by the BHEL / customer. However in construction projects of this magnitude it is possible that all the areas/ approaches may not be ready. In such cases consolidation of ground and arrangement of sleepers / sand bag filling etc. for safe operation / movement of equipment including cranes / trailers etc. shall be the responsibility of the contractor at his cost. No compensation on this account shall be payable.
- 37.11 In the event of contractor not using and maintaining BHEL T&Ps according to BHEL's instructions, BHEL will have the right to withdraw such item without any notice and no claim in this regard shall be entertained and contractor shall be responsible for delay in execution on this account.
- 37.12 The contractor shall furnish regular utilisation report of the BHEL's T&Ps as per requirement of BHEL.
- 37.13 Any loss / damage to any part of BHEL T&Ps shall be to the contractor's account and any expenditure on these accounts by BHEL will be recovered from the contractor's bill in case the contractor fails to make good the loss.
- 37.14 It shall be responsibility of the contractor to take delivery of T&Ps and IMTEs from stores or place of use by other contractor at project site, transport the same to site and return the same to BHEL / its Customer's store/ place as intimated by BHEL Engineer in project site in good working conditions after use.
- 37.15 Replacement cost including BHEL's overhead in respect of irreparable / completely damaged / non return of T&Ps shall be recovered from the contractor's running bills.
- 37.16 The contractor shall return BHEL's / its Customer's T&Ps and IMTEs issued to him in good working condition as and when desired by BHEL. If return of T&P and IMTE is delayed by contractor, hire charges as applicable shall be levied by BHEL from time, it was requisitioned till the time of actual return.  
T&Ps and IMTEs returned in damaged / unserviceable condition shall be got repaired by BHEL at its own discretion and entire cost of repair with BHEL overheads shall be recovered from the contractor.
- 37.17 Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, Manila ropes, winches and slings etc. History card and maintenance records for major T&Ps will be maintained by the contractor and will be made available to

BHEL Engineer for inspection as and when required. Identification for such T&Ps will be done as per BHEL Engineer's advice.

- 37.18 Contractor shall ensure deployment of reliable and calibrated IMTEs (Inspection measuring and Test equipment). The IMTEs shall have test/ calibration certificates from authorised/ Govt. approved / accredited agencies traceable to National / International standards. Each IMTE shall have a label indicating calibration status i.e. date of calibration, calibration agency and due date for calibration. A list of such instruments deployed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.
- 37.19 Re-testing / re-calibration shall also be arranged at regular intervals during the period of use as advised by BHEL Engineer with in the contract price. The contractor will also have alternate arrangements for such IMTE so that work does not suffer when the particular instrument is sent for calibration. Also if any IMTEs not found fit for use, BHEL shall have the right to stop the use of such item and instruct the contractor to deploy proper item and recall i.e. repeat the readings taken by that instrument, failing which BHEL may deploy IMTEs and retake the readings at contractor's cost.
- 37.20 BHEL shall have lien on all T&PS, IMTEs & other equipment of the Contractor brought to the Site for the purpose of erection, testing and commissioning. BHEL shall continue to hold the lien on all such items throughout the period of Contract. No material brought to the Site shall be removed from the site by the Contractor and / or his Sub-contractors without the prior written approval of the Engineer.
- 37.21 The month-wise T&P deployment plan to be submitted as per format (at Annexure-D to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required T&P, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account.

### **38.0 SUPERVISORY STAFF AND WORKMEN**

- 38.1 The contractor shall deploy all the skilled workmen like millwright fitters, welders, crane operators, drivers, gas cutters, riggers, 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 or acceptable to BHEL) and other experienced supervisory staff and especially skilled labour e.g. crane operators, heavy-duty vehicle driver, sarangs, riggers, khalasis, etc. under this contract especially for main material handling scope of work. To execute material handling work and to assist Stores-In charge for issue and receipt of HRSG, GTG and other packages material, **minimum two 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 and in general see that the works are carried out in a safe and proper manner and in coordination with other labour and staff deployed directly by BHEL or other contractors of BHEL or BHEL's client / other agency.

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.

- 38.3 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.

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

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

- 38.6 It is the responsibility of the contractor to engage his workmen in shifts (two or three shifts as per the requirement) or on overtime basis for achieving the targets set by BHEL and also during the period of commissioning and testing of unit. The contractor's finally accepted rates / prices shall include all these contingencies.

- 38.7 During the course of erection,

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

BHEL after giving reasonable opportunity to the contractor will induct on the work the required workmen in addition to the contractor's workmen to improve the progress. The

expanses so incurred shall be recovered from the contractor's bills with applicable overheads.

- 38.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wire, trees or any other property or to any part of erected components etc., the contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.
- 38.9 The **month wise manpower deployment plan** to be submitted as per format (at **Annexure-C** to general conditions of contract) is only to assess the capability as well as understanding of the contractor to execute the work. It shall be the contractor's responsibility to deploy the required manpower, for timely and successful completion of the job, to any extent over and above those indicated in the above deployment plan (including those which are not covered in the plan submitted) without any compensation on this account. The contractor shall identify separate persons at site for quality control and safety.
- 38.10 Though every endeavor shall be made to ensure that all plant materials are supplied as per schedule. However in a job of this kind it is possible that some materials may be delayed. In order to achieve the ultimate targets, the contractor may have to augment his manpower and resources. No compensation on this account shall be admissible.

### **39.0 MATERIAL HANDLING AND STORAGE FOR ETC PART**

- 39.1 All the equipment/ material furnished under this contract shall be received from the project stores, sheds / storage yards & transported to pre assembly area / erection site & stored in the storage spaces in a manner so that they are easily retrievable till the contractor erects them. **While drawing / lifting material from BHEL / customer stores, contractor shall ensure that the balance / other materials are stacked back immediately. No claim is admissible on this account**
- 39.2 While BHEL will endeavor to store / stack / identify materials properly in their open / close / semi closed / tarpaulins covered storage yard / shed, it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection. They should take the delivery of the same, following the procedure indicated by BHEL, and transport the material safely to pre-assembly yard / erection site in time, according to program.
- 39.3 The contractor shall take delivery of components, equipment / consumables from storage area after getting the approval of BHEL Engineer on standard indent forms.
- 39.4 The contractor shall identify and deploy necessary Engineers / supervisors / workmen for the above work in sufficient number as may be needed by BHEL, for areas covering their scope.
- 39.5 All the equipment shall be handled very carefully to prevent any damage or loss. No untested wire ropes / slings etc. shall be used for unloading / handling. The equipment shall be properly protected to prevent damage either to the equipment or to the floor where they are stored. The equipment from the stores shall be moved to the actual location at the appropriate time so as to avoid damage of such equipment at site.
- 39.6 Contractor shall ensure that while lifting slings shall be put over the points indicated on the equipment or as indicated in the manufacturer's drawings. Slings / shackles of proper size

shall be used for all lifting and rigging purposes. All care shall be taken to safe guard the equipment against any damage. Dragging of piping / valves should be avoided. In case of any damage the cost shall be covered from the contractor.

- 39.7 Approach road conditions from the stores / yards to the erection site may not be equipped and ideal for smooth transportation of the equipment. Contractor may have to be adequately prepared to transport the materials under the above circumstances without any extra cost.
- 39.8 Contractor shall be responsible for examining all the plant and materials issued to him and notify the Engineer immediately of any damage, shortage, discrepancy etc before they are moved out of the stores / storage area. The contractor shall be solely responsible for any shortages or damages in transit, handling, storage and erection of the equipment once received by him. As the erection work will be spread in different areas / locations of the project, contractor has to arrange sufficient number of watch / ward personal to avoid any pilferage of material. As per General Conditions of contract under provisions of clause No 29 BHEL will reserve the right to recover the cost of repair / replacement, if any, to bring back the equipment in original order, in case the equipment / material is lost / damaged while in the custody of the contractor. BHEL's decision in this regard shall be final and binding on the contractor.
- 39.9 The contractor shall maintain an accurate and exhaustive record-detailing out the list of all equipment received by him for the purpose of erection and keep such record open for the inspection of the engineer at any time.
- 39.10 All the material in the custody of contractor and stored in the open or dusty locations must be covered with suitable weather proof / fire retardant covering material wherever applicable and shall be blocked up on raised level above ground. All covering materials including blocks and sleeper shall be arranged by the contractor at his cost.
- 39.11 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's / customer's stores, plant materials storage shall be subjected to the following protection besides other provisions indicated in these specifications elsewhere.

- a) Items stored outdoors shall be stored in such a way that item is at least six inches (6") above the ground
- b) Motors, valves, electrical equipment, control equipment and instruments etc. shall be stored indoors in warehouse provided by contractor. If situation warrant: Motor windings shall be kept dry by use of external heat or space heaters.
- c) Bearings and other wearing surfaces of plant materials shall be protected against corrosion and kept clean.
- d) Insulation materials shall be stored indoors or otherwise protected against getting wet.

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

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

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

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

#### 41.0 ERECTION

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

- 41.2 It shall be contractor's responsibility to check the various equipment foundations for correctness with respect to level, orientation, dimensions etc. and ascertained dimensions shall be measured and submitted to BHEL for approval before erection.
- 41.3 All works such as cleaning, checking, leveling, blue matching, aligning, assembling, welding, temporary erection for alignment, dismantling of certain equipment for checking / cleaning, surface preparation, fabrication at site, cutting, grinding, straightening chamfering, filing, chipping, drilling, reaming, scrapping, machining, surface grinding, shaping, fitting up including NDT & PWHT etc. as may be applicable in such erection works are to be treated as incidental to erection and necessary to complete the work satisfactorily and shall be carried out by the contractor as part of the work.
- 41.4 HRSG supporting structure includes ACC sheets, monitor-roofs of drum & burner operating level including drains to canal. Contractor has to install these roofs as per drawings. The cement required for jointing of the ACC materials will be issued by BHEL free of cost.
- 41.5 It shall be the responsibility of the contractor to provide prefabricated ladders **including materials at his cost** on columns for initial work till such time stairways are completed. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.
- 41.6 No members of the ladder/structure/platform should be cut without specific approval of BHEL. In case it is necessary to cut, the contractor shall rectify / repair in a manner acceptable to BHEL/ customer without any additional cost.
- 41.7 The contractor is strictly prohibited in using the HRSG / BOILER components like angles, channels, hand rails etc. for any temporary supporting or scaffolding works. In case of such misuse a sum as determined by BHEL Engineer will be recovered from contractor's bills.
- 41.8 Normally the high-pressure valves will have prepared edges for welding. But, if it becomes necessary, the contractor will prepare new edges or recondition the edges by grinding or chamfering to match the corresponding tubes/ pipes within finally accepted rates.
- 41.9 All fittings like 'T' pieces, weld neck flanges, reducers etc. shall be suitably matched with pipes for welding. The valves will have to be checked, cleaned or overhauled in full or in part before erection/ after chemical cleaning and during commissioning within finally accepted rates.
- 41.10 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends of piping to suit the layout shall be considered part of the work and the contractor is required to carryout such work within the finally accepted price / rates as per instructions of BHEL, which shall include specified heat treatment & NDT procedures etc.
- 41.11 Certain adjustment in length may be necessary while erecting pipelines / ducts/ casings/ claddings etc. and the contractor should remove the extra lengths / add extra lengths to suit the final layout after preparing edges afresh by adopting specified welding/NDT/ heat treatment procedures, at no extra cost. It is possible that a few flanges may not be matching. The contractor shall be required to cut and re-weld the same as and when required without any additional cost.

- 41.12 The contractor shall completely erect & test all the integral piping systems, covered in the specification including sampling lines upto & including sample coolers, hangers & supports, valves & accessories in accordance with the drawings furnished. This includes all necessary bolting, welding, preheating, stress relieving, testing, cleaning & painting. System shall be demonstrated in condition to operate continuously in a manner acceptable to the Engineer. Welding shall be used throughout for joining pipes except where flanged, screwed or other type joints are specified or shown on the drawings. All piping shall be erected true to lines & elevation as indicated in the drawings. All vents and drains for piping equipment covered in the scope whether shown in the drawings or not, shall be terminated at suitable sump-pit (unless otherwise directed) as directed by the engineer. The contractor shall assist BHEL in preparation of as built piping drawings.
- 41.13 Steel for suspensions for piping, ducting etc will be supplied in running lengths. These are to be cut to suitable sizes and adjusted as per requirement.
- 41.14 Pipes sent in running lengths shall be cut to suit the site conditions and the layouts. Tubes or pipes wherever deemed to be convenient will be sent in running lengths with sufficient bends. Bends up to 80 mm NB will have to be fabricated and tested at site within the finally accepted rates.
- 41.15 Economiser / super heater coils/ Reheater coils, burner panels & valves may have to be hydraulically tested individually, if required, before erection as instructed by BHEL engineer within finally accepted rates.
- 41.16 Fittings and welding of necessary instrumentation tapping points, thermocouples pads, valves, root valves, condensing vessels, flow nozzles, Orifice plates and control valves etc. will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer within finally accepted rates. The erection, welding / NDT of all the above items will be contractor's responsibility even if the:
- (i) Product groups under which these items are released, are not covered in the scope of this tender.
  - (ii) Items are supplied by any agency other than BHEL.
- 41.17 a) All the valves including motorised valves, flap valves, dampers, actuators etc. shall be serviced and lubricated to the satisfaction of Engineer before erecting the same and during pre-commissioning also. Welding / jointing of extension spindle for valves to suit the site conditions and operational facility shall be part of erection work within the finally accepted rates.
- b) The contractor shall be responsible for correct orientation of all valves so that seats, stems and hand wheels will be in desired location. It will be the responsibility of the contractor to obtain the information regarding orientation of valves not fully located on drawings before the same are installed.
- c) The contractor shall dismantle the valves & actuator for overhauling, servicing & lubrication wherever required as advised by the Engineer. The contractor shall also lap or grind valve seats for ensuring the satisfactory performance of valves at no extra cost. All parts such as gaskets, gland packing which form the permanent part of equipment shall be supplied by BHEL free of cost.

- 41.18 No temporary supports should be welded on the pressure parts or piping. Welding of temporary supports / cleats etc., on main HRSG / BOILER columns should be avoided. In case of absolute necessity prior approval from BHEL Engineer will be obtained by contractor.
- 41.19 All hangers, supports and anchors shall be installed as per drawing to obtain safe and reliable and complete pipe installation as per instructions of Engineer. Any additional support as called for by Engineer shall have to be fabricated and erected by the contractor. The raw materials required for fabricating such supports shall be supplied by BHEL free of cost and contractor shall be eligible for payment of such additional supports as per applicable item of rate schedule.
- 41.20 The contractor shall ensure that all supporting elements, anchors & restraint have been installed and adjusted in accordance with the drawings / sketches & other written instructions of the Engineer. The contractor shall inspect the hangers associated with the piping systems as follows:
- After hydraulic test, with the piping in the cold position, with all travel stops removed, with the pipe completely insulated and complete in all respect ready for start up.
  - Piping in the hot position with the unit operating at the maximum load.
  - Piping in the cold position during the first complete shut down.
- 41.21 Spring suspensions/ constant load hangers have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Any adjustments, removal of temporary arrestors / lockers etc., have to be carried out as and when required.
- 41.22 The hanger assemblies shall not be used for attachment of rigging to hoist the pipes into position. Separate temporary supports shall be used to securely hold the pipe in position till pipe supports are completely assembled and attached to the building structure.
- 41.23 All attachments welding including those for insulation works coming on pressure parts / non-pressure parts which the contractor has erected shall have to be done by the contractor within finally accepted rates only.
- 41.24 The calibration of skid 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
- 41.25 Layout of small bore piping in HRSG / BOILER and fuel systems etc. as required shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection or from aesthetic point of view. Contractor at no extra cost to BHEL should carry this out. Bends up to 80 mm NB will have to be fabricated and tested at site within the finally accepted rates. As built

drawings shall also be made by the contractor and submitted to BHEL after final execution of respective small bore piping work with in the final accepted tonnage rate.

