



भारत हेवी इलेक्ट्रिकल्स लिमिटेड

(भारत सरकार का उपक्रम)

BHARAT HEAVY ELECTRICALS LIMITED

(A Govt. of India Undertaking)

TCN - 01

Ref: PSER:SCT:MUZ-S1351:TCN-01

Date:08-05-2012

Sub	Tender change notice (TCN) 01.	
Job	Dismantling and R & M of Boiler & Aux, Turbine, TG set & Aux, Miscellaneous Equipment for 1x110 MW unit # 2 at Muzaffarpur TPS,KBUNL, Bihar.	
Ref	1.0	Tender no PSER:SCT:MUZ-S1351:12.
	2.0	BHEL's NIT, vide reference no PSER:SCT:MUZ-S1351:2804, dated 30-04-2012.
	3.0	Other references (if any).

With reference to above, following points, relevant to tender, may please be noted and complied with while submitting offer.

- 1.0 Revised Volume-ID&II, Rev-1, superseding previous version.
- 2.0 Revised 'No deviation certificate' as per enclosed Annexure-2. Bidder to submit 'No deviation certificate' as per attached format only.
- 3.0 All other terms & conditions shall remain unchanged.

Thanking you,

Yours faithfully,
for BHARAT HEAVY ELECTRICALS LTD

ENGR (SCT)

Encl

As above.

पावर सेक्टर पूर्वी क्षेत्र (मुख्यालय)

POWER SECTOR EASTERN REGION, DJ-9/1, SALT LAKE CITY, KOLKATA - 700 091

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VOLUME – ID&II, REV-01

[TECHNICAL SPECIFICATION & SPECIAL CONDITIONS OF CONTRACT]

FOR

DISMANTLING AND R & M OF BOILER & AUX, TURBINE, TG SET & AUX, MISCELLANEOUS EQUIPMENT

FOR

1X110 MW UNIT # 2

AT MUZAFFARPUR TPS,KBUNL, BIHAR.



BHARAT HEAVY ELECTRICALS LIMITED
(A GOVT. OF INDIA UNDERTAKING)
POWER SECTOR – EASTERN REGION
PLOT NO. – 9 / 1, DJ – BLOCK,
SECTOR – II, KARUNAMOYEE,
SALT LAKE CITY,
KOLKATA – 700091.

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PART-A BOILER AND AUXILIARIES

SECTION - I

INTRODUCTION

BHEL is the original equipment manufacturer (OEM) of the units 1 & 2 of 2X110MW at Muzaffarpur TPS. Unit No 1 of MTPS was supplied and commissioned by BHEL in March 1985 and Unit No 2 in March 1986.

BSEB entrusted the R&M work of Units 1&2 (2 x 110 MW) of Muzaffarpur TPS and released LOI No: 577 dated 18-07-2005 on BHEL. Subsequently BSEB & NTPC formed a joint venture company in the name of Vaishali Power Generation Company Ltd, which was later renamed as Kanti Bijlee Utpadan Nigam Ltd.(KBUNL).

RLA/CA was conducted for Units 2 & 1 in October 2006 and May 2008 respectively and reports were submitted to NTPC.

SECTION - II

GENERAL DESCRIPTION OF EXISTING STEAM GENERATOR

The boiler is designed for natural circulation, balanced draft, tilting tangential firing of coal with three-stage super heater and with single stage de superheating and fusion welded WW furnace. The boiler is designed to generate steam of 375 T/hr at 540 ° C and pressure of 138 Kg/cm² at BMCR.

6 Nos. of bowl mill of type XRP 623 are provided at the front side of the boiler. The burner system is equipped with coal burners in 6 elevations in each corner (24 nos in total) and for start-up and stabilization, oil burners in three elevations (totally 12 nos) are provided.

For supply of primary air and secondary air, 2 No's of PA fan of type NDFV 20 b and 2 No's of FD fan of type NDFV 22 b are provided and 3 No's of ID fan of type NDZV 28 sidor are provided for removal of flue gas and maintaining furnace draft. 2 No's regenerative air heaters are provided in the second pass of the boiler. 40 No's of wall blower and 20 No's of long retractable soot blowers are provided. Electrostatic precipitators are located after the air heater to collect the fly ash from the flue gas.

The boiler has necessary lining and insulation along with fixing material to limit the outside surface temperature to the required level.

The complete integral piping, valves and fittings, all air and gas ducting with dampers/ gates are also provided.

1. PRESENT CONDITION OF THE BOILERS

- Regular annual overhauling and capital overhauling were not properly carried out with replacement of quality spares. This has resulted in deterioration of almost all equipments of the boiler and its auxiliaries. Most of the controls & instrumentation were not in operation or not available.
- The units were in operation without HEA Igniters, scanners, FSSS logics, secondary air damper controls, and burner tilt.
- Due to poor coal quality and deteriorated condition of the boiler, the unit was operated at low load. BSEB was using varying grades of poor coals from several mines, which had high inclusions of foreign materials. APH's had severe erosion of seals leading to higher air ingress.

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- RLA / CA studies were carried out in boiler no 2&1 in the month of October '06 & May '08 and the recommendations based on these studies are incorporated in this technical proposal. The scope of work is prepared based on the RLA/CA study.

- Unit no.1 & 2 were under shut down since 06.10.03 & 03.10.03 respectively. Unit -2 was in operation since 2008 till Nov. 2011 and unit was available for operation till 29.03.2012 and subsequently handed over to BHEL for R&M.

SECTION - III

CLARIFICATIONS AND COMMENTS

Fly ash hoppers for ESP, APH and Economiser will be terminated by BHEL with flanges beyond which the required accessories to connect to their equipments is to be taken care by KBUNL.

The work to be carried out under the scope of this specification covers dismantling/cutting/removal of the existing components /equipments as mentioned below of Unit-2 at Muzaffarpur Thermal Power Station, MTPS,BIHAR. The dismantled materials have to be transported to the Customer specified location within the Plant premises/ Plant Township. The bidder has to plan the dismantling/removal in such a way that the new components/equipments is erected in one is to one basis.

The work to be carried out under the scope of this specification also covers the complete work of handling including receipt of materials from stores/yard located within from project premises, arranging their issue, site transportation (from the place of issue to place of erection), temporary storage (including involved transportation) prior to erection if required, cleaning and preservative painting, erection, alignment, welding, leveling, adjustment, checking, chipping & leveling of foundations providing packers and shims, pre-assembling of equipment at the pre-assembly yard, inspection, minor rectification, grinding , laying/removal of temporary pipes, DP test, kerosene test, welding of hooks seal plates etc. insulation, all pre-commissioning test start up and trial run of rotary equipment, final commissioning covered under tender specification , up to the handing over of the units to Customer/MTPS/KBUNL and assistance for P.G. test of Main Boiler and providing assistance during commissioning and unit trial operation/PG Test, reconciliation of materials issued to contractor & returning the unused materials to Customer stores/yard. The work shall conform to dimensions and tolerances given in various drawings and documents that will be provided during erection. If any portion of works is found to be defective in workmanship or not conforming to drawings / documents / other stipulations/manuals , the contractor shall dismantle and re-do the work duly replacing the defective materials at their own cost, failing which recoveries, as determined by BHEL, shall be effected from contractor's bills.

The Scope under this specifications is not exhaustive but indicative only. However, any activity covered under the normal course of execution of the job shall be deemed to be within the scope.

Before submitting the tender, the bidder must visit Muzaffarpur TPS site to familiarize themselves to the nature / extent of the job, prevailing site local conditions etc.