- 41.26 Additional platforms and ladders of permanent nature for approaching different equipment, as per site requirement which may not be indicated in drawings shall be fabricated and installed by the contractor. However, the contractor will be paid for this work on accepted tonnage rate for erection irrespective of number of platforms. The materials required for platforms excluding consumables and T&P will be provided by BHEL, some materials for such work may have to be taken from packing materials, the contractor will be required to retrieve the same from packing materials by using gas cutting etc. at no additional cost to BHEL.
- 41.27 Erection of power cylinders, motorised valves, valve actuators etc. coming under various groups is covered under the scope of this specification. However C&I calibration for pneumatic valves & power cylinders shall be arranged by BHEL through C&I agency at no cost to the contractor for this package. The alignment and any mechanical adjustments including link adjustment, opening & reconnection of links, replacement of valve / actuator or any mechanical part, air filter & regulator cleaning etc. required during calibration and operation, the same shall be carried by the contractor for this package. However, if re-calibration is required till handing over of the equipments the same shall be organised by the contractor for this package as detailed above with in the final accepted rates. The valves & electrical operated actuators covered under this package shall be erected, tested & commissioned by the vendor for this package.
- 41.28 Hanger rods are shown in the pressure parts arrangement drawings for HRSG / BOILER. Any cutting / welding of these hanger rods will be done by the contractor. The hangers for pressure parts will be tested for even distribution of load with the help of torque wrench, which is to be arranged by the contractor.
- 41.29 All rotating machines and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. If, in the opinion of the BHEL engineer, the equipment is to be checked for clearances, tolerances at any stage of the work or during commissioning period, the contractor at his cost shall carry the dismantling, cleaning, lubricating and re-fitting. All rotating machines shall be rotated periodically during storage, erection and log maintained to avoid bowing of shafts.
- 41.30 All the shafts of rotating equipment should be properly aligned to those of the matching equipment to as perfect and as accurately as practicable. The equipment shall be free from excessive vibrations so as to avoid over heating of bearings or the conditions which may tend to shorten the life of equipment. All bearings, shafts and other rotating parts shall be thoroughly cleaned and suitably lubricated before starting.
- 41.31 The contractor shall carry out trial run of all motors including checking the direction of rotation in the uncoupled condition, Checking alignment and re-coupling the motor to the driven equipment as per instructions of BHEL engineer and to their satisfaction.
- 41.32 Forced lub oil system of motors or rotating equipment form parts of the work under this specification.
- 41.33 All the motors and equipment shall be suitably doweled after alignment of shafts with taper / parallel machined dowels as per the direction of the Engineer. Dowel pins required are

be machined by the contractor at his own cost. However the materials for dowel pins shall be issued by BHEL free of cost.

- 41.34 The contractor, at no extra cost to BHEL, shall carry out servicing and realignment of skid mounted equipment, if required by BHEL.
- 41.35 All electrical panels, control gears, motors and such other devices shall be properly dried by heating to improve IR valve, before they are energized. Bearings, slip rings commutators and other exposed parts shall be protected against moisture ingress and corrosion during storage and periodically inspected.
- 41.36 Contractor shall carry out kerosene testing of all bearing housing of various rotating equipment like pumps, fans etc. as per BHEL engineer's instructions. Performance of hydro test of oil coolers of rotating machines and other equipment as per BHEL engineer's instructions is included in the scope of work.
- 41.37 Certain rotating machinery after, initial runs and commissioning of the equipment, have to be hot aligned as per the instructions of BHEL engineer. Cleaning fans, ducting etc., free of extraneous steel, scaffolding materials, electrodes, all foreign materials etc. before trial run of rotating machinery, and at various stages of pre-commissioning activities as per BHEL engineer's instruction, is within the scope of work.
- 41.38 All the bearings, gear boxes, shaft and other rotating parts etc. of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer, for cleaning the bearing, gears etc. with kerosene or some other reagent, if necessary, by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing / lubricating them with recommended lubricants and for assembling back the dismantled parts, within the finally accepted rates. Lubricants will, however, be supplied free of cost by BHEL.
- 41.39 After initial trial of rotating equipment, control and power cabling for motors and other equipment / instrumentation shall have to be disconnected for checking alignment and re-setting / re-alignment / hot alignment. Contractor shall have to arrange for disconnecting control and power cabling as per BHEL engineer's instructions and clearance and reconnect the control and power cabling after realignment. Quoted tonnage rate shall be inclusive of the above.
- 41.40 Packer plates should not only be blue matched with the foundations but also interpacker contact surfaces, contact surfaces between packer and equipment, contact surfaces between packer and foundation frame etc. shall also be blue matched by Prussian blue match checks and percentage contact shall be achieved by chipping, machining, scrapping as per BHEL engineer's instructions.
- 41.41 Contractor shall arrange changing of preservative oil in the gear boxes, journal and other bearing assemblies of rotating equipment when in storage areas or after erection of equipment as the case may be as per the instructions of BHEL engineer. Necessary lubricants / oil will be supplied by BHEL and the same will be drawn by contractor from BHEL / customer's stores and transporting to site. No additional payment will be made for such works even though supply of lub oil might have been made under regular despatchable unit no. against product group main assembly (PGMA) and appearing in the shipping list. Prior to the commissioning of the equipment, oil to be drained and collected in drums provided by BHEL and returned to BHEL /customer's stores.

- 41.42 The HT motor bearings shall be blue matched at site and checked for bearing clearances. The contractor shall carry out scraping of bearing housing if required. Check for air gap and adjustment of stator/ rotor for magnetic center of HT motor shall be carried out as part of erection.
- 41.43 The contractor shall be responsible for obtaining necessary approval and making whatever additions / modifications considered necessary by the Electrical Inspector, Boiler inspector or other authorities to bring the installation in conformity with the applicable rules and regulations. The liaison with the inspectors, arrangement for inspection / inspector's visit, preparation of documents, furnishing clarifications, information etc. as and when required will have to be done by the contractor with in the final agreed price.
- 41.44 Contractor shall take all safety measures and ensure that adequate precautions are enforced for area safety and good house keeping is maintained in their work area in line with BHEL and it's client's safety policy. All packing material and scrap steel etc. shall be cleared from work site both inside 'plant courtyard' and area so allotted for site fabrication, on regular basis and transported to identified disposal yard as allocated by BHEL / it's client.
- 41.45 The temporary wiring used for construction power supply in fabrication area shall be taken through PVC pipes / conduit or overhead on temporary poles.
- 41.46 The entire work is being executed as per the specifications, drawing and documents furnished by BHEL manufacturing units and as directed by BHEL Engineers at site to the entire satisfaction of BHEL' client. BHEL's client / client's consultant has full authority to check / recheck / inspect any work, T&P, procedure, process etc. at any point of time jointly with BHEL or independently. It shall be responsibility of the contractor to cooperate in every respect and provide the necessary assistance with in the final accepted rates.
- 41.47 The fans and other rotating machines shall be checked for clearances & other vital tolerances. The IGV unit shall be serviced. Necessary assistance for balancing of equipment during trial run, if required, shall be provided by the contractor free of cost. \
- 41.48 Brief equipments / salient points for HRSG and associated equipments
- 1.0 HP and LP steam drums with internals.
  - 1.1 Spiral finned HP and LP super heaters
  - 1.2 Spiral finned HP and LP evaporators
  - 1.3 Spiral finned HP economizer.
  - 1.4 Spiral finned HP condensate preheated (CPH).
  - 1.5 Sample cooler (as part of SWAS system).
  - 1.6 Complete gas duct work with necessary expansion joints and insulation from HRSG inlet expansion joint up to stack inlet as shown in GA drawing.
  - 1.7 Boiler integral piping, fitting , valves , drains , and vents as required by boiler code.

- 1.8 HP steam attemperator with control valves.
- 1.9 Safety valves with silencers on drum, safety valve with silencer on super heater, and direct water level gauges and electronic water level indicators on drum , for HP and LP circuits.
- 1.10 Start-up vent with silencer for both HP & LP system.
- 1.11 Feed control station for HP & LP circuits.
- 1.12 Complete boiler supporting structural steel, foundation bolts and anchor channels.
- 1.13 Platform at bottom access door level, staircases for both HP & LP system.
- 1.14 Inside insulation with required fixing components.
- 1.15 CBD, IBD tanks.
- 1.16 Dedicated steel chimney of 70 M height for HRSG
- 1.17 Electrical & pneumatic actuators. & Lighting protection and aviation lamp for main stack.
- 1.18 The complete HRSG ducting from inlet to outlet is internally insulated in accordance with drawings / data sheet with required thickness such that the averaged surface temperature of the outer casing is maintained.
- 1.19 During pre-commissioning of HRSG, chemical cleaning will be done by alkali boil out or as per standard procedure of BHEL.

**HRSG Main Chimney:**

The steel chimney is of self-supported, straight cylindrical type. The chimney shell will be made of mild steel to IS 2062. Cage Ladder & platforms to approach aviation lamps and sampling ports are to be done. The handrails, cage ladder, platform etc. will be of painted. Aviation lamps (Neon type) including its cables and junction box up to bottom of chimney along with Lightning arrestor will be installed.

An access door at the bottom region of chimney is provided. Thermal insulation shall be carried out externally for full height of the chimney as per specifications. The insulation shall be of lightly resin bonded mineral wool covered with plain aluminium cladding sheet.

**Valves And Fittings:**

The boiler is provided with necessary stop valves, non return valves, control valves, safety valves, level gauges, blow down cocks, drain and vent valves as shown in the P & I scheme to facilitate smooth operation, safe start-up and shutdown. All regular valves (gate, globe, non-return, regulating, blow down, safety valves and test pressure gauge valves) , Control valves, drains, vent valves etc. will be carried out as per drawings / data sheets.

### **Insulation And Lagging**

The inside insulation material would be ceramic/mineral wool mattress of suitable density and designed for a suitable averaged surface temperature for a reference ambient temperature with a wind velocity as furnished in the data sheet. The HRSG is internally insulated. The internal insulation of the inlet /boiler/outlet duct will be covered by internal liner of suitable thickness and material as indicated in the data sheet. The steam drum and all external piping will be externally insulated with mineral wool with outer plain aluminium cladding .All the internal insulation of the HRSG will be carried out. The steam drum and boiler integral piping will be externally insulated and covered with aluminium cladding of suitable thickness as per spec.

HRSG casings are required to be internally insulated at site within the scope of contract and the insulation may be LRB Wool and Ceramic Wool as per design / data sheet.

### **Outlet Ductwork**

Outlet ductwork with support steel will be erected to connect between the HRSG outlet and the Chimney as per spec / data sheets.

## **42.0 DRUM LIFTING & PRESSURE PARTS MODULE ASSEMBLIES ERECTION.**

- 42.1 Boiler drum shall be unloaded either in storage area or near the erection site / boiler / HRSG depending upon site conditions. Shifting / dragging of the same to erection site for erection shall be within the scope of this contract and will be erected as per site conditions and instructions of BHEL Engineer.
- 42.2 The boiler drum of HRSG has to be lifted with 200/ 250 MT crane after the pressure part modules are positioned & secured. Being self-supporting the drum will not have any suspension arrangement. Fabrication & installation of the temporary structure for supporting & final alignment is in the scope of contractor. The structural material will be supplied by BHEL free of cost. This temporary structure is to be removed after the completion of welding of connecting piping.
- 42.3 The pressure parts (modules) are received at site with temporary transportation arrangement. The contractor has to remove these structures at defined stages of material handling / erection at no extra cost to BHEL. The temporary structures has to be accounted / returned to BHEL stores within the quoted rates.
- 42.4 Structural steel will be provided for handling of single module of HRSG and for up- righting them. Fabrication of this structure will be in the scope of the contractor. After erection of the modules this structure has to be accounted for / returned to BHEL stores. The contractor will be paid as per the quoted tonnage rate.

## **43.0 WELDING, HEAT TREATMENT, RADIOGRAPHY and NDT:**

- 43.1 The pressure parts & IBR pipe lines shall be erected in conformity with the provision of Indian Boiler Regulations and as may be directed as per any other standards/

specification in practice, in BHEL. The method of welding (ARC, GAS, TIG or other method) may be indicated in the detailed drawings/ schedules. BHEL Engineer will have the option of changing the method of welding as per site requirements. **Semi automatic welding (GMAW) process shall be used for non-pressure parts / ducting / structures etc to the maximum possible, considering its cost efficiency, better quality and time saving features.**

- 43.2 Welding of pressure parts / equipment / piping / high tensile structural steel shall be done by certified high pressure welders who possesses valid certificate of CIB of the state in which the equipment is erected as per provision of IBR. The HP welder who possesses necessary certificate shall appear well in advance before the expiry of the validity of his certificate for re-qualification test as per relevant provision of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates have expired, shall have to be terminated forthwith.
- 43.3 All welders including tack welder, structural and high pressure welder shall be tested as per ASME section IX and approved by BHEL Engineer before they are actually engaged on work though they may possess the IBR certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The records of qualification and performance of each HP welder shall be maintained by the contractor in Performa given by BHEL Engineer. All the welders qualified for the work will be issued an identity card by the contractor with the approval of BHEL Engineer and welder will keep the same with him at work place. The record of joints, consumables & equipments along with welders identity shall be maintained by the vendor as per BHEL Engineer's instructions.
- 43.4 The root run welding of all butt welds of tubes/ pipes (HP or LP), instrumentation tapping points etc. will be done by TIG welding process only. Subsequent welding will be done as per welding schedule / Instructions of the engineer including full TIG welding of butt weld joints of tubes / pipes of lesser thickness if required. The contractor within the finally accepted rates shall arrange purging with inert gas in case of stainless steel joints as per requirement.
- 43.5 Complete penetration of welding shall be achieved and all welded joints shall be subject to acceptance by the Engineer.
- 43.6 Engineer may stop any welder from the work if his work is unsatisfactory for any technical reason or if there is a high percentage of rejection of joints welded by a particular welder which, in the opinion of the Engineer, will adversely affect the quality of the welding though the welder has earlier passed the tests prescribed by Engineer. The welders having passed qualification tests does not relieve the contractor of contractual obligation to continuously check the welder's performance.
- 43.7 Faulty welds caused by the poor workmanship or lack of supervision of lack of supervision on the part of the contractor shall be cut and re-welded at the contractors expenses. The procedure for the repair of defective welds shall be approved by the Engineer prior to any repair being made. For each batch of approved brassed certified showing compliance with the specification shall be secured and shall be submitted to the BHEL Engineer.
- 43.8 All charges for testing of contractor's welders including destructive and non destructive tests conducted by BHEL at site or at any laboratory shall have to be borne by the contractor only. The materials for plate test pieces and for pipe and tube will be given by BHEL.

- 43.9 All welds shall be painted with anticorrosive paint, once Radiography and stress relieving works are over. Necessary consumables and scaffolding etc. Including paints shall be provided by contractor at his own cost. Daily welding reports in the proforma suggested by BHEL should be submitted without fail.
- 43.10 Only BHEL approved **electrodes and filler wires** as accepted by principal owner of plant will be arranged and used by the contractor, within the finally quoted price. BHEL reserves the right to test any approved electrode being used by the contractor. Testing charges for the same shall be borne by the contractor. All electrodes shall be baked and dried in the electric electrode drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot. The electrodes brought to the site will have valid manufacturing test certificate. The test certificate will have co-relation with the lot No. / batch No given on electrode packets. No electrodes will be allowed to be used in the absence of above requirement. The thermostat and thermometer of electrode drying oven should also be calibrated and test certificate from Govt. approved / accredited test house traceable to National / International standards shall be submitted to BHEL before putting the oven in use. Periodical calibration for the same shall also be arranged by the contractor within the finally accepted rates.
- 43.11 The regulators used on welding machines shall be calibrated before putting these into use for work. Periodic calibration for the same shall also be arranged by the contractor at his cost and records shall be maintained. The regulators used with the gas cylinders should be of repute make and preferably ISI marked.
- 43.12 Preheating, radiography and other ND tests, post-heating and stress relieving after welding of tubes, pipes, including attachment welding wherever necessary, are part of erection work and shall be carried out by the contractor in accordance with the instructions of the Engineer. All equipment's and consumables essential for carrying out the above process have to be arranged by the contractor at his cost.
- 43.13 Contractor shall arrange all necessary heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, heating elements, thermocouples, etc. insulating materials like asbestos cloth, ceramic beads, asbestos ropes etc. required for heat treatment/ stress relieve operations. Temperature shall be measured at least at two different points for pipes above 200 mm dia. by thermocouple, and recorded on a continuous printing type recorder. All the recorded graphs for heat treatment works shall be the property of BHEL. The contractor has to provide thermo-chalks, temperature recorders, thermocouple attachment units, graphs, sheets, etc. for checking within the finally accepted rates. All stress relieving equipment will be used after due calibration and submission of test certificate to BHEL. Periodic calibration from Govt. approved / accredited Test Houses traceable to National / International standards will also be arranged by the contractor for such equipment at his cost. The contractor shall obtain the signature of Engineer or his representative on the strip chart of the recorder after setting up the weld joints for heat treatment operation prior to the starting.
- 43.14 The technical particulars, specification and other general details for radiography work shall be in accordance with ASME, IBR, DIN or ISO as specified by BHEL.
- 43.15 Iridium-192 shall be used by contractor for radiography work. The geometric unsharpness shall not exceed 1.5 mm. Taking adequate safety precautions shall be the responsibility of

the contractor while carrying out radiography. Necessary safe guards required for radiography (including personnel from BARC) shall be arranged by contractor at his cost. All related documents issued by BARC shall be submitted by the contractor to BHEL.

- 43.16 Low speed high contrast, fine grain films (D-7 or equivalent) in 10 cm. width only be used for weld joint radiography. Film density shall be between 1.5 to 2.0.
- 43.17 All radiographs shall be free from mechanical, chemical or process marks, to the extent they should not confuse the radiographic image and defect finding. Penetra meter as per ASME, DIN, and ISO and as specified by BHEL must be used for each exposure.
- 43.18 Lead numbers and letters are to be used (generally 6 mm size) for identification of radiographs. Contract no., joint identification, source used, welder's identification and SFD are to be noted down on paper cover of radiograph.
- 43.19 Lead intensifying screens for front and back of the film should be used as per the above referred ASME specification.
- 43.20 The joint is to be marked with permanent mark A,B,C, etc., to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down stream side of the weld.
- 43.21 For multiple exposure on pipes, an overlap of about 25 mm of film should be provided.
- 43.22 The contractor shall have a dark room fully equipped with radiography equipment, film (un-exposed), chemicals and any other dark room accessories ie all the facilities including airconditioners for storing and processing radiography films. There should be adequate number of radiography personnel with sufficient experience and certified by M/s BARC as Radiographer for conducting radiography test in accordance with safety rules laid down by Division of Radiological protection. These personnel should also be registered with DRP / BARC for film badge service. The proof of having sufficient film / chemicals to complete the entire work should be shown to BHEL.
- 43.23 All arrangements for carrying out radiography work including dark room and air conditioner and other accessories shall be provided by contractor within the space allotted for office at his cost. As an alternative the contractor may deploy an agency having all above facilities and who are duly approved / accredited by BARC and/or other Regulatory authorities. Detailed particulars of such agencies will be submitted and got approved by BHEL Engineer before the actual deployment of agency for radiography work.
- 43.24 Contractor shall note that 100% radiography will be done at the initial stages on all the HP welding joints. Subsequently, radiographic inspection will be done on the basis of quality of welding. However minimum percentage of joints to be radiographed shall not be less than the requirement of IBR or as specified by BHEL. The percentage may be increased depending upon the quality of joints and at the discretion of BHEL. Every rejection shall be penalised with further two no of additional weld joints to be radiographed in case of percentage radiography.
- 43.25 If the contractor does not carryout radiography work due to non-availability of source/ film/ chemical/ operator etc., BHEL will get the work done departmentally or through some other agency at the risk and cost of the contractor.
- 43.26 All the radiographs shall be properly preserved and shall become the property of BHEL.

- 43.27 Since radio-isotopes are being used, all precautions and safety rules as prescribed by BHEL/BARC/Customer shall be strictly followed. BARC/ DRP Certificates to be provided before taking up the work.
- 43.28 The defects as pointed out by the engineer shall be rectified and re-radiographed immediately to the satisfaction of BHEL Engineer. The decision of the engineer regarding acceptance or otherwise of the joint will be final and binding on the contractor.
- 43.29 Radiography of joints shall be so planned after welding that the same is done either on the same day or next day of the welding to assess the performance of HP welders. If the performance of welder is unsatisfactory, he shall be replaced immediately.
- 43.30 Wherever radiographs are not accepted, on account of bad shot, joints shall be re-radiographed and re-shots submitted for evaluation. Radiographs shall be taken on joints after carrying out repairs. However, if the defect persists after first repair, as per radiograph, carrying out radiography shall be repeated till the joints is made acceptable. In case the joint is not repairable, the same shall be cut, re-welded and re-radiographed at contractor's cost.
- 43.31 The contractor shall also be equipped for carrying out other NDT like LPI / MPI/ UT etc. as required as per welding schedule/ drawings within the finally accepted rates/ prices.
- 43.32 Heat treatment and radiography may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all necessary arrangements including labour, supervisor/ Engineer required for the work as per directions of BHEL.
- 43.33 The contractor shall maintain a record in the form as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection, heat treatment (if any) etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final. All site welding joints shall be subject to acceptance by BHEL Engineer.
- 43.34 All butt / fillet welds shall be subject to dye penetration test as per the instructions of the Engineer at no additional cost.
- 43.35 The contractor shall carry out the edge preparation of weld joints at site in accordance with the details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only wherever edge preparation otherwise is impractical. All slags / burrs shall be removed from cuts and all the hand cuts shall be ground smooth to the satisfaction of engineer.
- 43.36 The contractor's Engineer shall prepare as per direction of BHEL Engineer the complete field welding schedule for all the field welding activities to be carried out in respect of piping and equipment erected by him involving high pressure welding at least 30 days prior to the scheduled start of erection work at site and submit the same to BHEL Engineer for approval. Such schedules shall be strictly adhered to by the contractor after approval.

#### 44.0 APPLICATION OF INSULATION

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

- 44.1 All attachment welding including welding of hooks / supports as per pitch both on equipment & piping shall have to be done by the contractor as per drawings or as directed by Engineer. Attachment welding shall have to be done by certified welders. If necessary contractor may have to cut the hooks without any extra cost. The HRSG / BOILER ducting / casings shall be internally insulated with ceramic wool and cladded with stainless steel sheet on stainless steel hooks & retainers. Plasma cutting machine required is to be arranged by the contractor.
- 44.2 Applying of red oxide paint including supply of paint on welded portions as directed by Engineer.
- 44.3 The mineral wool mattresses (bonded / unbounded) are received at site in standard sizes. These are to be dressed / cut to suit site requirements by the contractor.
- 44.4 The no. of layers / thickness of mineral / ceramic wool shall be as per various drawing / insulation schedule and as directed by Engineer. After applying the mineral / ceramic wool mattress, the required holding materials if necessary (by fabrication of rings/ hooks at no extra cost) shall be fixed as directed and as per drawings and specifications. Required material for fabrication of rings / hooks shall be supplied by BHEL free of cost.
- 44.5 Application of two coats of anti-corrosive black bituminous paint (corresponding to relevant IS code) on inner surfaces of sheet cladding and bitumen sealing compound on cladding joints, if necessary, is included in the scope of this work and will be carried out within the finally accepted rates. The sealing compound and the anti-corrosive black bituminous paint required for this work is to be arranged by the contractor at his cost
- 44.6 To ensure that the finished surface of the insulation conform to the dimensions and tolerances given in the drawing. Aesthetic finish and accuracy of work are most important.
- 44.7 It is the responsibility of the contractor to ensure that the insulation materials and sheet metal covering issued to him for application are well protected against loss or damage from weather conditions tending to affect its quality by the provision of closed / semi closed sheds at his cost. If any damage occur to the material due to improper storage or due to any causes attributable to the contractor except for normal breakages or damages allowed in such cases, the cost of such damaged material shall be to the account of the contractor.
- 44.8 Contractor is liable for the accounting of the material issued to him and any unaccountable losses shall be made good by him.
- 44.9 All the surplus, unused materials etc., supplied by BHEL shall be returned to BHEL after the work is over. Materials like gunny bags and packing materials, empty containers may be returned at periodical intervals.

- 44.10 Contractor shall mix & apply the refractory / insulation as per the instructions of BHEL Engineer. Castable refractory / insulation after application shall be cured as per the instructions of BHEL Engineer.
- 44.11 Application of Castable refractory between tubes, around burners, on ceiling is to be done as directed by Engineer and as per detailed drawings & specifications.
- 44.12 Dressing of insulation brick to suit site conditions, curing refractory concrete applied / sheet cladding over insulation form part of this work.
- 44.13 Contractor shall observe all precautions for laying / curing of Castable refractory. Any defective works found shall be rectified by contractor at his own cost including materials.
- 44.14 Making structural supporting work for pour able insulation, laying pour able insulation, adhering to all specifications and instructions during application form part of this work.
- 44.15 The contractor shall provide the required quantity of wire, nails, planks for formwork and other material for centering and grouting works.
- 44.16 The contractor shall leave certain gaps and opening while doing the work as per instructions of BHEL engineer to facilitate inspection during commissioning and to fix gauges, fittings and instruments. The gaps will have to be finished as per drawings at a later date by the contractor at his cost.
- 44.17 Plates, bars and rods and other materials shall be cut and rewelded from the fabricated pieces to suit erection requirements for which no extra payment shall be made to the contractor.
- 44.18 Aluminum / stainless steel sheet metal cladding over insulation will consists of plain / ribbed / corrugated sheets. The sheets will be supplied in standard sizes. Their application shall be carried out by fabrication to the sizes and shapes specified in drawings, beading, swaging, bewelling of sheets, crowning the sheets if necessary, application of two coats of anti-corrosive black bituminous paint on inner surfaces, fixing the same to supports over wool insulation with screws as specified in BHEL drawings or as instructed by BHEL Engineer.
- 44.19 A logbook shall be maintained by the contractor for the clearance of the area for application of insulation. If the contractor does the work on his own accord without prior permission the area shall be redone at his cost.
- 44.20 Wastage allowance for insulation materials issued are as follows:
- |  |   |    |
|--|---|----|
| a) Wool / LBM mattresses and cladding sheets | : | 2% |
| b) Castable refractory                       | : | 2% |
| c) Insulation bricks & mortar                | : | 2% |
- 44.21 If during erection and commissioning any of the parts are to be temporarily fixed and then replaced by permanent ones at a later date or if any of the parts are to be removed for modification, rectification, adjustment and then refitted or if some parts are to be opened for inspection and checking and for measurement of metal surface temperature the same may necessitate removal and reapplication of insulation and sheet metal

cladding, which shall be done by the contractor at no extra cost and the erection rate quoted shall be inclusive of such contingencies.

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

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

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

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

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

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

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

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

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

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

- 45.8 Commissioning of the HRSG / BOILER will involve trial run of all the equipment erected, alkali flushing, alkali boil out, acid cleaning, passivation, preservation, steam blowing, floating of safety valves, flushing of all the lines by air, oil or steam as the case may be, trial run of the HRSG / BOILER, servicing of valves and any other works incidental to commissioning. Contractor shall provide various category of manpower in sufficient numbers along with supervisors / engineers including necessary consumables, IMTEs, T&P etc and any other assistance required during pre-commissioning, commissioning & post commissioning of equipment & attending any problem in the equipment erected by the contractor till handing over. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 45.9 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after alkali boil out, steam blowing and during commissioning as may be necessary and is the part of erection & commissioning.
- 45.10 In case any defect is noticed during tests, trial runs and commissioning such as loose components, undue noise or vibration, strain on connected equipment etc., the contractor shall immediately attend to these defects and take necessary corrective measures. If any readjustment and realignment are necessary, the contractor within the finally agreed tonnage rate shall do the same as per Engineer's instructions including repair, rectification and replacement work. The parts to be replaced shall be provided by BHEL.
- 45.11 During this period though the BHEL's customer's staff will also be associated in the work, the contractor's responsibility will be to arrange for the complete requirement of supervision, men, consumables, T&P and IMTEs till such time the commissioned units are taken over by the BHEL's customer.
- 45.12 It shall be specifically noted that the above employees of the contractor may have to work round the clock along with BHEL Engineers and hence overtime payment by the contractor to his employees may be involved. The contractor's finally accepted rates/ price shall be inclusive of all these factors also.
- 45.13 In case, any rework is required because of contractor's faulty erection which is noticed during commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 45.14 During commissioning, opening / closing of valves, changing of gaskets, realignment of rotating and other equipment, attending to leakage, minor adjustments of erected equipment may arise. The finally accepted price / rates shall include all such works.
- 45.15 All temporary supports shall be removed in such a way that pipe supports are not subjected to any sudden load. During hydro static testing of pipes, all piping having variable spring type supports shall be held securely in place by temporary means while constant spring type support hangers shall be pinned or blocked solid during the test.
- 45.16 The contractor shall carry out cleaning and servicing of valves and valve actuators prior to pre-commissioning tests and / or trial operations of the plant. System for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer and to ensure that no valves and valve actuators are left un-serviced. Wherever

necessary as required by BHEL Engineer, the contractor shall arrange to lap/ grind valve seats at no extra cost.