The work to be carried out under the scope of this specification shall broadly comprise of but not to be limited to the following:

Cleaning/water washing of ash accumulated in PENT House, DOG House and DEAD Chamber , Bottom Ash Hopper and total Boiler & Aux. area including cable trays and day to day cleaning/water washing as required under the instruction of BHEL Engineer is to be carried out within the total quoted price.

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- 2.1 Foundation and other necessary civil works for supporting structures, equipment etc, will be provided by BHEL as required. The dimensions of the foundation and anchor bolt pits shall be checked by contractor for their correctness with respect to the above access as per the erection drawings. Further, top elevation column foundations shall be checked with respect to bench-mark etc. All minor adjustment of foundation levels dressing and chipping of foundation surfaces etc. upto 50 mm as may be required for the erection of equipment/plants will be carried out by the contractor at no extra cost. Installation and charging of starters (including attending minor defects), distribution etc, shall be done by the contractor while only incoming supply to the common isolating switch will be arranged by BHEL.
- 2.2 Grouting of all columns, equipment base plates, anchor bolt holes etc are included in the scope. The grouting mixture shall be either composed of port land cement or ready mix grout of proved quality. However, in both the cases the vendor has to arrange Portland cement and ready mix grout component respectively within the included cost and no payment shall be released by BHEL to the contractor on this account. Before arranging the type of cements/grouting materials, the contractor must take approval from BHEL/Customer for the brand to be used. Application of the two options will depend on drawing/specification/ instruction of BHEL Engineer. The contractor shall arrange for sand, stone chips, gravels, anti shrink compound, plasticizer, shuttering, grout mixing machine, labours etc at his cost. The contractor shall prepare the required test pieces/test cubes to ensure the strength of grout and get the same tested in laboratory at his cost. Test cube shall also be taken during grouting for testing in the laboratory and shall be tested at his cost. Necessary arrangements along with watering till complete curing has to be arranged by the vendor.
- 2.3 The contractor shall take delivery of material/equipment at projects store/yard. As soon as the material is issued to the contractor, all responsibility of proper handling and storage shall be the responsibility of the contractor and thereafter any loss/damage to the equipment and material due to faulty handling and storage or any other reason attributable to contractor, shall be made good by the contractor at his own cost.
- 2.4 The contractor shall check, tally and inspect all material consignment issued to him and shall maintain proper record of the receipt of material received and such reports shall be produced by the contractor to the Engineer for verification. Any deviation from packing list or damage to any component noticed during receipt of material should be immediately brought to the notice of BHEL engineer. Any claim in this regard after receipt of material by the contractor will not be entertained.
- 2.5 The contractor shall clean the surfaces of the material/equipment before erection and any preservative coating which has peeled off shall be applied / painted by the contractor. The paints required for such touch-up painting shall be supplied by the contractor within his quoted rate as per the specification approved by BHEL.
- 2.6 Pre-assembly of equipment to be done at the pre-assembly yard for inspection and checking. It is to be noted that BHEL will provide only reasonably levelled open space for pre-assembly yard. The contractor has to arrange desired levelling of the area at their cost. The fixtures, steel structures required for temporary supporting for pre-assembly, checking, and welding for lifting and handling during pre-assembly and erection shall be arranged by the contractor at his own cost. Steel for such work if required shall be arranged by the contractor.
- 2.7 All the works such as cleaning, touch up painting, checking, aligning, assembling, temporary erection for alignment, dismantling of certain equipment for checking and cleaning, surface preparation, grinding, straightening, chamfering filing, chipping, drilling, reaming, rapping, shaping, filling up etc and other works, as may be applicable in such erection works which are treated as incidental to the erection works and are necessary to complete the work satisfactorily, shall be carried out by the

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- contractor as part of the work. All consumables including Paints for touch up painting shall have to be supplied by the contractor at his cost.
- 2.8 Extra lengths in various fabricated ducts and piping given as erection allowance shall have to be cut to suit site conditions and do edge preparation/chamfering without any extra payment.
 - 2.9 The contractor shall fabricate and install as part of the work, all platforms ladders , and approaches wherever required for facility of operation of equipment/instrument wherever required but not specifically shown in the drawings/bill of materials. However raw materials for the same shall be provided by BHEL.
 - 2.10 Attachment welding of necessary seal boxes inspection windows. Instrument tapping points, etc., both for regular measurement and performance testing to be provided on Main Boiler, covered within the scope of this tender, will also be the responsibility of the contractor and the same will be done as per the instructions of BHEL Engineer. The erection and welding of all above items will be the contractor's responsibility, within their quoted rate even if:
 - (a) Product groups (PG) under which these items are released are not covered in the scope of this tender.
 - (b) Items are supplied by an agency other than BHEL.
 - 2.11 Suspension for ducting, piping, etc. will be supplied in running lengths which shall be cut to suitable sizes and adjusted as required without any extra cost. Secondary steel for hangers etc shall be supplied by BHEL. Ducts/expansion bellows are likely to be dispatched to site in walls/plate/loose pieces and those are to be assembled and welded at site, before erection. This involves intensive seal welding/full welding on ducts and same shall be included in the scope of work of the contractor including NDT on weld joint like DPT, kerosene test etc.
 - 2.12 Fabrication of supports wherever required, shall also be carried out by the contractor without any extra cost. Any additional support if required for effective completion of work, as advised by BHEL engineer, shall be fabricated and erected by the contractor at no extra cost. However, the raw material required for such additional supports shall be supplied by BHEL.
 - 2.13 All rotating machineries and equipment under the scope shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and refitting 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, facilities for dismantling, cleaning, lubricating and refitting shall be provided by the contractor. All consumables required shall be supplied by the contractor at no extra cost.
 - 2.14 All the flap valves, dampers of ducts shall be serviced and lubricated to the satisfaction of BHEL Engineer, before erecting the same.
 - 2.15 All attachment, welding, fixing hooks, supports, anchors, studs, plates, angles and other steel components to support insulation over the ducts erected shall have to be carried out by the contractors as specified in the drawings and as per instructions of the Engineer. Welding of supports shall be done by BHEL approved welders only. Touch-up painting required prior to insulation/refractory work (including supply of paints) shall be done by contractor without any extra cost.
 - 2.16 In case of any class of work for which there is no such specification as laid down in the contract, such as welding of stainless steel parts such work shall be carried out including supply of consumables in accordance with the instructions and requirements of the Engineer at no extra cost.
 - 2.17 Fitness of all lifting tackles including wire-ropes slings, shackles, used by the contractor, shall be got approved by BHEL Engineer. It will be the responsibility of the contractor to ensure safe lifting of

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the equipment taking due precautions to avoid any accidents and damages to other equipment and personnel. Test certificates and periodical calibration of lifting appliances from a recognized body are to be submitted to BHEL site office, as per requirement of BHEL/ISO system. Expenditure on such works forms a part of the scope of work.

- 2.18 All attachment, welding, fixing hooks, supports, anchors, studs, plates, angles and other steel components to support insulation (thermal/acoustic) over the component erected shall have to be carried out by the contractor as specified in the drawings and as per instruction of the Engineer. Touch up painting including paints and consumables supply will be provided by contractor within quoted rate (required as per drawing/BHEL instructions)
- 2.19 The contractor shall erect scaffoldings/Temporary platforms supports etc required during erection before the permanent supports are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structure materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. Further, any cutting or alteration of member of the structure or platform or other equipment shall not be done without specific prior, approval of BHEL Engineer.
- 2.20 Removal of all temporary supports, foreign materials, scraps, debris etc. from inside the Ducts and other erected components/items and thorough cleaning to be done to the satisfaction of BHEL engineer before giving commissioning clearance.
- 2.21 The contractor shall erect scaffoldings/Temporary platforms supports etc as required during erection before the permanent supports, hangers etc are erected. These should be of adequate capacity and shall never be overloaded. These should be replaced when not found suitable during erection work. All structural materials required for the above shall be arranged by the contractor at his own cost. No such material shall be supplied by BHEL in any case. Welding of temporary supports, cleats etc on the boiler columns shall be avoided. In case of absolute necessity, contractor shall take prior approval from BHEL Engineer. The surfaces damaged during removal of temporary supports will be set right by contractor within quoted rate, as per BHEL instructions. Cleats welded /fixed during erection stage is to be removed and surface grounded as per BHEL instructions.
- 2.22 The contractor shall carry out the trial run of motors covered in the Product Group including checking the direction of rotation in the uncoupled condition, checking alignment and re-coupling the motor to their respective driven equipment. For alignment etc. Packers /SS shims of different thickness and sizes, gaskets (water , steam/ oil) etc. if required are to be supplied by successful bidder within the total quoted price. Before starting the motor IR Value of the motor shall be recorded and if found necessary dry out operation shall be carried out by the contractor to make up the IR Value to normal/acceptable level, as per the advice of BHEL Engineer within the quoted rate. Megger of appropriate capacity will be arranged by contractor within quoted rate.
- 2.23 All the necessary Boiler & Aux and TG & Aux.(including Condenser doors) High tensile / Carbon steel fasteners,Washers/Gaskets (Water, Steam, Oil), jointing compound like Holdtite , Favicol, Araldite etc. are to be arranged as per instruction / specification of BHEL Engineer is to be arranged by successful bidder within the total quoted price.
- 2.24 Proper account of the packing wood and steel supports forming part of packing will be kept by the contractor and returned to BHEL stores from time to time.

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- 2.25 All terminating connections with system not mentioned elsewhere of this tender will be in the scope of contractor.
- 2.26 Non specified jobs at the interface / terminal points like bolting welding, gasket changing etc. have to be done by the contractor within the quoted price.
- 2.27 Instrument tappings coming on the Main Boiler areas for normal operation and PG test are to be welded/fitted on the Main Boiler areas as per drawing / instruction of BHEL engineer without any extra cost. Some of the Instruments fitted with supplied and erected equipment may have to be dismantled and re-fitted for calibration / safety purposes and this job has to be done by the vendor under their regular scope of work within the quoted price.
- 2.28 Removal of all temporary supports, foreign materials, scraps, debris etc. from inside of the Main Boiler and other erected components and thorough cleaning to achieve clearance / IR values .
- 2.29 For all plate welding, seal welding from inside and stitch welding from other side is to be followed as per drawing.
- 2.30 Side cladding over Main Boiler pent house ,Dog House, Operating floor, Dead Chamber etc. to be done by the vendor within his quoted price. Required corrugated sheets and fixing hardware will be supplied by BHEL under regular supply. Minor consumables/hardware like bitumen washers, putty etc. need to be arranged by the vendor within his quoted price.
- 2.31 The terminal points decided by BHEL should be final and binding on the contractor for deciding the scope of work and effecting payment for the work done.
- 2.32 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 personnel of BHEL, BHEL's customer, customer's consultants and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.
- 2.33 All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory / local authorities are to be arranged by the contractor at his cost in time to ensure smooth progress of work.
- 2.34 BHEL reserves right to recover from the contractor any loss which arises out of undue delay / discrepancy / shortage / damage or any other causes due to contractor's lapse during any stage of work. Any loss to BHEL due to contractor's lapse shall have to be made good by the contractor.
- 2.35 All cranes, transport equipment, handling equipment, tools, tackles, fixtures, equipment, manpower, supervisors / Engineers, consumables etc. except otherwise specified as BHEL scope of free issue, required for this scope of work shall be provided by the contractor. **All expenditure including taxes and incidentals in this connection will have to be borne by the contractor** unless otherwise specified in the relevant clauses. The contractor's quoted rates should be inclusive of all such contingencies.
- 2.36 During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc. may become necessary on account of feedback / revision of drawing. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc. promptly and expeditiously. Daily log sheets signed by BHEL Engineer and indicating the details of work carried out, man-hours etc. shall be maintained by the contractor for such reworks.

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- 2.37 The contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. However, necessary steel will be provided by BHEL free of charge from the scrap / surplus materials available at site.
- 2.38 Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas / site to enable other agencies to carry out their work or for any other reason, same shall be done by contractor most expeditiously. No claim for extra payment for such work will be entertained.
- 2.39 The details of components/equipments to be erected under this contract is generally as per the Weight Schedule given in **ANNEXURE – IV (BLR)**. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the erection documents which will be furnished in the course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.
- 2.40 Instrumentation like pressure switches, air sets, filters, regulators, pressure gauges, dial thermometers, flow meters, valve actuators, flow indicators, centrifugal / speed switches of motors etc. which are received in assembled condition as integral part of equipments ,shall be dismantled by Contractor for calibration and calibration if required will be done by contractor.
- 2.41 Actuators / drives of dampers, gates, powered vanes etc. may have to be serviced, lubricated, before erection, during pre-commissioning & commissioning, including carrying out minor adjustments required as incidental to the work.
- 2.42 Suspensions of Main Boiler are to be tightened by Calibrated torque wrench as required.
- 2.43 During the course of erection, testing and commissioning certain rework/ modification/ rectification/ repair/ fabrication etc., will be necessary on account of feedback from various power station units already commissioned and/ or units under erection and commissioning and also on account of design discrepancies or manufacturing defects and site operation/ maintenance requirements. This will also include modifications/ re-works suggested by FES/ other inspection group etc. Contractor shall carry out such rework/ modification/ rectification/ fabrication/ repair etc., promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc. shall be maintained by the contractor.
- 2.44 Interconnection/ hook up, if any, with the existing system shall form part of work. Such interconnections, hook ups may require shut down of running plant and the relevant work has to be completed within such planned shutdowns. This may call for working with enhanced resources and working on extended hours. Contractor's offer shall cover all such contingencies.
- 2.45 The contractor shall make suitable security arrangements including employment of security personnel and ensure protection of all materials/equipment in their custody and installed equipments from theft/fire/pilferage and any other damages and losses.
- 2.46 Rectification of damage caused during transportation / handling of materials, if required is to be done by the contractor without any extra financial implication.
- 2.47 During movement of crane or transportation /shifting of erectable materials in the work site, Boiler & Aux. areas' exposed foundation along with foundation bolts are to be suitably protected by covering the same with sand blanketing and subsequent earth filling.

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SECTION - VI

SUMMARY OF CHANGES / MODIFICATIONS TO BE CARRIED OUT

(The details are furnished in the following sections)

A. System under Replacement:

SI No	Description	Remarks
1.	Furnace Water Wall, Extd WW	100% Replacement based on RLA
2	Burner Panel	
3	Furnace bottom Seal plate	
4	Radiant Roof (1st pass) & roof tubes of second pass	
5	Screen Tubes (WW & Super heater)	
6	Hanger Tubes (WW & Super heater)	
7	Platen SH Outlet Header	To be replaced.
8	Final SH Inlet Header	To be replaced
9	Final SH Outlet Header	To be replaced
10	Steam Cooled Wall tubes	25% Replacement
11	SH De Super Heater	Deleted
12	RH De Super Heater	Deleted
13	LTSH Coils & terminal tubes	50% Replacement
14	Wall Blowers & Furnace temp probe	100% Replacement.
15	Drains and Vents.	To be done as supplied.
16	Safety valves at Drum, RH, SH and ERV	Retained.
17	Refractory, lining and insulation	100% Replacement
18	Hand Rails, Grills & toe guards	50% Replacement
19	Hot Secondary Air ducting	100% Replacement
20	Cold air ducting (SA, PA & tempering air)	100% Replacement
21	Buck stays	Buck stays to be replaced as supplied.
22	Fuel Oil system	Corner oil skid and oil stations and associated valves fitting etc. Including oil lines are to be done,
23	Tracing line for Fuel oil piping from pump house to boiler front	Only tracing line replacement with insulation to be done
24	Platen Super heater coils	100% replacement
25	Burner (wind box) assembly	100% Replacement
26	Igniters, Flame scanners	100% Replacement
27	PF pipes with couplings supports, hangers	Associated work related to replacement is included in the scope of work
28	Ceralin Bends	100 % Replacement
29	Hot Primary Air ducting	100% Replacement
30	FG ducting from Eco O/L to ESP I/L	100% Replacement
31	ID system ducting	100% Replacement
32	Boiler roof sheeting.	Retained.
33	Economiser Coils with header	100% Replacement of coils . Headers replacement deleted.
34	Reheater coils along with headers	100% Replacement of coils . Headers replacement deleted.