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

#### **46.0 PROGRESS REPORTING**

- 46.1 Contractor is required to draw mutually agreed monthly erection program in consultation with BHEL Engineer well in advance. Contractor shall ensure achievement of agreed programme and shall also timely arrange additional resources considered necessary at no extra cost to BHEL
- 46.2 Weekly progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled programme shall be discussed for actions to be taken for achieving targets. Contractor for discussions shall also present the programme for subsequent week. The contractor shall constantly update/ revise his work programme to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of non-conformities.
- 46.3 The contractor shall submit daily, weekly and monthly progress reports, HP joints welding and radiography reports, manpower reports, materials reports, consumables report and other reports as per proforma considered necessary by the Engineer.
- 46.4 The progress report shall indicate the progress achieved against planned, with reasons indicating delays, if any, and shall give the remedial actions which the contractor intends to take to make good the slippage or lost time, so that further works again proceed as per the original programme and the slippages do not accumulate and effect the overall programme.
- 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 DRAWING 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 / documents to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL Engineer at site after completion of work. Contractor shall ensure safe storage and quick retrieval of these documents.
- 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 drawing/ data/ documents and removal of obsolete ones from work place and returning to BHEL.

- 47.4 The data furnished in various annexures 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.
- 47.7 Any ambiguity found in the drawings should be brought to the notice of engineer prior to start of work.
- 47.8 Certain revisions of drawings are received during the course of execution, if the same have been received prior to start of particular (specific) job then no claim will be admissible on this account.

#### **48.0 EXTRA WORK:**

- 48.1 BHEL may consider for payment of extra works on man-hour basis @ Rs.30/- (Rupees thirty only) per man-hour only for such of those works which:
- a) Require major revamping or repair on the BHEL / CUSTOMER supplied material and which are totally unusual to normal erection work.
  - b) Require rectification / modification for change or improvement in the design during erection or commissioning,
  - c) Requiring fresh fabrication of components in place of rejected /replaced components. Where rejection is not due to contractor's workman-ship.
- 48.2 The rates indicated as above, shall include over time, if any, consumables, supervision, use of tools and tackles and other site expenses and incidentals.
- 48.3 The extra works, if any, shall be carried out by a separate gang, which can be identified for certification of man-hours. Logbook should be maintained and should be signed jointly by the contractor's representative and the BHEL Engineer on day-to-day basis. However, signing of the logbook does not necessarily mean acceptance of the extra works, which would be identified by Engineer whether work is covered in one of the above categories. Only those works and man-hours, which are certified by the BHEL Engineer-in-charge, will be considered for payment. The decision of BHEL in this regard shall be final and binding on the contractor.

#### **49.0 TAXES & DUTIES**

- 49.1 **TDS under Income Tax, Sales Tax, VAT, Surcharge etc**, if any, shall be deducted at prevailing rates on gross invoice value from the running bills

unless Exemption Certificate from appropriate Authority / Authorities is furnished.

- 49.2** 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.**

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

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

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

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

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

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

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. 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.

## 52.0 INSTRUCTIONS TO TENDERER

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

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

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

- 52.4 The contractor in the event of this work awarded to him, shall establish a site office at site and keep posted an authorised 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 authorised representative shall be communicated to the contractor's representative at site office and the same will be deemed to have been communicated to the contractor at his legal address.
- 52.5 **House keeping:** To maintain safe and healthy working atmosphere, it is expected from the contractor to maintain proper storage and handling of equipments under his custody and ensure regular housekeeping on daily basis. In case at any time, if it is found to be under disorderly and unsafe condition & pointed out by BHEL/Customer, it should be immediately set right. In the event of non-compliance to the same within reasonable period as intimated by BHEL, the latter will have right to get the same done at the risk and cost of the contractor along with applicable overhead charges and an additional penalty at a rate of Rs.1000/- shall also be recoverable from the running bills of contractor on such of each occasions / notices to contractor.

SECTION - III B

SPECIAL CONDITIONS OF CONTRACT

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**Cl. No Description**  
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- 53. Scope of work
- 54. Finish Painting
- 55. Facilities to be provided by BHEL/Contractor
- 56. Time schedule
- 57. Over run
- 58. Terms of payment
- 59. Liquidated Damage
- 60. Security deposit
- 61. Others
- 62. Insurance

SECTION - III B  
SPECIAL CONDITIONS OF CONTRACT

53.0 SCOPE OF WORK

53.1 BHEL has been entrusted the work of– Design, Engineering, Manufacturing, Fabrication, and supply of Main plant and equipments for 160 MW RAMGARH CAPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan comprising of 110 MW Gas Turbine Generator set, 50 MW steam generator set, Heat Recovery Steam Generator (HRSG) & associated auxiliaries and Power cycle Piping valves including C&I etc.

53.2 **SCOPE:** Material handling work for the entire plant packages: Receiving, Unloading, verification, properly stacking, Storage at site, their preservation, safe keeping, watch & ward, record-keeping and issuing, collection/ delivery of materials from various locations from transporters delivery points etc and as specified in the tender specification.

Scope of work covers Erection, testing, commissioning and trial operation of 1 x 182 TPH HRSG (including 70 M high steel chimney) with related auxiliaries for HRSG: Checking, dressing, chipping, and leveling of foundations, pre-assembly, erection, alignment, welding, radiography and other nondestructive testing, heat treatment, touch-up and finish painting including supply of paints etc., hydraulic testing, air leak test, chemical cleaning, alkali boil out, steam blowing and safety valve floating including erection & dismantling of all temporary piping, valves, pumps, tanks etc. required for above operations and other commissioning activities including post commissioning, Unit trial operation and handing over of above as per specifications/ drawings/ data sheets.

(a) Scope of these specifications includes but not limited to following:

**The details of major items (PG) to be erected are as per Annexure-1A. Total tentative tonnage to be erected is 2850 MT including chimney & auxiliaries. But the contractor is required to erect actual tonnage (irrespective of any variation plus or minus) which may be necessary to commission above HRSG / Boilers and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage rates.**

**The total weight of chimney and Weight of heaviest shell piece to be handled is indicated in Annexure-1A. Each shell has to be erected / welded at site after removing ovality. The chimney is to be insulated on outside with mineral wool & aluminum cladding upto full length. The scope of work also includes erection & commissioning of earthing, aviation & lightning arrestor of chimney as supplied by BHEL. No Claim will be entertained, in case the number of shell increases due to change in shall height.**

(b) Scope of Material Handling for entire 160 MW GTG package :

**The details of major items to be handled at site are as per Annexure-1B. Total tentative tonnage is about 6000 MT. But the contractor is required to handle actual tonnage (irrespective of any variation plus or minus) which may be necessary to complete 160 MW GTG package work and complete the work in all respects as detailed in tender specifications, for which payments shall be released on finally accepted tonnage rates.**

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 HRSG 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 over all variation in final executed value (w.r.t the awarded value indicated in the LOI) beyond (minus) 30% i.e in case of reduction in executed value w.r.t awarded value, the contractor will be eligible for compensation as per the following provision;**

**“The final executed value shall be raised by 10 % of the executed value 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 Ramgarh CCPP shall be under the scope of material handling work however, some major packages to be handled are as under:

- HRSG and its auxiliaries
- Gas Turbine, Steam Turbine, turbo-generator and their auxiliaries
- HRSG controls & instrumentation and accessories.
- GTG controls and instrumentation and accessories.
- Electrical and C&I 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 and other items received from other sites/locations.
- Oil, gases, chemicals etc

53.3.1 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.

53.3.2 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.

53.3.3 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.

53.3.4 Approximately 6000 MT materials for entire main plant package will be supplied from our manufacturing units located all over the country as well as our vendors located both in the country and abroad. The scope of work for material handling under this tender consists of taking delivery of the materials from transporters; unloading shifting to their designated locations, verification, stacking & re stacking of consignments supplied to project shall be under the scope of contractor. The delivery of these materials will mostly be inside the project campus by road transport. However, delivery of some items may also have to be taken from Godowns of transporters. All material entering the project premises shall have to go through security checks at entry gate. Contractor has to co-ordinate / makes all arrangements for entry of vehicles carrying material inside project premises, including initiating request for entry of material / vehicle within the finally quoted rates.

Brief descriptions of items; their unit weight and size are indicated under Annexure-I B. 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, Generator, Generator stator, Generator rotor, 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 weights and dimensions of material shown are approximate and are liable to vary. No increase in quoted / accepted rates /prices shall be allowed due to change in weights and dimensions of the equipment / materials.

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

The Generator Stator shall be transported to site by road and are to be unloaded near respective area as directed by BHEL.

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

**53.3.5 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.**

53.3.6 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.

53.3.7 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. **Sleepers as required shall also be deployed** by the contractor within finally acceptable rate / price for handling / stacking / storage of materials.

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.

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

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

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

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

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

Any discrepancy / shortage / damage found in the consignment after taking delivery from the carriers after giving clear receipt would be the responsibility of the contractor and the amount liable to be lost by BHEL on such accounts is recoverable from the contractor.

In case of apparent damages / shortages in consignments /packing noticed by the contractor, such cases shall be brought to the notice of BHEL and cleared only with their consent/approval.

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.

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.

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.

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.

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.

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.

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

- 53.3.8 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 7 days** and report shall be submitted as a documentary proof.

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.

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. 5000/- per MT** for such works.

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.

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

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.

- 53.3.9 The contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence. Any loss to BHEL

due to contractor's lapse / negligence shall have to be made good by the contractor.

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

- 53.3.10 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.

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).

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

- 53.3.12 In case some materials are required to be dispatched from Ramgarh 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.

53.3.13 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.

53.3.14 Some of the plant and civil package material has already received at Ramgarh site before start of this contract. The contractor as per the instruction of MM In charge 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.

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

Second class train fare with reservation / supplementary charges/bus fare subject to furnishing details regarding ticket numbers, journey details, amount of fare etc. Local conveyance charges (Actual bus / cycle rickshaw/ auto rickshaw fare for local journeys at out station) as permitted by the Engineer.

- 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.

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.

53.4 The contractor under this contract shall also provide free of cost services of skilled persons for a total period of **165 Man-months** exclusively for use by BHEL. This manpower will be required for following services

- ◆ Qualified persons experienced in computer working for maintaining store record and posting stock ledgers and secretarial work. (15 manmonths)
- ◆ Skilled workers for working in store, office and colony. (60 manmonths)
- ◆ Unskilled workers for working in store, office and colony. (90 manmonths)

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 categories given plus 10% will be made from the final bill of the contractor.**

- 53.5 The customer M/s. RRVUNL and / or their Consultant may depute their representative for checking and supervision of important stages of work. The contractor shall be required to provide all facilities for inspection of works, without any cost implications to the BHEL. Any defect in quality of work or deviations from drawings / specifications pointed out during such inspection shall be made good by the contractor in the same way as if pointed out by the BHEL Engineer, without any cost implication to BHEL.
- 53.6 Bidder may note that as the place of work is inside the premises being manned by Customer's security agency, 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.
- 53.7 Contractor shall make necessary arrangements to ensure following :
- **Contractor shall ensure deployment of Qualified level-2 Engineer for NDT services (1 No.) at site.**
  - Contractor shall ensure **deployment of Qualified & Experienced Safety Engineer / Officer (1 No.)** at site.
  - Contractor shall ensure **deployment of Qualified & Experienced Piping Engineer / Officer (two No)** at site.
  - It is the responsibility of the contractor to engage his workmen in shifts or on overtime basis for achieving the targets set by BHEL. **Deployment of adequate resources (including necessary illumination facilities) for minimum two shift operation (so as to work in all the areas simultaneously and as time warrants three shift working) has to be ensured by the contractor.** The contractor's finally accepted rates shall include all these contingencies.
  - 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 & IV**) **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.**
- 53.8 Customer's Civil contractor is carrying out barricading of entire working area. However localized barricading may be required to carry out works like welding, gas cutting, grinding etc. Localized barricading of construction area, using GI sheet, scaffolding etc. is to be arranged by the contractor for subject work at his cost. Contractor may have to take required work permit, as per existing refinery procedures for carrying out works which may produce sufficient heat to ignite flammable vapor.
- 53.9 **For Piping Systems, SS, CS, AS (P91, P22, others) etc. materials are envisaged. 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 43 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 Contractor has to provide all services and consumables, if any, 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. 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.

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

#### 54.0 TOUCH-UP & FINISH PAINTING

- 54.1 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. Mostly the equipment / components installed are with one coat each of primer paint and synthetic enamel / heat resistant paint. However, due to storage and handling, the same may have got deteriorated or peeled off. 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. These cleaned surfaces are to be touch up painted with suitable approved primer matching with shop paint approved final colour. Bare surfaces / unpainted surfaces shall be provided with two coats of suitable primer after cleaning as above.
- 54.2 After applying primer as above, all the structure, equipment / items and piping (covered under the scope of this contract) are to be finished painted with approved quality synthetic enamel paints (as specified by BHEL engineer) to achieve proper finish and film thickness as per drawings / specifications. The minimum thickness of painting as specified has to be checked by Alchometer (to be arranged by contractor) duly calibrated / suitable means as per advice of BHEL Engineer. Chimney is required to be painted out side in full length using heat resistant and acid resistant aluminum paint silencers and un-insulated steam lines have to be painted with Heat Resistant Aluminum paint
- 54.3 Certain equipment like control panels, valves etc. shall require spray painting. The contractor shall make arrangements of the required equipment for spray painting of such equipment at his own cost. Spray painting at the job site shall be permitted only at times and locations approved by the owner / Engineer.

**Contractor at no extra cost to BHEL shall supply all paints, primers, tools and other consumables including scaffolding materials required for**

**Touch-up / 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. 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 the finally accepted rates. All paints should be stored in well-ventilated store. The painters and other personnel deployed should use proper protective equipment to avoid inhalation of fumes. No paint whose shelf life has expired should be used for painting. The contractor shall ensure availability of

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

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

54.6 The painters have to under go test and only qualified painters will be allowed to work. The contractor shall make all arrangements including materials for testing of painters at his cost.

#### **55.0 FACILITIES TO BE PROVIDED BY BHEL / CONTRACTOR**

55.1 BHEL shall provide, as and where made available by M/s RRVUNL, 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.

55.2 RRVUNL 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 **electricity consumption shall be chargeable** at standard rates applicable as per Nigam's standard rates. Contractor shall install calibrated energy meter for metering electricity consumption.

55.3 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. Land for housing colony shall be provided by customer.

55.4 The contractor shall submit to BHEL Engineer his electrical power requirements. Construction power, for construction purposes as well as office use will be provided ON FREE OF CHARGE BASIS at one point near erection site from supply point. Contractor at his cost shall do further distribution of power. All wiring must comply with local regulations and will be subject to Engineer's inspection and approval before connecting supply. Required

energy meter, duly calibrated, for measurement of power consumed has to be arranged / installed by Contractor at his cost.