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35	Hangers (Critical piping) MS, HRH, CRH	Ref. Annexure A
36	Sample coolers along with valves, piping and chiller units for SWAS.	100 % Replacement.
37	Fasteners for drum internals	New supply.

B. System under Modification:

SI.No	Description	Changes / Modifications/ Remarks
1	Soot Blowing piping & Soot Blowing system	100% Modification
2	SH / DESH station	100% replacement of all the valves.
3	RH / DESH Station	100% replacement of all the valves.
4	Fuel Oil system Boiler front & corner station	Corner oil skid and oil stations and associated valves fitting etc. Including oil lines are to be done as supplied.
5	Scanner Air Fan system	100% Replacement .
6	Seal Air fan system including casting of foundation including supply of steel , cement and other casting ingredients as per drg. specification.	100% Replacement .
7	Controls & Instrumentation	Minor assistance only as required
8	Auxiliary PRDS System with valves & piping	Ref. Annexure A
9	Feed control station with valves & piping	Retained. Ref. Annexure A
10	Pulverisers (Mills)	Ref Annexure B
11	APH	Ref Annexure C
12	FANS	Ref Annexure D; Decoupling/coupling/Alignment /foundation bolt fitting etc. If required is to be done in Unit-2 also. Lub. Oil system ,service air,CW system of PA /FD/ID fans as applicable to be refurbished/serviced/replaced..
13	ESP	Ref Annexure E
14	Gates & Dampers	Ref Annexure F

C. System Retained:

SI.No	Description
1	Water Wall headers (inlet & outlet)
2	Riser tube & support
3	Down comer & support
4	Platen Super Heater inlet header
5	Steam cooled wall headers
6	Final Super heater coils
7	Low Temp Super Heater I/L & O/L headers
8	Roof I/L & O/L headers
9	Links between SH headers
10	Steam Cooled wall (75% Retained)
11	Fuel oil/steam lines from pump house to boiler & back except the steam tracing line and insulation
12	Platen SH outlet Header, Final SH I/L & O/L Header – to be replaced in unit-2

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13	Saturated steam links
14	Boiler Main structure with ceiling girder
15	Boiler Auxiliary structure & Platforms
16	Hand Rails, Grills & toe guards – 50 % retained
17	Volumetric Coal Feeder
18	Eco inlet & outlet headers
19	Re heater inlet/outlet headers
20	Boiler Supporting Structure : Strengthening of boiler supporting structure shall be done. • Boiler supporting structure sand blasting up to one meter height from floor level will have to be done by successful bidder. Boiler structures and equipment painting is also in the scope of successful bidder. Paints to be supplied by Successful bidder within the lump sum quoted price as per specifications provided by BHEL engineer.

D. State of Art Improvements:

Following items will have to be added by successful bidder as state of the art improvement of boiler:

SI.No	Description	REMARKS
1	BHEL SCAN	Flame scanners of advanced version
2	BHEL Vision	Electronic water level indicators .

SECTION - VI (1)

PRESSURE PARTS

MODIFICATIONS/CHANGES TO BE CARRIED OUT DURING R&M

ECONOMISER SYSTEM

The scope of the Economiser system is as follows:

Headers

The existing Economiser inlet / outlet headers are retained.

Elements

The proposed Economiser elements are of one to one replacement of plain tube seamless continuous loop.

Supports

Necessary support material for supporting the elements shall be supplied.

FURNACE WALL SYSTEM

Total water wall panels including burner panel, radiant roof, WW hangers shall be replaced. Furnace bottom sealing plate-SS plates is to be replaced along with the S panels.

Screen tubes and Hanger tubes is to be replaced.

SUPERHEATER SYSTEM

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The finish pendant super heater is retained as existing.

The proposed replacement in super heater system includes the following:

Headers

The Platen SH outlet Header and Final SH inlet and outlet are to be replaced .

Steam Cooled Walls

No specific defect/deformation was observed in SCW during RLA study. As per KBUNL requirement 25% of tubes and fins will be supplied as spares for any erection contingency requirement during execution of R&M work.

De super heater system for Super heater

100 % Replacement of all the valves of SH /DESH station . (Multi disc pneumatic type control valves with smart controllers and flow measurement in each limb are to be erected in line with other NTPC projects).

The spray water piping, valves and fittings of the spray control station shall be replaced to suit the new C&I system.

REHEATER SYSTEM

Headers and Coils

Re heater coils will be replaced one to one.

Re heater headers will be retained.

De super heater for Re heater

100 % Replacement of all the valves of RH /DESH station. (Multi disc pneumatic type control valves with smart controllers and flow measurement in each limb are to be supplied in line with other NTPC projects).

The spray water piping, valves and fittings of the spray control station shall be replaced to suit the new C&I system.

BOILER MOUNTINGS

INTEGRAL PIPING, VALVES AND ACCESSORIES

All conventional valves need to be replaced.

As per KBUNL requirement Economiser inlet valve and NRV will also be replaced.

Soot blower lines along with SB control station and Thermal drain system is to be replaced to suit the new C&I system. SB line safety valves are to be replaced.

SECTION - VI (2)

FUEL PREPARATION AND FIRING EQUIPMENT

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CHANGES IN FUEL PREPARATION AND FIRING EQUIPMENT

FUEL PREPARATION EQUIPMENT

Raw coal feeders :

Scope shall be refurbishment of the existing RC feeder (06 nos.).

New Eddy current drive along with control panel shall be supplied (MOM dated 7 – 9 May 2008 and 11th / 12th August 2008).

PULVERISING EQUIPMENT

As per KBUNL requirement the existing XRP 623 mills are retained. However, all the components are getting refurbished other than mill base in BHEL MUs and accordingly erection/commissioning /servicing is to be carried out by the successful bidder within the total quoted price.

Seal Air System for Pulverisers

Existing system is to be replaced.

COAL PIPING

Existing fuel pipes shall be replaced with existing size. Necessary Ceralin bends shall be provided in line with current practice to minimize erosion.

The equipment will include:

Pulverised fuel piping from pulveriser outlet to burner windbox inlet including pipe couplings, supports, etc.

The pulverised fuel piping from pulveriser outlet to the burner wind box inlet shall be fabricated from carbon steel pipes. These piping will be connected with coupling.

FIRING EQUIPMENT

Wind box

Wind box is to be replaced and the HEA ignitors and scanners will be accommodated suitably.

The equipment shall include four (4) number burner wind box assemblies of compartmented fuel and air nozzles arranged vertically complete with necessary isolation, scanners, dampers and fuel connections for installation near each corner of furnace including the following:

1. Tilting type nozzles, including pneumatic actuators, are provided with individual operating rods and connecting linkage and a master control lever, which actuates nozzle tips to the same degree of angularity simultaneously as a unit, arranged for remote operation.
2. Wind box for each assembly fabricated from steel plate of welded and bolted construction including:
 - a) Louver type secondary air dampers, with pneumatic power positioners, suitable for remote operation for proportioning of secondary air.

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b) Necessary steel partition plates. c) Outer steel sheet casing.

3. HEA Ignitors with control cabinet

4. Scanners and scanner cooling air system – BHELSCAN

5. Scanners /gun cooling air fans—04 Nos (2AC+2DC).

Ignitors

HEA Ignitors are provided at each corner of wind box at 3 elevations in oil compartments. LDO /HFO are ignited by a high voltage electric spark.

Description of proposed HEA Ignitor system

HEA ignitors are envisaged for lighting up purposes. The HEA ignitors are capable of igniting light oil / HFO directly.

Type of Ignitors : HEA - retractable.

Number : Twelve (12) per boiler.

Location : At the same elevation as oil burner.

The main purpose of HEA - ignitors is the elimination of the use of oil or gaseous fuels for the ignitors.

The HEA - ignites the oil by use of a very high-energy discharge into the fuel/ air stream. Once the spark has successfully ignited the fuel, the discharge is terminated, and the spark rod is automatically retracted from the wind box to protect it from overheating. Essential components of HEA system are as follows:

1. Spark rod.
2. Retract mechanism.
3. Exciter.

The spark rod has a flexible portion to allow air to tilt with the wind box nozzles, and features a replaceable tip.

Essential components of the exciter include as step up transformer, rectifier, and storage capacitor and trigger gap.

The transformer boosts 110 Volt 50 Hz. A.C. to 2500 Volt A.C., which is then rectified and used to charge the capacitor. When the voltage reaches the break down level of the trigger gap, the capacitor discharges across the spark tip, creating the arc. The arc produced is of very short duration, but its instantaneous energy release is very high. The great amount of energy released by the spark accounts for its in extinguish ability and self-cleaning ability.

PROPOSED SCANNER AND SCANNER COOLING AIR SYSTEM

The equipment shall consist of the following:

Scanners (BHEL SCAN)

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The scanners offered shall be BHELSCAN of visible light, SAFE-FLAME type. The scanner mounting would be provided with isolating facilities to permit the head to be removed for maintenance during operation. All the flame scanners will be wired into the control system.

Scanner gun Cooling Air System

The proposed equipment shall consist of two numbers scanner gun cooling air fans (one working and one standby). The suction for the scanner air fans shall be tapped off from the cold air-interconnecting duct at FD fans outlet. The outlet of the fans shall be provided with auto transfer damper. The drive motors for these fans shall be furnished. Complete ducting/piping with dampers, air filters, supports/hangers from the suction point to the scanner air fans and from the fans to the scanners and complete equipment required for the operation of scanners shall be provided.

An emergency air supply duct from a separate source (atmosphere) with a damper shall also be provided for continuous supply of cooling air to scanners, in case the FD fans fail.

OIL SYSTEM - HFO / LDO system

- Piping, valves and fittings of the oil system are redesigned to suit the new C&I system in boiler front and corner stations for one unit only.

TRACING SYSTEM

For the new oil lines this will be replaced in the boiler front and corner stations. Tracing line alone will be replaced for the fuel piping from pump house to boiler.

PIPING, VALVES AND FITTINGS OF OIL SYSTEM

The complete piping, valves and fittings for the equipment in boiler front and corner stations including oil Skid will be replaced.

OIL BURNERS

Air-cooled oil guns are to be replaced with the new one.

Type of Atomization

Existing steam atomisation is retained for one unit.

SECTION - VI (3)

STRUCTURES

50% each of handrails, floor grills and toe guard will be replaced. Buck stays will be replaced as supplied.

SECTION - VI (4)

DUCTING SYSTEM

DUCT WORK, DAMPERS AND EXPANSION JOINTS

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Generally all the existing ducting & expansion joints are in bad shape and complete replacement will be carried out. In addition to that due to specific requirements, following ducting needs modification.

AIR DUCTS

All the hot air and cold air ducting will be replaced along with expansion joints. As the ducting supporting structures / columns / foundations were originally designed for the ducts load of 5mm thickness plates, increasing of duct plate thickness may overload the structures/columns than the design value. Hence all the air ducts shall be fabricated from carbon steel plates of thickness 5 mm

FLUE DUCTS

All the flue gas ducts from boiler outlet flange to stack shall be fabricated from carbon steel plates of thickness 5 mm.

1. Flue gas ducting from economiser to air heaters will be replaced.
2. Flue gas ducting from air heaters to boiler outlet flange will be replaced.
3. Flue gas ducting from boiler outlet flange to dust collector inlet
4. Flue gas ducting from dust collector to ID fans.
5. Flue gas ducting from ID fans to stack will be replaced.

SECTION - VI (5)

REFRACTORY AND INSULATION

Refractory and Insulation wool will be supplied for the total boiler pressure parts/ducts and APH, since the existing insulation are found to be damaged and not in good condition. Refractory work inside the bottom ash hoppers is included in the scope.

SECTION - VI (6)

SOOT BLOWING SYSTEM

The existing wall blowers and the furnace temperature probe are to be replaced with new ones. The number of wall blowers shall be same as existing.

SECTION - VI (8)

UTILITY REQUIREMENTS

1. COOLING WATER REQUIREMENT (PRELIMINARY)

PARAMETERS: 5 KG/CM² (A) AT 38 DEG C.

QUALITY: Clean and Filtered DM Water

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SL. NO.	DESCRIPTION	NO OF PER BOILER	NO OF WORKING/S TANDBY	QTY.PER R EQPT M3/HR.	TOTAL QTY PER BLR. M3/HR.	REMARKS
01	ID fan bearing lube oil cooler	4	2/2	3	6	Continuous
02	ID fan hydraulic coupling	2	2/-	27	54	Continuous
03	PA Fan lube oil cooler	4	2/2	24	48	Continuous
04	FD fan lub oil cooler	4	2/2	24	48	Continuous
05	Pulveriser lube oil cooler.	6	5/1	10	60	Continuous
06	Regenerative air heater					Continuous
a)	Guide bearing Oil Cooler	4	2+2	1	2	Continuous
b)	Supporting bearing Oil Cooler	4	2+2	1	2	Continuous
c)	Oil carry over probe	2	2	0.5	1.0	Continuous
07	Water cooled access doors	2	2	1.0	2.0	Continuous
08	Sample coolers	6	6	2.0	12.0	Continuous

2. SERVICE AIR REQUIREMENT (PRELIMINARY)

PARAMETERS : 5 KG/CM2 (A) AT AMBIENT TEMPERATURE

QUALITY : Clean dust & Moisture free Filtered air

SL. NO.	DESCRIPTION	NO OF PER BOILER	QTY.PER EQPT. (NM3/HR.)	TOTAL QTY. PER BLR. (NM3/HR.)	REMARKS
01	Atomising air for LDO firing	4	120	480	When LDO guns are in service during start up
02	Pulverised coal sampling / pipe	2(1+1)	35	35	Intermittent per sample
03	HEA ignitor	12	16	192	Continuous.
04	Regenerative AH soot blower:	2	--	2000	Intermittent (One blower at a time)
05	Scavenging air	3 elevations	180	540	

3. INSTRUMENT AIR (PRELIMINARY)

CLEAN DUST FREE AND MOISTURE FREE AIR - PRESSURE: 7 KG/CM2 (G)

SL. NO.	DESCRIPTION	QTY.PER EQPT. (NM3/MIN.)	EQPT.
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1.	Continuous requirement	4.3
2.	Intermittent requirement	5.5

4. SERVICE WATER REQUIREMENT (PRELIMINARY)

PARAMETERS: 5 KG/CM2 (A) AT AMBIENT TEMPERATURE.