- 55.5 The drinking water & construction water inside the Power plant shall be made available ON FREE OF CHARGE BASIS at points decided by BHEL/RRVUNL & further distribution as per requirement is to be made by the contractor.
- 55.6 The contractor should arrange at his cost for temporary lighting in & around his work area for execution of work. Adequate lighting facilities such as flood lights, hand lamps shall be arranged by the contractor at the site of construction, contractor's material storage area etc. within finally accepted rates.
- 55.7 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.
- 55.8 Provision of distribution lines of both electrical power and water from the supply points to the required place with proper distribution boards observing the safety rules laid down by the electrical authorities of the state shall be done by the contractor, supplying all the materials like cables, distribution board, switch boards, TPN, CBS, ELCBS/ MCCBS/ Earthing, change over switches etc. at his own cost. If any failure is caused in supply of the power and water, it is the responsibility of the contractor to make alternate arrangements at his cost. The contractor shall adjust his working shifts / hours accordingly and deploy additional manpower if necessary so as to achieve the targets.
- 55.9 Following points should be strictly adhered to by the contractor while drawing construction power supply.
- (a) All electrical installations should be as per Indian Electricity rules.
  - (b) All distribution Boards installed by the contractor should be constructed with fire proof materials viz steel frames, Bakelite sheets etc.
  - (c) Connection for single phase should be taken from phase and neutral. No where the connection should be taken with Earth as neutral.
  - (d) All electrical connections should be made through connectors, nuts and bolts, switches, plug and sockets. Loose connections or hooking up of wires shall not be permitted.
  - (e) Contractor have to make proper Earthing arrangement for their equipment / DB etc. The Earthing connections have to be done with proper size conductor and suitable lugs/clamps as per discussion with BHEL Engineer.
  - (f) All electrical equipment / tools and plants should be properly earthed. DBs to be earthed diagonally opposite at two points.
  - (g) Contractor should use "MCCB" and "ELCB" either on incoming or outgoing connections to the DBs.
  - (h) Contractor should ensure that all the CBs / TPNs / Fuses / MCCB / ELCB cables etc. should be of adequate rating/ capacity.
  - (i) For permission of supply connections contractor has to submit a test report of their installations with a single line diagram of connected / proposed loads.
  - (j) ELCB will be tested biweekly by actually simulating the earth leakage for all installations and the same shall be recorded by BHEL Engineer in the log book to be maintained by the contractor.

- 55.10 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.
- 55.11 On completion of work or as and when required by BHEL, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, same will be got done by the Engineer and expenses incurred shall be recovered from the contractor along with prevailing overhead. The decision of BHEL Engineer in this regard shall be final.
- 55.12 The contractor has to bring all the accessories required for the distribution of construction power as detailed further and has to manage the construction power available at one point and to distribute through cable, further as per use, by 1 No. of Power distribution board of 400 A for HRSG work and 1 No. of PDB of 200A for storage area along with required cables to distribute further with MCBs, ELCBs, Welding Sockets etc. to Site Offices, Store sheds, other Site Requirements etc.**

**56. TIME SCHEDULE**

- 56.1 The contractor is required to commence the materials handling work within 10 days from the date of issue of Letter of Intent and subsequently other works of this tender specifications within 30 days of this LOI unless otherwise BHEL decides to fix any other date however the date of start of work as agreed and certified by BHEL shall be considered as zero date of start of this contract after adequate deployment of manpower and T&P by the contractor for material handling work and site facilities.

**For material handling, contractor has to mobilize one crane, Trailer with Pulling Unit etc. within 10 days of LOI and rest of resource mobilization within one month from date of LOI for ETC work.**

- 56.2 Entire work as detailed in tender specification shall be completed within **17 months** from the Zero date of the contract as per the programs / milestones indicated by BHEL from time to time. Contractor has to auxiliary adequate resources to meet BHEL commitments to customer as indicated from time to time for which no compensation will be payable. However, in case of contractor discharges his contractual responsibility even before schedule contract period, he will be allowed to wind up his set up without any financial implications on either side.
- 56.3 The various tentative milestone dates to be achieved, for HRSGS the current status of contract are as below:

<b>MILE STONES</b>	<b>MONTH</b>
Start of MM (Zero Date)	within 10 days from issue of LOI
Start of HRSG	within 1 month from issue of LOI
Drum lifting	within 6 months of Zero date
HRSG Hydro Test	within 9 months of Zero date
Gas in & Alkali boil Out completion	within 11 months of Zero date
Steam Blowing completion, Safety Valve Float and	

readiness for Trial operation	within 13 months of Zero date
Module Trial Operation	within 16 months of Zero date
Completion of all facilities	within 17 months of Zero date

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

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

## **57.0 OVER RUN**

57.1 In case due to reasons not attributable to the contractor, the work gets delayed and scheduled completion gets extended, the contractor shall not be entitled for any over run compensation for a period of first **3 (Three)** months after the contractual completion date. In case the scheduled completion time gets extended beyond **3 (Three)** months as stated above, the contractor shall be considered for payment of fixed over run charges @ **Rs. 50,000/- (Rupees Fifty thousand only)** per month on receipt of advance notice intending to claim over run and on fulfillment of following conditions:-

- a) The reasons for delay in completion of work are not attributable to contractor but however subject to the provisions of clause – 31.
- b) The targets fixed during the over run period are achieved by contractor.

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

57.2 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.

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

57.4 For the purpose of ORC the actual date of start of erection as certified under clause 56.1 will be considered.

## **58.0 TERMS OF PAYMENT**

58.1 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.

58.2 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.

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

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

**I. PROGRESSIVE PAYMENT ON PRO-RATA BASIS .**

**I.A 85 % of unit rate for Erection, Testing and Commissioning of HRSG.**

**(Applicable for installation of all items work for Sl. No. 1 of rate schedule)**

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

OR

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

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

**II.A FOR SI. No. 2.1 OF RATE SCHEDULE FOR MATERIAL HANDLING WORK) WORKS- (85% of unit rates)**

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

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

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

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

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

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

**II.B FOR SI. No. 2.2.1, 2.2.2 & 2.2.3 OF RATE SCHEDULE FOR MATERIAL HANDLING WORK – (85% of unit rates)**

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

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

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

**II.C FOR SL NO. 3, 4, 5, AND 6 OF RATE SCHEDULE FOR MATERIAL HANDLING WORK) WORKS – (85% of unit rates)**

**1** **85 %** of the applicable unit rate shall be paid on completion of particular item.

**III. MILESTONE PAYMENTS for HRSG (8.0% of CV)**

- 2.0% of CV on completion of hydro test of the HRSG
- 2.0% of CV on completion of ABO of the HRSG
- 2.0% of CV on completion of steam blowing and SV Floating of HRSG.
- 2.0 % of CV on completion of trial operation of HRSG.

Notes:

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

**IV. FINAL PAINTING (2 %of CV)**

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

**V. 2.5% of CV** shall be payable on handing over of the unit to BHEL's customer or 3 months after the contractor has discharged his responsibilities as stipulated in this

contract whichever is earlier, if delay in handing over is not attributable to contractor. The unit shall be deemed to be handed over on completion of trial operation.

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

**NOTE:** Above payment against item No. V & VI shall be released after adjustment of the contract value based on actual work carried out against respective item of rate schedule.

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

1. Name of the Company
2. Name of Bank
3. Name of Bank Branch
4. City/Place
5. Account Number
6. Account type
7. IFSC code of the Bank Branch
8. MICR Code of the Bank Branch

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

#### **59.0 LIQUIDATED DAMAGES (LD)**

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

#### **60.0 SECURITY DEPOSIT**

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

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

#### **61.0 OTHERS**

- 61.1 In case of any contradiction between General Conditions of Contract (GCC) and Special Conditions of Contract (SCC), the latter shall prevail.
- 61.2 The tenderer shall specifically confirm that he has inspected the site of work and acquired full knowledge and information about the site conditions, wage structure, Industrial climate, total work involved and will not raise claim of any nature due to lack of knowledge of site condition. He will also confirm that local taxation laws at the site have been clearly understood by him.
- 61.3 **The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation / Techno-commercial bids and acceptance of customer. BHEL reserves the right to reject the bidders with unsatisfactory past performance in the execution of a contract. BHEL's decision in this regard shall be final & binding.**

## **62.0 INSURANCE**

All equipment will be insured by M/s BHEL within the comprehensive MCE policy up to the time of Trial run completion for marine, storage, erection, testing and commissioning with the provisions of deductible franchise of 5% of the claim amount with a minimum values of Rs 5 Lakh /- against normal perils and Rs.15/- Lakh during testing, AGO Fire & Explosion of other items against each incidence.

Commercial implication shall be applicable to this contract subjected to Provisions of GCC clause No. 29.0.

The Contractor shall take an insurance policy for all the workmen employed by him against accidents and injuries as per the statutory requirements.

**AA) HRSG WEIGHT SCHEDULE****Approximate weights**

HRSG	:	2400 MT
CHIMNEY	:	200 MT
PIPING	:	220 MT
INSULATION ON PIPING	:	60 MT

**Tentative weights as per PGMA LIST for HRSG**

NS	PG	MA	DESCRIPTION	WEIGHT
1	04	118	BOILER DRUM WITH INTERNALS – HP	<b>75000</b>
1	04	144	DRUM SLIDE BEARING PLATES – HP	150
1	04	148	DRUM SLIDE BEARING PLATES – LP	150
1	04	149	FASTENERS FOR DRUM SADDLE – HP	20
1	04	158	FASTENERS FOR DRUM SADDLE – LP	20
1	04	176	BOILER DRUM WITH INTERNALS – LP	<b>17000</b>
1	07	206	RISER PIPES – HP	10000
1	07	208	RISER PIPES – LP	6000
1	07	210	RISER HEADERS & LINKS – HP	6200
1	07	212	RISER HEADERS & LINKS – LP	4000
1	07	411	DOWNCOMER SUSPENSIONS-HP	700
1	07	413	DOWNCOMER SUSPENSIONS-LP	100
1	07	504	DISC SPRING FOR MODULES SUPPORT	1000
1	07	505	EVAP. MODULE SUPPORTS-HP FRONT	1500
1	07	506	EVAP. MODULE SUPPORTS-HP REAR	1500
1	07	508	EVAP. MODULE SUPPORTS-LP FRONT	1500
1	07	510	EVAP. MODULE SUPPORTS-LP REAR	1500
1	07	992	IMPORTED ELECTRODES	25
1	07	993	ERECTION MATERIALS	300
1	08	910	EXPANSION MOVEMENT MEASURING COMPONENT	200
1	12	850	HP SAT. STEAM CONNECTING LINKS	7000
1	12	851	HP MAIN STEAM LINE	8500
1	12	852	DE SUPERHEATER INLET & OUTLET LINKS	12800
1	12	853	LP SAT.LINK	1500
1	12	854	LP MAIN STEAM LINE	2850
1	12	900	DE SUPERHEATER	900
1	12	901	HP SH. SUPPORTS & SUSPENSIONS (SAT LINK & DESH)	2300
1	12	902	HP SH. SUPPORTS & SUSPENSIONS (MS LINE)	1200
1	12	904	LP SH. SUPPORTS & SUSPENSIONS ( SAT LINK & MS LINE)	500
1	12	911	LP SH MODULE SUPPORTS(LEFT& RIGHT)	500

1	12	912	HP SH –II MODULE SUPPORTS(LEFT& RIGHT)	1500
1	12	913	HP SH-I MODULE SUPPORTS(LEFT& RIGHT)	1500
1	12	992	IMPORTED ELECTRODES	30
1	12	993	ERECTION MATERIALS	600
1	19	101	CPH INLET LINE	2500
1	19	102	CPH OUTLET LINE	2500
1	19	850	HP ECONOMISER FEED PIPE	2500
1	19	851	ECONOMISER LINK TO DRUM	4500
1	19	852	ECO –I INTER CONNECTING LINKS	800
1	19	853	ECO-II INTER CONNECTING LINKS	2000
1	19	854	LP ECONOMISER FEED PIPE	500
1	19	901	ECONOMISER SUPPORTS & SUSPENSIONS ( HP FEED PIPE)	800
1	19	902	ECONOMISER SUPPORTS & SUSPENSIONS (ECO LINK)	2000
1	19	904	ECONOMISER SUPPORTS & SUSPENSIONS ( LP FEED PIPE)	500
1	19	908	SUPPORTS FOR CPH LINKS	300
1	19	911	CPH MODULE SUPPORTS	2000
1	19	912	ECO-I MODULE SUPPORTS(LEFT& RIGHT)	1000
1	19	913	ECO-II MODULE SUPPORTS(LEFT& RIGHT)	3500
1	19	992	IMPORTED ELECTRODES	30
1	19	993	ERECTION MATERIALS	700
1	24	200	LP DRAINS,VENTS & FITTINGS	10000
1	24	201	LP BOILER TRIM PIPING-SUPPORTS	1250
1	24	220	LP SAFETY VALVE ESC piping	8500
1	24	225	LP SAFETY VALVE SILENCER SUPPTS	4000
1	24	260	BHEL VALVES FOR LP	6000
1	24	273	LP DWLG	320
1	24	275	LP DRAIN HEADER	450
1	24	280	LP SAFETY VALVES	500
1	24	285	LP SAFETY VALVE SILENCER	2000
1	24	290	LP START-UP VENT SILENCER	700
1	24	400	HP DRAINS,VENTS&FITTINGS	32000
1	24	401	BLR TRIM PIPING SUPPTS	5500
1	24	420	HP SAFETY VALVE ESC PIPING	7000
1	24	425	HP SAFETY VALVE SILENCER SUPPTS	5000
1	24	460	BHEL VALVES FOR HP	14000
1	24	465	BELLOWS& VALVES(SD)	6500
1	24	473	HP DWLG	320
1	24	475	HP DRAIN HEADERS	750
1	24	480	HP SAFETY VALVES	750
1	24	485	HP SAFETY VALVE SILENCER	5500
1	24	490	HP START-UP-VENT SILENCER	2000
1	24	955	LAPPING TOOLS FOR SV	20
1	24	960	LAPPING TOOLS FOR CONV. VALVES	25

1	24	989	COMMISSINING SPARES	80
1	24	992	IMPORTED ELECTRODES	50
1	24	993	ERECTION MATERIALS	1000
1	24	994	NAME PLATES	100
1	28	700	CLADDING SHEET FIXING PINS, NUTS& WASHERS	7800
1	32	010	CLADDING SHEET INLET DUCT	<b>7200</b>
1	32	055	EXTERNAL INSULATION –PIPING	<b>7300</b>
1	32	110	CLADDING SHEET – S1 TO S2	3000
1	32	120	CLADDING SHEET – S2 TO S3	3000
1	32	210	CLADDING SHEET – S3 TO S4	3000
1	32	310	CLADDING SHEET – S4 TO S5	3000
1	32	410	CLADDING SHEET – S5 TO S6	3000
1	32	510	CLADDING SHEET – S6 TO S7	3000
1	32	520	CLADDING SHEET – S7 TO S8	3000
1	32	610	CLADDING SHEET – S8 TO S9	3000
1	32	620	CLADDING SHEET – S9 TO 10	3000
1	32	810	CLADDING SHEET – OUTLET DUCT	2500
1	32	993	ERECTION MATERIALS	400
1	33	021	CERAMIC WOOL	<b>47000</b>
1	33	621	MINERAL WOOL FOR PIPING	<b>64200</b>
1	33	970	WIRE MESH	550
1	33	975	SEALING COMPONENTS	100
1	35	010	FOUNDATION MATERIALS-BOILER	10000
1	35	110	MAIN COLUMNS LEFT	100000
1	35	120	MAIN COLUMNS RIGHT	100000
1	35	131	INLET DUCT SUPPORT STRUCTURE FOR HRSG	14000
1	35	140	AUXILIARY COLUMNS	13000
1	35	220	PIPING SUPPORT – STRUCTURE	9500
8	35	391	MODULE TRANSPORTING STRUCTURE	72000
8	35	392	SINGLE MODULE LIFTING FRAME	<b>3500</b>
8	35	393	MODULE UPRIGHTING FRAME	6500
1	35	540	AUXILIARY COLUMN BRACING	8000
1	35	591	BOTTOM BRACING BEAM	<b>24000</b>
1	35	592	TOP BRACING BEAM	<b>24000</b>
1	35	593	BASE BEAMS OR MODULE BOTTOM SUPPORT	8000
1	35	594	DUCT STIFFENER BEAMS	28000
1	35	595	LATERAL SUPPORT BEAM FRONT	<b>14000</b>
1	35	596	LATERAL SUPPORT BEAM REAR	<b>35000</b>
1	35	597	MODULE AND DRUM SUPPORT STRUCTURE	19500
1	35	610	BOILER ROOF STRUCTURE	17500
1	35	611	BOILER ROOF SHEETING – METAPOLY SHEET	5000

1	36	250	MAIN FLOOR 5 <sup>TH</sup> LEVEL	3500
1	36	210	MAIN FLOOR 1 <sup>ST</sup> LEVEL	3000
1	36	220	MAIN FLOOR 2 <sup>ND</sup> LEVEL	1500
1	36	230	MAIN FLOOR 3 <sup>RD</sup> LEVEL	1500
1	36	240	MAIN FLOOR 4 <sup>TH</sup> LEVEL	10000
1	36	390	MISCELLANEOUS PLATFORMS	3500
1	36	810	FLOOR GRILLS & GUARD – BHEL STD GAL. ELECTROFORGED.	26000
1	36	820	STAIRS & LADDERS – BHEL Std.Galvanised Electroforged	14000
1	36	850	HANDRAILS AND HAND RAIL POST	9000
1	37	810	OUTER CASING SHEET –PIPING	1400
1	48	200	INSTRUMENT TAPPINGS	350
1	48	422	HRSG INLET DUCT	42100
1	48	424	EXP. JOINT – INLET	500
1	48	452	DUCT BOILER OUTLET	8400
1	48	454	EXP.PIECES – OUTLET	500
1	48	482	DISTRIBUTION GRID	4400
1	48	700	BULKED BPS COMPONENTS	100
1	48	993	ERECTION MATERIALS	1300
1	80	145	EXHAUSTS & VENTS – BD TANK	7000
1	80	273	BLOW DOWN SYSTEM VALVES	550
1	80	274	CBD TANK SAFETY VALVE	200
1	80	992	IMPORTED ELECTRODES	15
1	81	411	BDT TUBULAR LEVEL GAUGE	120
1	81	413	BDT CONTROL VALVE(SD)	250
1	81	005	IBD TANK	5200
1	81	011	CBD TANK	5500
1	97	401	<b>GAUGES AND LOCAL GAUGE BOARD</b>	3000
1	97	402	<b>EWLI</b>	300
1	97	411	<b>TRANSMITTERS AND RACK</b>	3000
1	97	414	<b>TEMPERATURE SENSORS</b>	300
1	97	416	<b>FLOW ELEMENTS</b>	200
1	97	417	CONDENSING POT	100
1	97	444	<b>JUNCTION BOXES</b>	400
1	97	453	<b>CABLE TRAYS</b>	800
1	97	454	<b>INSTRUMENT CABLE</b>	500
1	97	455	TUBINGS AND FITTINGS	500
1	97	457	ANGLES AND CHANNELS	800

1	HL	098	COLUMN-CASING BRIDGING COMPONENTS	13000
1	HL	101	EVAPORATOR MODULE ASSY.- HP FRONT LEFT	28000
1	HL	102	EVAPORATOR MODULE ASSY.- HP FRONT RIGHT	28000
1	HL	103	EVAPORATOR MODULE ASSY.- HP MIDDLE LEFT	84000
1	HL	104	EVAPORATOR MODULE ASSY.- HP MIDDLE RIGHT	84000
1	HL	105	EVAPORATOR MODULE ASSY.- HP REAR LEFT	28000
1	HL	106	EVAPORATOR MODULE ASSY.- HP REAR RIGHT	28000
1	HL	121	EVAPORATOR MODULE ASSY.- LP FRONT LEFT	78000
1	HL	122	EVAPORATOR MODULE ASSY.- LP FRONT RIGHT	78000
1	HL	123	EVAPORATOR MODULE ASSY.- LP REAR LEFT	26000
1	HL	124	EVAPORATOR MODULE ASSY.- LP REAR RIGHT	26000
1	HL	131	HP SH-II MODULE ASSY(LEFT)	22875
1	HL	132	HP SH-II MODULE ASSY(RIGHT)	22875
1	HL	133	HP SH-I MODULE ASSY(LEFT)	22875
1	HL	134	HP SH-I MODULE ASSY(RIGHT)	22875
1	HL	141	LP SH MODULE ASSY(LEFT)	4750
1	HL	142	LP SH MODULE ASSY(RIGHT)	4750
1	HL	151	HP ECO –II MODULE ASSY (LEFT)	88900
1	HL	152	HP ECO-II MODULE ASSY (RIGHT)	88900
1	HL	153	HP ECO-I MODULE ASSY (LEFT)	34200
1	HL	154	HP ECO –I MODULE ASSY (RIGHT)	34200
1	HL	171	CPH MODULE ASSY.- FRONT LEFT	35000
1	HL	172	CPH MODULE ASSY. – FRONT RIGHT	35000
1	HL	173	CPH MODULE ASSY.- REAR LEFT	46800
1	HL	174	CPH MODULE ASSY. – REAR RIGHT	46800
1	HL	201	LINKS FOR EVAP. MODULES- HP FRONT LEFT	500
1	HL	202	LINKS FOR EVAP. MODULES- HP FRONT RIGHT	500
1	HL	203	LINKS FOR EVAP. MODULES- HP MIDDLE LEFT	12000
1	HL	204	LINKS FOR EVAP. MODULES- HP MIDDLE RIGHT	12000
1	HL	205	LINKS FOR EVAP. MODULES- HP REAR LEFT	500
1	HL	206	LINKS FOR EVAP. MODULES- HP REAR RIGHT	500
1	HL	221	LINKS FOR EVAP. MODULES- LP FRONT LEFT	3500
1	HL	222	LINKS FOR EVAP. MODULES- LP FRONT RIGHT	3500
1	HL	223	LINKS FOR EVAP. MODULES- LP REAR LEFT	500
1	HL	224	LINKS FOR EVAP. MODULES- LP REAR RIGHT	500
1	HL	231	HP SH-II MODULE CROSS OVER & LINKS(LEFT)	2000
1	HL	232	HP SH-II MODULE CROSS OVER & LINKS(RIGHT)	2000
1	HL	233	HP SH-I MODULE CROSS OVER & LINKS(LEFT)	2000
1	HL	234	HP SH-I MODULE CROSS OVER & LINKS(RIGHT)	2000
1	HL	251	HP ECO-II MODULE CROSS OVER & LINKS(LEFT)	2000
1	HL	252	HP ECO –II MODULE CROSS OVER & LINKS (RIGHT)	2000
1	HL	253	HP ECO-I MODULE CROSS OVER & LINKS(LEFT)	1000

1	HL	254	HP ECO-I MODULE CROSS OVER & LINKS (RIGHT)	1000
1	HL	271	LINKS FOR CPH MODULES – FRONT LEFT	750
1	HL	272	LINKS FOR CPH MODULES – FRONT RIGHT	750
1	HL	273	LINKS FOR CPH MODULES – REAR LEFT	750
1	HL	274	LINKS FOR CPH MODULES – REAR RIGHT	750
1	HL	301	EVAPORATOR BAFFLES & SPACERS – HP FRONT LEFT	3500
1	HL	302	EVAPORATOR BAFFLES & SPACERS- HP FRONT RIGHT	3500
1	HL	303	EVAPORATOR BAFFLES & SPACERS- HP REAR LEFT	3000
1	HL	304	EVAPORATOR BAFFLES & SPACERS- HP REAR RIGHT	3000
1	HL	321	EVAPORATOR BAFFLES & SPACERS- LP FRONT LEFT	3000
1	HL	322	EVAPORATOR BAFFLES & SPACERS- LP FRONT RIGHT	3000
1	HL	323	EVAPORATOR BAFFLES & SPACERS- LP REAR LEFT	2500
1	HL	324	EVAPORATOR BAFFLES & SPACERS- LP REAR RIGHT	2500
1	HL	331	HP SH MODULE BAFFLES & SPACER TUBES	2500
1	HL	351	ECO –I BAFFLES & SPACER TUBES	4000
1	HL	352	ECO –II BAFFLES & SPACER TUBES	6000
1	HL	371	WPH BAFFLES & SPACERS – FRONT LEFT	1000
1	HL	372	WPH BAFFLES & SPACERS – FRONT RIGHT	1000
1	HL	373	WPH BAFFLES & SPACERS – REAR LEFT	1250
1	HL	374	WPH BAFFLES & SPACERS – REAR RIGHT	1250
1	HL	501	SIDE CASING S1 – S2	12180
1	HL	502	SIDE CASING S2-S3	12180
1	HL	503	SIDE CASING S3 – S4	11270
1	HL	504	SIDE CASING S4 – S5	11270
1	HL	505	SIDE CASING S5 – S6	11270
1	HL	506	SIDE CASING S6 – S7	11270
1	HL	507	SIDE CASING S7 – S8	6630
1	HL	508	SIDE CASING S8-S9	9440
1	HL	509	SIDE CASING S9 –S10	4800
1	HL	601	TOP & BOTTOM CASING S1 – S2	5750
1	HL	602	TOP & BOTTOM CASING S2- S3	4200
1	HL	603	TOP & BOTTOM CASING S3 – S4	4750
1	HL	604	TOP & BOTTOM CASING S4 – S5	3550
1	HL	605	TOP & BOTTOM CASING S5 – S6	3200
1	HL	606	TOP & BOTTOM CASING S6 – S7	3000
1	HL	607	TOP & BOTTOM CASING S7- S8	3650
1	HL	608	TOP & BOTTOM CASING S8- S9	3000
1	HL	609	TOP & BOTTOM CASING S9- S10	4050
			<b>TOTAL WEIGHT</b>	<b>2373585</b>
			<b>Approx. WEIGHT</b>	<b>2400MT</b>

**NOTE:**

1. Consumables such as welding electrodes, filler wires, lubricants etc. issued free of charge for applications shall not be paid on Tonnage basis. Contractor should take care of such items while submitting their offer.
2. Electrical , C and I items of PG 97 which may be covered in the scope of Electrical and C and I package contract shall be excluded from this contracts scope as per the discretion of BHEL engineer at site. However the welding and heat treatment parts as applicable for Thermowells, and for other instruments shall be under the scope of this contract free of cost. Contractor should take care of such items while submitting their offer.

**BB) Trichy Valves:** PCP Valves, CPH System, Safety Relief Valves, Root Valves, HP Bypass System etc.

Approx Qty: 740 nos.

Approx. Size of valves: ½” to 16”

Approx. weight: 39.6 MT

**CC)Details Regarding 70 M High Chimney for HRSG- approx. WT 200 MT**

Chimney Inner Diameter : 6.0 M  
 Chimney L Height : 70 M  
 Material : Carbon Steel  
 Each Shell Height : 2.5M, Half Shell  
 Total no of Half Shell : 56  
 Maximum weight of half shell : 6.0Mt  
 Minimum weight of half shell : 2.5Mt  
 Insulation : 100mm thick Mineral wool for full 70M height

**EE) PIPINGS & AUXILIARIES :**

SL NO	EVENT	CUST	PGMA	DESCRIPTION	WT / BOILER (kgs)	IBR / Non-IBR
1	LU	7083	80345	AUX STEAM TO DEAERATING HEATER	11,500	I
2	LU	7083	<b>80359</b>	<b>STEAM FROM PROCESS BLR</b>	57,000	I
3	LU	7083	80400	CONDENSATE SUCTION	4,700	N
4	LU	7083	80401	CD FROM PUMP TO LPH1/DC INLET TEE&RECIR	2,100	N
5	LU	7083	80403	CD FROM TG TP TO DEAERATING HEATER	32,500	N
6	LU	7083	80407	CONDENSATE FOR SEALING OF VACUUM	1,600	N
7	LU	7083	80408	CONDENSATE DUMP FROM HEADER	2,200	N
8	LU	7083	<b>80417</b>	<b>BOILER FEED DISCHARGE PIPING</b>	17,000	I
9	LU	7083	80420	BOILER FEED PUMP SUCTION	5,200	N
10	LU	7083	80421	BOILER FEED PUMP RECIRCULATION	5,100	I
11	LU	7083	80446	DEAERATING HEATER OVER FLOW AND DRAIN	1,600	N
12	LU	7083	<b>80452</b>	<b>HP PIPING DRAINS – SG SCOPE</b>	4,000	I

13	LU	7083	80453	LP PIPING DRAINS – SG SCOPE	3,600	I
14	LU	7083	80455	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	3,600	N
15	LU	7083	80463	TG AUX COOLING WATER	23,500	N
16	LU	7083	80473	DEMINERALISED WATER SYSTEM	1,400	N
17	LU	7083	80600	HIGH PRESSURE DOSING PIPING	1,100	N
18	LU	7083	80601	LOW PRESSURE DOSING PIPING	600	N
19	LU	7083	80616	INSTRUMENT AIR FOR INDIVIDUAL UNIT	1,900	N
20	LU	7083	80922	H&S FOR LIGHT UP – NON STEAM LINES	24,000	N
21	LU	7083	80933	H & S FOR LP PIPING	1,600	N
22	LU	7083	81415	TEST THERMOWELLS	400	N
23	SB	7083	<b>80305</b>	<b>MS DUMP TO CONDENSER</b>	9,600	I
24	SN	7083	80348	AUX STEAM TO GLAND SEALS – SG SCOPE	1,100	I
25	SN	7083	80388	CONDENSER AIR EVACUATION PIPING	1,200	N
26	SN	7083	80392	GS COOLER LEAK OFF TO ATMOSPHERE	700	N
27	SN	7083	80434	UNLISTED SPRAY WATER – SG SCOPE	400	N
28	SN	7083	80438	GLAND COOLER DRAIN TO CONDENSER	200	N
29	SN	7083	80481	SAMPLING PIPE	500	N
30	SN	7083	80496	DRAIN FLASH TANK VENT TO COND.	800	N
<b>GRAND TOTAL</b>					<b>220,700</b>	
					51,000	
					80 305	

Material Forecast for Critical Piping (Power Cycle Piping)

80 - 305						
S.No	Description	Material	Size		Qty in m	Unit Wt
			OD	Tk		
1	Pipes	SA 106 Gr B	457	12.7	30	139.200
			273	6.35	60	41.770
			355.6	9.53	45	81.330
			406.4	9.53	22	93.270
			60.3	11.07	60	13.440
			88.9	20	10	33.980
			<b>660</b>	<b>36</b>	<b>15</b>	<b>554.000</b>
			273	28	30	169.200
			323.9	45	15	310.000
			88.9	11.13	85	21.350
			660	22	50	346

80 - 417						
S.No	Description	Material	Size		Qty in m	Unit Wt

			OD	Tk		
1	Pipes	SA 106 Gr B	219.1	6.35	104	33.310
		SA 335 P22	88.9	11.13	3	21.350
		SA 106 Gr C	168.3	14.27	132	54.200
			88.9	11.13	110	21.350
			114.3	13.49	85	33.540
			48.3	5.08	60	5.410
			60.3	5.54	125	7.480

80 - 452						
S.No	Description	Material	Size		Qty in m	Unit Wt
			OD	Tk		
1	Pipes	SA 335 P22	33.4	4.55	600	3.240
		SA 312 TP 304H	60.3	3.91	130	5.440
			33.4	3.38	370	2.500
			21.3	2.77	170	1.270
			88.9	3.05	105	6.460

80 - 359						
S.No	Description	Material	Size		Qty in m	Unit Wt
			OD	Tk		
1	Pipes	SA 106 Gr B	406.4	9.53	150	93.270
		SA 335 P22	323.9	28	150	204.300
			273	28	40	169.200

NOTE: Above details are only to give a general idea to the contractor to quote the rates as per rate schedule. Contractor is required to carryout such items also within their applicable tonnage rate. Above system can regrouped / renamed or any addition / deletion can be made to make system complete. No extra claim shall be entertained on this account.