QUALITY: Clean and Filtered DM Water

SL. NO	DESCRIPTION	NO OF PER BOILER	QTY.PER EQPT. (M3/HR.)	TOTAL QTY PER BLR. NM3/HR.	REMARKS
1	Mill (fire fighting)	6	10	60	Intermittent
2	Air heater water wash hot end and cold end	4	68	272	Intermittent
3	Air heater fire fighting hot end and cold end	4	68	278	Intermittent
4	Blow down tank Cooling water	1	40	40	Continuous
5	ESP water washing per pass	2	75	150	
6	Economiser water washing	2	50	50	Intermittent

5. AUXILIARY STEAM REQUIREMENT (PRELIMINARY)

PARAMETERS: 16 ATA, 210 Deg.C

Sl.No	Description	No./ blr.	Qty/Blr. (Kg/hr.)	Service (Continuous/ Intermittent)	Remarks
01	Atomising steam	12	1500	Intermittent	During start up and flame stabilisation.
02	Scavenging steam.	12	600	Intermittent	
03	Fuel oil heater	1	1200	Intermittent	
04	Fuel oil line Tracing	-	350	Intermittent	Small quantity continuous
05	Mill inerting	7	13300	Intermittent	One mill at a time
06	SCAPH (SA)	2	8000	During start up	Depending on ambient temperature
07	AH soot blower	2	2100	Intermittent	One soot blower in

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					operation at a time. Auxiliary steam parameter: 16 ata and 310°C.
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SECTION-VII

Annexure – A

CRITICAL PIPING

AUXILIARY PRDS & FEED WATER CONTROL SYSTEM

1.0 INTRODUCTION

This offer covers scope of engineering, manufacture and supply of piping, associated fittings, valves, associated sub-delivery items, hangers and supports and thermal insulation that are clearly specified in section 3.0.

The scope of engineering for the piping systems covered under section 3.0 is

- Preparation of Schemes (flow diagrams), valve schedule and instrument Schedule.
- Layout of piping
- Stress analysis of piping
- Hanger engineering consisting of selection of type of supporting arrangement, selection of
- Variable spring hangers/ constant load hangers, selection of auxiliary steel structures for the hangers.
- Engineering of Thermal insulation and preparation of Insulation schedule.

2.0 CLARIFICATIONS

Hangers and supports will be in line with current design.

3.0 SCOPE OF REPLACEMENT

The following piping systems are specifically included under BHEL's scope of engineering, manufacture and supply of steam generator package:

CRITICAL PIPING SYSTEM & PRDS STATION

1. Main stream Stop Valve – 2 no's, MS stop valve internals – 2 No's
2. Main stream line flow nozzle – 2 no's
3. Supply of one set complete replacement of hangers and supports required for MS, HRH and CRH piping systems, BFD system from Control station up to Eco inlet, from MS line PRDS tap-off up to 11 ata headers & 6 ata headers.

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4. Auxiliary steel structures for the above mentioned piping systems. Auxiliary steel structures (for hangers) mean those structures which are connected to main columns, auxiliary columns, main beams, secondary beams, floor and wall beams, et.. In case separate columns and beams are required for purpose of support, then the same are to be provided by BHEL and to be erected by successful bidder.
5. Main feed control valve, 100% bypass feed control valve, 30% bypass feed control valve, all isolation valves, all drain /vent valves along with the actuators wherever applicable in feed control station.
6. BFD line flow nozzle – 1no.
7. Replacement of 139/11 ata PRDS Control station piping from station upto DESH only.
8. Replacement of Spray Control station piping from station up to DESH only.
9. 100% main 139/11 ata. PRDS control valve, 30% bypass 139/11 ata PRDS control valve, De-super heater assy, Spray control valve for 139/11 ata station, 11/6 ata Pressure control valve, safety valves on 11 ata AS header, all isolation, root valves & drain valves of 139/11 ata & 11/6 ata control station.
10. Piping from 139/11 ata DESH up to 11 ata header & 6 ata header. 11 ata header & 6 ata header sliding supports.
11. Complete replacement of Thermal Insulation for the above systems.
12. Complete instrument root valves for the above systems.

AUX. STEAM PIPING.

- AS Piping and Valves for AH soot blowers.
- AS Piping for steam tracing & valves, steam traps for drains.
- AS Piping and Valves for Mill inerting system.
- AS Piping and Valves for Deaerator
- AS Piping and Valves for steam ejectors.
- AS Piping and Valves for gland seals.
- Complete replacement of Hangers & supports, Aux. structure for the above systems.
- Complete replacement of Thermal Insulation for the above systems.
- Complete instrument root valves for the above systems.

BLOW DOWN PIPING

1. Continuous Blow down to CBD vessel. CBD vessel level control valve & control station Isolation valves
2. Emergency drum drain piping up to Blow down tank
3. Boiler blow down drain piping up to Blow down tank

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4. SH header drains piping up to Blow down tank
5. Combustion Chamber drain piping
6. Soot blower drain piping
7. Complete replacement of Hangers & supports, Aux. structure for the above systems.
8. Complete replacement of Thermal Insulation for the above systems.
9. Complete instrument root valves.

FO SYSTEM PIPING.

1. The complete replacement of steam tracing lines for LDO, HFO system piping from pump house to Boiler. LDO / HFO Piping will be retained.
2. Condensate Flash tank 6 cu.meter near FOPH – 1 no.
3. Complete replacement of Hangers & supports, Aux. structure for the above systems.
4. Complete replacement of Thermal Insulation for the above systems.
5. Complete instrument root valves.

OTHER PIPING SYSTEMS.

1. Aux. Cooling water piping & valves for new/replaced equipments.
2. HP dosing system (Skid mounted), Valves and SS piping up to Boiler.
3. Instrument air piping & Valves for new/replaced equipments.
4. Service air piping & Valves for new/replaced equipments.
- 5 Service water for Mill fire fighting, APH water wash & APH fire fighting (if required).
- 6 Hangers & support for the above system.
- 7 Complete instrument root valves for the above systems.
- 8 TIG wire for root welding of all replaced/new-piping systems at site.

Controls & Instrumentation of Piping

Assistance during all local gauges & switches (PG, TG with TW, LG, LS, PS, etc.)

4.0 MODE OF REPLACEMENT

1. Non-Critical Piping:

Pipes, which require heat treatment, will be supplied in prefabricated condition with all attachments welded unless otherwise indicated. All fittings such as tees, elbows, reducers and flanges will be supplied loose. Items, which are agreed to be supplied by BHEL due to late stage additions / changes (after the drawings have been

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released for production), will be supplied loose. Pipes, which do not require heat treatment, will be issued in running metres as straights. These are to be cut and edge prepared at site to the required lengths to suit the layout as given in erection drawings. All attachments like stubs (pressure, temperature, drain, vent stubs), hanger attachments, cleats, etc. will be supplied as loose items and are to be cut and welded to the main pipes at site as per erection drawings. Necessary drilling of holes on main pipe for welding stubs shall also be done at site by erector. Fittings like bends, tees, elbows / mitre bends, reducers, flanges, etc. will be supplied as loose items.

2. Pipes Nb 50 and below:

These will be supplied in running metres as straights. Necessary fittings like tees, reducers, flanges etc. will be supplied loose. For pipes of size Nb 50 and thickness exceeding 8 mm, standard bends / elbows will be supplied. Other pipes are to be bent at site satisfying the minimum bend radius applicable. Since these pipes are treated at site routed, only schematic drawings showing the connection points will be issued for erection purposes. Erector shall finalise the routing of these pipes at site in consultation with site representatives of Customer / Consultant as per the standard technical procedure for site routing of steam/ water pipes. Erector shall prepare a sketch showing as erected routing of these pipes and submit the same to Customer.