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## Annexure – 1B

**Indicative Weight Schedule for Material Handling**  
**For 1X160 MW RAMGARH CCPP**

**1) Condenser:**

Sl.No	Equipment	Overall Dimensions (in mm)	Quantity	Dry Weight (in kgs)
<i>1</i>	<b>Surface Condenser</b>			(Wt / no.)
a.	Tubes	OD 22 x Thk 1 x L 6500	13100	3.66
b.	Front water box assly	L 1700 x W 3300 x H 4600	2 nos	9500
c.	Rear water box assly	L 1700 x W 3300 x H 4400	2 nos	7600
d.	Front water chamber assly	L 500 x W 3200 x H 5200	2 nos	5600
e.	Rear water chamber assly	L 500 x W 3200 x H 5200	2 nos	5600
f.	Hotwell assly	L 6300 x W 2000 x H 1200	1 no.	5700
g.	Bottom Plate assly	L 4000 x W 6000 x H 800	2 no.	8500
h.	Support plate assly	W 2700 x H 4800 x Thk 12	24 nos.	1150
i.	Side wall assly	L 6500 x H 2600 x Thk 16	4 nos.	5000
j.	Dome assly #1	L 6500 x H 3600	2 nos.	6800
k.	Dome assly #2	L 5000 x H 900	2 nos.	5400
l.	Dome assly #3	L 6300 x H 3900	2 nos.	9000
m.	Dome assly #4	L 4600 x H 2400	2 nos.	7600
n.	Dome stiffeners	Dia 168.3 x Thk 21.97 x L 6000	30 nos.	2900
o.	Dome stiffeners plate	Pl 32 x 2500 x 6300	2 nos.	4000
p.	Loose items	-	1 set	18000
<i>2</i>	<b>Vacuum pump ( 2 x 100%)</b>			
a.	Assly	-	2 nos.	6300
<i>3</i>	<b>Gland Steam Condenser</b>			
a.	Complete Assly.	L 2750 x W 1300 x H 1400	1 no.	1400
b.	Fan & Motor	L 1000 x W 600 x H 800	2 nos.	500
<i>4</i>	<b>Water to Water Heat Exchanger</b>			
a.	Complete Assly.	Ø 600 x L 5000	1 no.	3000
<i>5</i>	<b>GTG Air Cooler</b>			
a.	Per Element	L 3000 x W 700 x H 550	7 nos.	1500
<i>6</i>	<b>ST oil Cooler</b>			
	Per Cooler	Ø 700 x H 3300	2 nos.	3300
<i>7</i>	<b>STG Air Cooler</b>			
	Per Element	L 4200 x W 800 x H 530	9 nos.	1200
<i>8</i>	<b>Spray cum Tray Deaerator</b>			
a.	Header	L 7800 x W 2250 x H 2900	1 no.	12000

b.	Feed Storage Tank	L 12400 x W 3050 x H 3600	1 no.	19000
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**2) BFP, BP & CEP :**

**(A) Boiler Feed Pump (BFP)-FK6D30 & Booster Pump (BP)-FA1B56**

S.N.	Description of Equipment	Dimensions(mm)	Unit Weight (kg)	Total Qty. (No.)	Total Weight (kg)
		Length x Breadth x Height			
1	BFP Skid (Pump Assly. + Base Plate + tubing + Seal Coolers)	2250 x 1000 x 1050	5770	2	11540
2	BP Skid (Pump Assly. + Base Plate + tubing)	1650 x 1200 x 950	2550	2	5100
3	Gear Box (DD).	1150 x 1000 x 860	1200	2	2400
7	Suction Strainer at BP Suction DD)	900 x 800 x 1400	800	2	1600
8	BFP Recirculation valve (DD)	1800 x 550 x 1400	350	2	700
9	Local Gauge Boards with instruments (DD)	2200 x 300 x 1800	650	2	1300
*10	Loose Items	-----	3000	---	3000
11	Local Instrument Rack (LIR)	2000 x 650 x 2150	250	1 (1 No/Unit)	250

**(B) Condensate Extraction Pump (CEP) :**

S.N.	Description of Equipment	Dimensions(mm)	Unit Weight (kg)	Total Qty. (Nos.)/ Unit	Total Weight (kg)/Unit
		Length x Breadth x Height			
1	CEP Assembly	1100 x 3250	2100	2	4200
2	Canister	900 x 3100	510	2	1020
3	CEP Foundation Ring	1100 x 1100 x 150	185	2	370
4	CEP Suction Strainer	900 x 800 x 1400	800	2	1600
5	Local Gauge Board with Instruments (DD)	2000 x 300 x 1800	500 (per unit)	1	500
6	Loose Items	-----	210	2	420
7	Local Instrument Rack (LIR)	1300 x 900 x 2000	300 (per unit)	1	300
8	Tool and Tackles				

**(C) LPBFP**

S.N.	Description of Equipment	Dimensions(mm)	Unit Weight (kg)	Total Qty. (Nos.)	Total Weight (kg)
		Length x Breadth x Height			

1	LPBFP Assembly	1,000 x 600 x 350	750	2	<b>1500</b>
2	LPBFP drive motor	1,000 x 600 x 250	270	2	<b>540</b>
3	LPBFP Suction Strainer	300 x 300 x 400	300	2	<b>600</b>
4	LPBFP R.C. Valve	800 x 300 x 1000	200	2	<b>400</b>
5	Common foundation frame	2500 x 600 x 200	525	2	<b>1050</b>

**(D) CPHRCP**

S.N.	Description of Equipment	Dimensions(mm)	Unit Weight (kg)	Total Qty. (Nos.)	Total Weight (kg)
		Length x Breadth x Height			
1	CPHRCP Assembly	1,000 x 600 x 350	1500	3	<b>4500</b>
2	CPHRCP drive motor	2350 x 1400 x 1350	3800	3	<b>11400</b>
3	CPHRCP Suction Strainer	700 x 500 x 400	800	3	<b>2400</b>
4	CPHRCP R.C. Valve	800 x 300 x 1000	300	3	<b>900</b>
5	Common foundation frame	2500 x 600 x 200	1200	3	<b>3600</b>

**(3) GTG**

SL. NO	DESCRIPTION	WT. (kg)	DIMENSIONS OF BOX (Length x Width x Height) (m)
1	Gas Turbine Fr-9E Flange to Flange	230,000	12.6 x 4.6 x 5
2	Accessory Package (Accessory Base)	60,000	8.4 x 3.4 x 4.8
3	Exhaust Frame Blowers	1,000	2.2 x 1.5 x 1 (2 Nos.)
4	Exhaust Plenum	9137-Top 9818-Lower 460-Loose items	5.661 x 3.113 x 3.632 5.661 x 3.061 x 3.632 0.6 x 0.7 x 2.5
5	Base Exhaust Plenum	1000	6.5 x 1.2 x 1 (2 nos)
6	Lube oil Centrifuge	3500	3 x 1.5 x 1.8
7	Load Coupling with Hardware	2850	4.5 x 1.5 x 1.1
8	Accessory Coupling & Hardware	500	2.2 x 1 x 1
9	Guard Coupling Accessory	300	1.5 x 1 x 1
10	Jacking Oil Skid	1200	2.2 x 1.5 x 1.5
11	Piping Lube Oil Flush Field	700	4.5 x 1.5 x 1.1
12	Field Inter Connection Piping	25000	4.5 x 1.5 x 1.1 (10 nos)

13	Enclosure GT & Accessory Compartment, GT Walkway + Ladders	125,000	6 x 3 x 3 ( 10 Nos) 14 x 1.2 x 1.5 ( 3Nos.)
14	Turbine Vent Fans	8,500	2.5 x 2.5 x 2 (2No.s) 2.2 x 1.8 x 1.8 (2No.s) 2.2 x 2 x 1 (2 NO.s) 1.5 x 1 x 0.5 (2No.s)
15	GT Cabling	3,000	15000
16	Generator Enclosure	75,000	6 x 3 x 3 ( 7 Nos)
17	Filter house (For GT and Generator )	125,000	10 x 3.5 x 3.5 (10 No.s)
18	APU	3,000	6 x 2 x 2.5
19	Cooler Finned-APU	1500	6 x 0.5 x 3.5
20	<b><u>Inlet Duct</u></b>		
	i) Inlet Plenum Extension	3,000	4.3 x 2.3 x 3 ( 2 nos.)
	ii) Inlet Duct Transition Pieces	3,500	9.8 x 3.5 x 3 (2 nos.)
	iii) Inlet Duct Expansion Pieces	2,250	10 x 3.5 x 0.6 ( 2 nos.)
	iv) Inlet Duct Elbow	11,000	10 x 3.3 x 3.7
	v) Silencer	20,000	10 x 3.5 x 3
	vi) Duct Pieces	6750	10 x 3.5 x 3 (4 nos)
	vii) Support Structure	5,000	10 x 3 x 3 ( 2nos ) (W x D x H)
21	<b><u>Exhaust Dust</u></b>		
	i) Plenum Cover	17,000	8x 3.5 x 1.6 (2 no)
	ii) Horizontal Duct between plenum and EJ-1	15,400	6.0 x 3.2 x 3.2 ( 2no)
	iii) Horizontal transition Duct after EJ-1	19,700	7.0 x 3.2 x 3.2 ( 2no)
	iv) Horizontal Duct before EJ-2	9,270	6.0 x 3.2 x 3.2 ( 2no)
	v) Horizontal duct between diverter damper and guillotine	5,080	6.2x3.1x3.1 (2 no)
	vi) Horizontal duct after Guillotine	4,000	6.2x3.1x3.1 (2 no)
	vii) Silencer Inlet Transitino	4,300	8 x 3.2 x 3.2 ( 2 no)
	viii) Silencer Assembly with panels	74,730	8 x 3.2 x 3.2 ( 8 no)
	ix) Stack Transition	16,600	6 x 3.2 x 3.2 ( 2 no)

	x) Vertical Stack Assembly	50,550	6 x.3.2 x 3.1 (8 no)
	xi) Ladder & Platforms	15,800	6 x 3.2 x 1.2 ( 2 no)
	xii) Support structure Assembly	59,000	6 x 3.2 x 1.2 ( 2 no)
	xiii) Aviation lamp & Lightning Arrestor	300	0.4 x0.3 x 0.3
	xiv) Expansion Joint (EJ-1)	1,980	5.6 x 3.0 x 0.6 (2 no)
	xv) Expansion Joint (EJ-2)	2,480	5.6 x 3.0 x 0.6 (2 no)
	xvi) Expansion Joint (EJ-3)	2,100	5.6 x 3.0 x 0.6 (2 no)
	xvii) Expansion Joint (EJ-4)	2,480	5.6 x 3.0 x 0.6 (2 no)
22	Sensor Arrangement Exhaust	75	0.1 x 0.05 x 0.015
23	Gas Valve Module	5000	3 x 2 x 4.2
24	CO2 Rack (CO2 bottle Racks)	4,000	3.5 x 1 x 2.5 ( 8 nos.)
25	Auxiliary Control Panel	700	1 x 0.915 x 2.286
26	Lube Oil Demister	3,000	2.5 x 1.6 x 2.5 (1 no)
27	Water Wash Skid	9000	3.5 x 3.2 x 8
28	Water injection skid	6500	6.5 x 3.2 x 3.2 (1 no) 6.5 x 3.2 x 1.8 (1 no)
29	Diverter Damper	38000	3.2 x 3.2 x 3 (8 nos)
30	Guillotine Damper	20000	3.2 x 3.2 x 1.8 (6 nos)
31	Piping Arrangement Lube oil Junction Boxes	2000	4.5 x 1.5 x 1.1 (3 nos)
32	Piping Arrangement Lube oil Junction Boxes	12000	6.5 x 1.2 x 1 (3 No.s) 4.5 x 1.5 x 1.1 (2No.s)
33	Anchoring, Base Plates Positioning Blocks (Foundation Hardware-Concrete Embedments)	3350	1.2 x 1.5 x 3.5
34	Anchoring, Base Plates Positioning Blocks (Foundation Hardware Shims, Guideblock etc)	1590	0.4 x 0.5 x 1.5
35	Anchoring, Base Plates Positioning Blocks (Angle 75x75x45000)	400	0.175 x 0.325 x 6 (7 Nos.) 0.175 x 0.325 x 3 (1 No.)
36	Special Tools for GT Maintenance (Tools )	550	1 x 1 x 2.2

**(4) STEAM TURBINE (HNK 71/3.2-4) & AUXILIARIES :**

SL.No.	ITEM DESCRIPTION	QTY.	TOTAL WEIGHT	DIMENSIONS (mm)
			(Kgs)	LxWxH
				(Approximate)
1.	Outer Casing – Upper Part	1	14000	3725x3110x1600
2.	Outer Casing- Lower Part	1	15000	3495x3100x1600
3.	Exhaust hood – Upper part	1	15000	5800x2100x2000
4.	Exhaust hood – Lower part	1	22000	6200x2300x2700
5.	Rotor assembly	1	23000	7200x2300x2300
6.	Front Bearing Housing assly including Bed plate	1	7500	1600x2000x1500
7.	Rear Bearing Housing assly	1	7000	4300X1600X1500
8.	Inner Casing	1	4000	1300x1500x1250
9.	Guide blade carrier-I	1	1800	600x1300x1200
10.	Guide blade carrier-II	1	4700	600x1500x1500
11.	Guide blade carrier-III	1	3500	350x2000x2000
12.	Guide blade carrier-IV	1	4800	420x2400x2200
13.	Lube oil pump assly.	2	1100 each	2500x1000x900 each
14.	EOP Assly. (DC)	1	700	1600 x 750 x 700
15.	JOP Assly. (AC & DC)	1	2000	1550x1350x800
16.	Oil accumulators	1set	585	1000x500x2300
17.	Lube oil tank	1	5500	4450x2700x3000
18.	Oil centrifuge	1	1000	2200x1900x2000
19.	Duplex filter	1	500	1500x500x2000
20.	Overhead oil tank	1	3000	2800x2700x2800
21.	Governing console	1	1000	1800x1500x1500
22.	Valve Block	2	4000	2000x700x950