3. Hangers and Supports:

All hanger components, spring cage assembly, constant load hanger and auxiliary steel structure will be supplied as loose items. Erector shall pick out the correct components pertaining to a hanger, assemble the components at site and erect as per the erection documents issued for hangers. Necessary cutting of rod and aux. steel structure to the required lengths shall be done at site by erector. Documents issued for erection purposes will be only standard erection drawings / booklets for standard hanger components.

4. Insulation:

Insulation will be of lightly bonded mineral wool mattress type and will have a density of 150 Kg/m³ for temp above 400 °C and 100 kg/m³ for temp below 400 °C. The binding wire used for fixing insulation will be of GI material and the outer cladding will be of aluminium sheets. All the items like fixing pins, brackets, clamps, rivets, wool mattresses, outer casing sheets etc. will be supplied as loose items. Erector shall carry out application of insulation as per the erection documents issued.

GENERAL (as applicable)

1. IBR Approval:

For those piping systems coming under the purview of Indian Boiler Regulations, approval of fabrication drawings from CIB, Tamil Nadu will be obtained by BHEL. Approval of piping layout drawings for the purpose of erection and registration from CIB of the State in which the plant is installed is to be obtained by the NTPC . During execution necessary coordination, arrangements of vehicle etc. for IBR inspection ,assistance as required is to be provided by successful bidder within the quoted price.

2. Bends:

For critical piping systems bends of radius $R= 4D / 5D$ will be used. At places of layout Constraints, elbows of radius $R=1.5D / 1D$ will be used. For all other piping systems, elbows or mitre bends of radius $R=1.5D/1D$ will be used. For piping systems coming under the purview of IBR, use of mitre bends will be restricted to the limitations

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indicated in IBR. Pipes Nb 50 and below are to be bent at site by the erector, satisfying the minimum bend radius applicable. However, for pipes of size Nb 50 and thickness exceeding 8 mm, standard bends / elbows will be supplied.

3. Hangers and Supports:

Hanger components, variable spring hangers, constant load hangers, etc. will be as per BHEL's standard design. For lines which are treated as site routed, standard U-bolts, clips will be issued. Constant load hangers will be provided at those locations wherever the variation between hot and cold load exceeds 25% of the hot load in case variable spring hangers were to be used at these locations. At other locations, variable spring hangers or tie rod hangers will be used.

4. Valves:

All conventional valves falling under the range of manufacture of BHEL will be as per BHEL standard design. All motorised valves will be suitable for 415V, 3 phase, 50 Hz supply unless otherwise indicated elsewhere in this offer. For low-pressure application such as instrument air, service air and aux. cooling water system ball / gun metal / butterfly valves will be used according to service requirement.

SECTION-VIII

Annexure - B

PULVERISER

(XRP623 MILLS)

THE EXISTING MILL (XRP 623) CONSISTS OF THE FOLLOWING MAJOR ASSEMBLIES:

- A) MILL DRIVE AND BOWL ASSEMBLY.
- B) MILL SIDE AND LINER ASSEMBLY
- C) SEPARATOR BODY & SEPARATOR TOP ASSEMBLY.
- D) ROLLER JOURNAL ASSEMBLY
- E) MILL DISCHARGE VALVE & MULTIPLE PORT OUTLET ASSEMBLY
- F) MILL HANDLING ARRANGEMENT

A) MILL DRIVE AND BOWL ASSEMBLY:

Mill drive assembly consists of a set of bearings and worm gear reduction set, which reduces the motor speed to the speed of the bowl. The worm shaft is coupled to the motor by a flexible coupling. Two nos of oil coolers are assembled to mill base containing lub oil filled to the level of worm shaft axis. Gearing and bearings are sump lubricated. The mill base assembly is coupled to the bowl assembly by means of bolts. Bullring assembly is assembled on the bowl. The velocity of the primary air can be adjusted to the optimum so that foreign material, pyrites and stones are rejected out of the mill. This optimises the bowl pressure drops. Rotating scrappers remove the rejected tramp iron and pyrites into tramp iron spout. Further these rejects are let into pyrite Hopper

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which is periodically evacuated. Since the mill is pressurised, to prevent coal air mixture from entering into gearbox, seal assembly with high-pressure seal air supply from a seal air system is provided.

B) MILL SIDE & LINER ASSEMBLY:

Hot primary air required for drying and carrying pulverized coal from the mill enters the mill side and liner assembly. The mill side and liner assembly is insulated internally by thick insulation. This is assembled on the Mill Drive in such a way that the Air inlet flange is oriented to suit the project layout.

C) SEPARATOR & SEPARATOR TOP ASSEMBLY:

The separator body assembly houses Roller journal assemblies and spring assemblies. The spring assembly is mounted on the journal opening cover of the separator body assembly. Spring assembly supplies force on to the roller journal assembly for crushing the coal. These spring assemblies are provided on each of the roller journal assemblies. Uniformly distributed hot air flow is provided all around the bowl through specially fabricated ports. Powdered coal is lifted up by this upcoming air stream and carried to the stationary classifier (assembled inside separator top) mounted on the top of the separator body. The stationary classifier assembly consists of externally adjustable Nihard classifier vanes, which can be adjusted in position. The vanes impart spin to the coal air mixture. The heavier particles are thrown out of the stream and returned to the bowl for further grinding by sliding back on the inner-surface of the classifier cone. The classifier product enters the outlet venturi, which distributes the coal air mixture from the classifier equally into the four outlets. Outlet venturi has four lined vanes, one each for each outlet, which breaks the coal air stream vortex and stream lines the flow as the coal/air mixture enters the multiple port outlet.

D) ROLLER JOURNAL ASSEMBLY:

This consists of Grinding Roll mounted on an assembly consisting of Journal bearings, Journal housings, Journal heads and Trunnion shaft with end caps. The grinding force from the pressure spring assembly is transmitted through the Journal assembly on to the coal on the bowl. When coal comes between the Roller and the Bull ring assembly, the roller assembly lifts compressing the pressure spring. There is no metal to metal contact between the Roller and Bull ring assembly when the Bowl is empty. The Roller assembly can be raised or lowered by means of stop bolt arrangement. The Roller assembly moves up and down on the Bowl depending on the coal bed, between the Roller and Bull ring assembly. The Roller assembly oscillates up and down about the trunnion shaft, which is supported on rubber bushings in the separator body.

E) MILL DISCHARGE VALVE & MULTI PORT OUTLET ASSEMBLY:

This assembly is mounted on top of the Separator Top. The multi port outlet is lined for wear resistance. Mill discharge valve operated with pneumatically operated air cylinder. The mill discharge valve flap will be closed -

- 1) When the mill is under maintenance.
- 2) When the mill is full of coal after a trip and the new/ additional coal/ oil elevation is being put into operation.

The Mill is fully isolated from the furnace, so as to ensure safety during maintenance and operation of boiler with coal-laden mills, by closing the MDV.

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Purge air is provided above the mill discharge valve to keep the fuel pipe purged continuously whenever the mill discharge valve is closed. Pulverized coal sampling point tapings are provided on the mill discharge valve at two points, at right angles, in each of the four discharge valves.

SCOPE OF WORK:

Refurbishment of the existing mills only has to be done. Replacement of the following items/components has to be done.