**(5) S.T.G & G.T.G:****(A) 59.7 MW S.T.G**

S.NO	DESCRIPTION EQUIPMENT	Qty.	OVERALL DIMENSIONS IN MM			Weight in tonnes
			LENGTH	BREADTH	HEIGHT	
1	GENERATOR STATOR	1	6000	3300	3300	89
2	GENERATOR ROTOR	1	7700	950	950	20.2
3	FOUNDATION ITMES	LOOSE ITEMS				5.4
4	BEARINGS	2	1810	540	1228	2.3

5	AIR COOLER UNIT	LOOSE ITEMS				2.7
6	EXCITER	1	3000	2000	2000	5
7	CO <sub>2</sub> EQUIPMENT	1	3000	1000	1500	3

**B) G.T.G**

S.NO	DESCRIPTION EQUIPMENT	OVERALL DIMENSIONS IN MM			WEIGHT IN M.T
		LENGTH	BREADTH	HEIGHT	
1	GENERATOR PACKAGE	9000	4100	4700	210
2	FOUNDATION ITMES	LOOSE ITEMS			8
3	GENERATOR ENCLOSURE	12600	5600	5100	8
4	EXCITER	4600	2020	1803	7

**(6) TANKS :**

SL. NO.	DESCRIPTION	SHIPPING DIMENSIONS (M)	DRY WEIGHT (MT)	FLOODED WEIGHT (MT)
	<b>Misc. Tanks</b>			
1	Reserve feed water -60 m3	9.3(L) x 3.52 OD x 0.016 TK	17.1	101
2	Atmospheric Flash Vessel	1.500(H) x 1.0 OD x 0.010 TK	1	2.1
3	RE Joint – Conventional type 1100 NB	1.750 OD x 0.800	0.625	–

**(7) B. F. VALVE & other types etc.**

Sl. NO.	SIZE OF VALVE (MM)	APPROX.WEIGHT OF EACH VALVE (KG)	APPROX.OVERALL DIMENSIONS OF EACH VALVE:L(MM) X B(MM) X H(MM)
1	Dia 1100 NB (Dia 1200 NB with Taper Piece) BF Valve	3300	1900 X 1500 X 1000

Other valves	17.1 / 101	9.3 (L) x 3.52 OD x 0.016 Tk
	1 /2.1	1.500 (H) x 1.0 OD x 0.010 Tk
	0.625	1.750 OD x 0.800 (H)

**(08) EDN**

Sl.No	Document	BOQ (Aprox)	Dimension ( aprox) / Pc ( L X B X H)	Aprox.Gross Weight/Pc
<b>A</b>	<b>EDN</b>			
<b>1</b>	<b>DCS control panel-BOP</b>	22 Panels	95 Cm X 105 Cm X 270 Cm	565 Kg
<b>2</b>	<b>TG Package :</b>	22 panels	95 Cm X 105 Cm X 270 Cm	565 Kg
<b>3</b>	<b>MMI System :</b>	02 Panels	95 Cm X 105 Cm X 270 Cm	565 Kg
<b>4</b>	<b>AVR Package</b>	2 sets	325 Cm X 105 Cm X 270 Cm	2325 Kg
<b>5</b>	<b>Mark-VI package :</b>	1 set	91Cm X 225 Cm X 228 Cm	3000 Kg
<b>6</b>	<b>UCP</b>	1 No		2000 KG
<b>B</b>	<b>BOP – Bought Out Items</b>			<b>Approx Wt. for total quantity</b>
1	CJC Box	15 Nos		300 Kg
2	Valve Manifolds	75 Nos		225 Kg
3	Socket Weld Fittings	1000 Nos		200 Kg
4	Impulse Pipes	4500 Mtr		5700 Kg
5	Pr/DP Switches	16 Nos		250 Kg
6	Pr/DP Gauges	104 Nos		175 Kg
7	Temp Gauges	94 Nos		125 Kg
8	LIE/LIR	30 Nos	1650 Cm X 650 Cm X 2150 Cm	550 Kg
9	Temp Elements	60 Nos		110 Kg
10	SWAS-Analysers	42 Nos		180 Kg
11	SWAS-Panels	4 panels		18000 Kg

12	Pr. & Diff Pr. Transmitters	110 Nos		165 Kg
13	Level Transmitter	9 Nos		210 kg
14	HMS	1 set		100 Kg
15	Digital Indicators	8 Nos		35 Kg
16	Pen Recorders	4 Nos		16 Kg
17	Instrumentation Cables	75 Km		24000 Kgs
18	Compensating Cables	1.5 Km		1500 Kgs
19	Master Clock System	1 Set		100Kg
20	HMI Control Desk	1 No		1000 Kg
21	Rotameters	5 Nos		500 Kg
22	Level switches	10 Nos		100 Kg
23	Level guages	1 No		10 KG
24	FEP Extruded Cable	5 Km		5000 KG

**09. PEM-** Air Traps, Aluminium Sheet, Ancilliary Materials for Insulation, Chemical Dosing System, Control Valves, Flow elements, ME Bellows, Steam Traps, Thermal insulation, Air Release Valves, Ball Valves, CI-Gate-Globe-NRV Valves , GM Valves, eḡC.

**10.** Weights of annexure IA inclusive.

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

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## Annexure – II

<b>LIST OF T&amp;P BEING PROVIDED BY BHEL ON FREE OF HIRE CHARGES AND ON SHARING BASIS</b>			
<b>Sl. No.</b>	<b>Equipment</b>	<b>Capacity</b>	<b>Qty.</b>
1	<b>Crawler crane for drum lifting only</b>	200-250T	1 No.
2	<b>Crawler crane</b>	100/150 T	1 No.
3	<b>Mobile Crane</b>	15/20 T	1 No.
4	<b>Hydro test pump set</b>	250 / 400 kg	1 No
5	<b>Induction heating machine(in case of P91 piping)</b>		As per requirement
6	<b>DG set (in case of P91 piping only)</b>	250 KVA	As per requirement

## NOTES:

1. Any other special T&P if supplied by Manufacturer will also be provided free of hire charges as and when made available. These special tools & tackles are to be used only for the purpose for which these are meant and are to be required to be returned in good condition as and when required by BHEL.
2. Other terms & conditions regarding above items shall be as per clause no 37 (T & P / IMTE's).

## Annexure-III

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

Sl. No.	Equipment	Capacity	Qty.
1	Tyre mounted mobile crane	12 / 15T	1 No.
2	Tyre mounted mobile crane	18/ 20T	1 No.
3	Tractor trailer unit 15 MT or higher capacity as per requirement		1No
4	Welding equipment with accessories & ovens for welding electrodes baking and holding		15-20 Nos /As per requirement
5	Hydraulic Pipe bending M/c		1 No.
6	Concrete drilling machine		1 No.
7	Plasma cutting machine with Air Compressor and Air storage tank		1 No.
8	Winches		As per requirement
9	Slings	1.5",12m	2 No. / As per requirement
10	Chain Pulley Block	10T	6 No. / As per requirement
11	Rails		As per requirement
12	Max puller		6 No. / As per requirement
13	Jacks		As per requirement
14	Slippers		As per requirement
15	Bolt Tension Calibrator		As per requirement
16	Electric Winch 2/3/5 MT		As per requirement
17	Heat treatment and Stress relieving arrangement		As per requirement

**BB) TENTATIVE LIST OF MAJOR IMTEs TO BE ARRANGED BY CONTRACTOR AT HIS COST**

Sl. No.	Instrument Description	Range, accuracy, least count as applicable.
<b>HRSG / BOILER STRUCTURES / PRESSURE PARTS</b>		
1	Steel Scales	300 mm, one meter. Least Count 0.5 mm
2	Tapes	3,15,30, 50 meters
3	Theodolite	1 Second accuracy
4	Time, Temperature Recorder	as per requirement or 0 to 600 Deg.C Least count 10 Dec.C. (Charts having 120 divisions).
5	Spirit Level	0.02 MM/Meter, Six inches size (Boiler CC Pumps)
6	Pressure Gauges	as per requirement _0-5, 0-10, 0-20, 0-50, 0-200, KG per CM square (Air, Hydro Tests) for Air test before HT and Oil lines HT); As per requirement
7	Torque Wrench	300NM (5-50 Kg/mtr) / As per requirement
8	Hand Operated Megger	(500 / 1000 V ) / As per requirement
9	Tong Tester (0 to 50A, + / - 3 % Accuracy)	As per requirement
10	Digital Multimetres	As per requirement
11	U Tube Manometer 0-2000 mm Water Column	As per requirement
12	Inclined Manometer 0-50 mm Water Column	As per requirement
13	Bolt Tension Calibrator	As per requirement

**NOTES:**

1. The above list specifies only major T&P & IMTE's (may not be complete) to be deployed by the contractor. All additional T & P and IMTE's / other tools and plants including suitable capacity D shackles, slings, rails sleepers hydraulic / mechanical jacks etc which are required for satisfactory & timely completion of work shall also be deployed by the contractor within finally accepted price.
2. Sleepers, rails, jacks, winches etc required for unloading of heavy consignment as such as Boiler drum, Generator stator, Generator 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

3. In case the contractor fails to arrange above minimum required T and P and IMTEs the latter shall have right to arrange the same at the risk and cost of the contractor.
4. For other terms & Conditions regarding above items please refer clause 37.

**CERTIFICATE OF DECLARATION FOR CONFIRMING THE KNOWLEDGE OF SITE CONDITIONS**

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

Tenderers Name and Address

Place:

(Signature of the Tenderers with stamp)

Date:

**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.....

RATE SCHEDULE

Sl. No	DESCRIPTION OF WORK	Rate in Rupees (In figures and words)	TOTAL VALUE in Rupees (In figures and words)
<b>1</b>	<b>HRSG</b>		
1.1	Rate in Rupees per MT for complete work of Erection, Testing, Commissioning, Trial operation and handing over, of 1X182 TPH HRSG and Auxiliaries, 70 M Chimney etc as per tender specifications.  (Approximate Weight is 2600 MT as per Annexure- IA)		
1.2	Erection, Testing, Commissioning, Trial operation and handing over of Piping and their insulation of various piping systems of all types of materials such as AS, CS, SS etc. along with Insulation as indicated under Annexure - IA of tender specifications.  (Approximate weight 280MT)		
<b>2.0</b>	<b>MATERIALS HANDLING</b>		
2.1	<b>Rate in Rupees per MT</b> for entire material being supplied to the project as per tender specifications and items as listed in Annexure – 1B.  (Approx. tonnage to be handled 6,000 MT)		
2.2	<b>Lump sum</b> price for entire scope of materials handling work as defined in this Tender Specification in respect of following items from Trailers, directly coming to site. Materials to be unloaded MANUALLY (using sleeper/ Jack method). All the resources such as sleepers, fixtures, T and P and manpower is in the scope of contractor for following LUMPSUM items.	<b>LUMPSUM PRICE</b>	<b>LUMPSUM PRICE</b>

2.2.1	<p><b>LUMPSUM PRICE FOR Gas Turbine Skid</b>  Approximate weight: <b>230 MT</b>  Approx. Dimensions: 12.6X4.6X5.0 M<sup>3</sup></p> <p>Quantity – 1 (One No.)  <b>(Optional)</b></p>		
2.2.2	<p><b>LUMPSUM PRICE FOR Gas Turbine Generator Skid</b>  Approximate weight: <b>210 MT</b>  Approx. Dimensions: 9.0X4.1X4.7 M<sup>3</sup>  (LXWXH)  Quantity – 1 (One No.).</p>		
2.2.3	<p><b>LUMPSUM PRICE FOR Steam Turbine Generator Stator</b>  Approximate weight: <b>89 MT</b>  Approx. Dimensions: 6.0X3.3X3.3 M<sup>3</sup>  Quantity - 1 (One No.).</p>		
3.0	<p>Rate in Rs. per MT for packing and Loading of materials in their own Trucks / Trailers and transporting the same to Carriers Godown / Railway Station at <b>JAISALMER</b> &amp; their booking for destination as per BHELs instructions.</p> <p>(Approx. tonnage to be handled <b>20 MT</b>)</p>		
4.0	<p>Rate in Rs. per MT for Taking delivery of materials in their own Trucks / Trailers from Godowns of Carriers / Railways at <b>JAISALMER</b> &amp; bringing the same to BHEL store as per tender specifications.</p> <p>(Approx. tonnage to be handled <b>20 MT</b>)</p>		
5.0	<p>Rate in Rs. per MT for collecting and loading of materials including packing (if required) in carriers Trucks / Trailers, to be placed by Carriers inside the project area.</p> <p>(Approx. tonnage to be handled <b>10 MT</b>)</p>		

6.0	Rate in Rs. per MT for shifting of materials already stored or stacked at BHEL stores/sheds/ erection site to customer's premises or premises of other agencies in plant complex or vice versa by loading, transporting, unloading and stacking.( Approx. Lead distance 3km).  (Approx. tonnage to be handled <b>20 MT</b> )	/	/
	<b>GRAND TOTAL AMOUNT IN WORDS AND FIGURES (Rs.)</b>	/	/

**NOTES:**

- 1 The quantities indicated against each item above are tentative and these are liable to vary depending upon the site requirement.
- 2 ABOVE RATES ARE TO BE SUBMITTED IN SEALED ENVELOPE, AS PER CONTRACT CLAUSE- 51.0 (RATE SCHEDULE).
- 3 Only 'Unit Rate' shall be considered for evaluation and award.
- 4 The rate shall be entered in figures as well as in words. In case of difference in rates between words and figures, the lesser of the two will be treated as valid rate.
- 5 In case of omission in quoting any rate, the evaluation will be done considering the highest quoted rate obtained against that item. But the work, if awarded, will be paid at the lowest quoted rate obtained against that item.
- 6 Rates applicable against item no 2.2.1, 2.2.2 & 2.2.3 will be applicable only when the material is unloaded manually by sleeper / jack method. In case material is unloaded using BHEL cranes of 100 / 150 /200 / 250 MT and other higher capacity cranes or EOT CRANE, the payment shall be released as per quoted rate against the applicable rates under Item no 2.1.

(Seal and Signature of Tenderer)

**GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION (RA)**

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

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

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

REF:

Dt.

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

**Sub.: Erection, Testing, Commissioning and Trial Operation of 1 x 182 TPH HRSG (including 70 M high steel chimney) with related Auxiliaries and Material Handling work for the entire plant packages of 160 MW RAMGARH CCPP at Combined Cycle Power Plant of M/s Rajasthan Rajya Vidyut Utpadan Ltd (RRVUNL) at RAMGARH, Rajasthan**

Dear Sirs,

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

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

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

Thanking you,

Yours faithfully,

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

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

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