S.N.	Description of the item	Qty / Unit
01	Grinding rolls	18 Nos.
02	Bullring segments	6 Sets
03	Airport ring Assembly / vane wheel assy.	6 Sets
04	Ceramic lined inner cone (Both inside & outside)	6 Nos.
05	Mechanical face seal Assembly	-
06	RTD's for Gear box temperature measurement	-
07	Oil level switches & Limit switches	-
08	Electrical operated trolley with hoist-5 tons capacity.	1 NO
09	First Fill of Lube Oil for Gear Box and General Assemblies.	6110 Ltr
10	Worm gear worm shaft Assembly with locknut & keys	6 Sets
11	All type of bearing	6 Sets
12	Cylindrical shaft (as supplied to Sabaramati) assembly With locknut & keys	6 NOS
13	Bowl	6 NOS
14	Bowl hub	6 NOS
15	Gear hub	6 NOS
16	Other components of MDBA	6 Sets
17	Scraper guard Assembly	6 Sets
18	All types of shims	6 Sets
19	All types of hoses	6 Sets
20	Oil seals & 'O' rings	6 Sets
21	Mill motor coupling	6 NOS
22	Tall top classifier with ceramic components, consist of the following items	6 SETS
a	Tall top separator top	6 NOS
b	Inner cone drum section	6 NOS
c	Deflector blades	6 SETS
d	Deflector control Assembly	6 NOS
e	Venturi collar Assembly with centre feed pipe	6 NOS
f	Ceramic lined inner cones	6 NOS
g	Inner cone spout segments	6 NOS
h	Inverted cone	6 NOS
23	Bearing less spring Assembly	18 NOS
24	MDV Assembly complete with ceramic lined and MPO Assembly	6 NOS
25	Pyrite hopper Assembly with Knife gate	6 NOS
26	All types of Ni-hard liners	6 SET
27	All types of fasteners	6 SET
28	Journal	18 SETS

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NOTE:

1. The grinding elements would give a wear life of 2500 hours.
2. Mill 100% Capacity with Design Coal is 18.3 TPH, 70% thro 200 mesh & 98% thro 50 mesh PF fineness.
3. Mill 100% Capacity with worst coal: 19.0 TPH, 70% thro 200 mesh & 98% thro 50 mesh PF fineness.
4. 90% of the above capacity is considered as maximum permissible loading on each mill for 100%BMCR and 100% TMCR loading on the mills.
5. The power consumption for 100%TMCR with Design Coal is 700 KW (HT), with FIVE Mills in service.
6. The design air flow through the Mill is 28.8 TPH and Mill outlet temperature range permissible is 66 – 90°C.

As only refurbishment is considered in the mills, the above predicted performance figures furnished is for information only.

RAW COAL FEEDERS

Only refurbishment of the existing raw coal feeders has been considered. Replacement of the following items/components only has been considered.

Sl. No.	Description	Qty
1	Feeder Roll blade & spider Assembly	6 NOS
2	Hing gate shaft bearing Assembly	6 NOS
3	Clutch drive Assembly	6 NOS
4	Clutch shifting lever	6 NOS
5	Clutch shifting liner bracket	6 NOS
6	Feed roll blade bolt	16 NOS
7	Cam follower bearing	1 NO
8	Chain wheel	1 SET
9	Spring rod bushing	2 NOS
10	Bumper	1NO
11	Bearing assembly	2 SETS
12	Chains for drive	1 SET
13	Clutch hub sprocket	1 NO
14	Drive shaft sprocket	1 NO
15	Spares for vibrator	1 SET
16	Eddy current drive (6 nos.) along with panels	1 SET

No raw coal flow measurement system is provided as there is no feasibility for provision of the same for volumetric bucket type raw coal feeders.

SECTION-IX

Annexure – C

AIR PRERHEATERS

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Heater size: 24.5 VIT 57.5"

Quantity : 02 nos per Boiler.

I. Replacement of following materials required for modification and increasing the PA opening from 50° to 72° of Air preheaters.

- Air heater support bearing with circulating lub oil system.
- Motorized hoist along with monorail.
- Oil circulating unit.
- APH soot blowers along with pipeline and nozzles.
- Diaphragm Plates, stay plates, cold end gratings, rotor angle, rotor shell plates axial seal support bar and axial seal tabs. Guide trunnion with trunnion bolts and adapter sleeve. Pin rack assembly and Complete set of APH Seals.
- Complete air heater heating elements with following split details.
- Hot end 0.63 DU 698 mm, Hot inter 0.63 DU 457 and Cold end 1.2 NF 305 mm
- Drive assembly having an Electric Motor and an Air Motor coupled to a common Gear Reducer, Rotor Stoppage Alarm, and Bearing Lubricating Oil System for Guide & Support Bearings, Thermo-couple based Fire Detecting elements, Rotor stoppage alarm.
- Guide bearing assy. Fire Fighting Manifolds, Water Washing Manifolds and Motor Driven Soot Blower at Cold End. Air side access doors.
- Air side Rotor Housing panels consisting of Primary air side panel, Secondary air side panel and Rotor drive panel. Primary Pedestal with expansion arrangement, Axial Seal Plate assembly (3 Nos/APH) with modified adjuster rods and static seals.
- Hot end Primary centre section, Full length Tub plate of Main centre section, Roller supported sector plates 3 Nos. / APH with modified tracking rod with static seal on both sides, By pass seal angle, modified stationary spool assembly, modified air side connecting plate ducts and bracing pipes at both side (air & gas).
- Cold end Primary centre section, sector plates 3 Nos. / APH with modified adjuster with Static seal, By pass seal angle and modified stationary spool assembly, modified air side connecting plate ducts and bracing pipes for both sides (air & gas).
- Special Tools : Two set of Hydraulic Lifting Cylinder with accessories, Two set of Seal setting Aluminium channels and Four numbers Chain Pulley Block with Mono Rail for handling heating elements from inside APH to APH operating floor along with new structure for traveling of hoist.
- Note : If old heating baskets assy. (CE,HIE and HE) are removed are and re-erected after condition assessment and cleaning , the tonnage will be paid as per Unit-2 Heating element baskets Shipping list.
- SCAPH

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II. The following existing materials will be used,

1. Rotor post assembly with Support Trunnion & Trunnion bolts.
2. Support bearing Housing with bolts.
3. Gas side Panels, Access doors, Expansion plates for main pedestals.
4. Gas side connecting plate ducts for both Hot and Cold end. Cold end Main centre section.
5. Observation Port & Light assembly, Air seal pipe assembly for soot blower, Pinion.
6. All the existing supporting structures, approach platforms, and stairways around APH.
7. Steam piping for Soot blowers and Water piping for wash & Deluge system.
8. Cooling water piping for APH lube oil circulation unit and Service air piping for APH air motor.

SECTION-X

Annexure – D

DRAFT SYSTEM

The existing fan 'NDFV20 B' with a motor rating 750 KW /1480 rpm (existing) is retained and the following items are considered for scope of supply

1.0 FD FAN : As per table B sl.no.12.

SIZE : 'NDFV22 B'.

NO OF FANS : 02 PER BOILER

2.0 PA FAN :As per table B sl.no.12.

SIZE : 'NDFV20 B'

NO OF FANS : 02 PER BOILER

3.0 ID FAN

SIZE : NDZV 28 SIDOR

NO.OF FANS : 03 PER BOILER

The existing fans 'NDZV 28 SIDOR' with a motor rating of 800 KW / 740 rpm. are retained and the following items are considered for scope of supply/replacement for boiler. Scoop control shall be provided.

SR NO	ITEM DESCRIPTION	QUANTITY PER BOILER
1	COMPLETE ROTOR ASSY	3 NOS

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2	FIXED AND FREE BEARING ASSY (INCLUDING HOUSINGS & LABYRINTH SEAL ASSY)	3 SETS
3	RTDs & MISTs FOR FAN BEARINGS.	3 SETS
4	HYDRAULIC COUPLING WITH CONNECTING COUPLINGS AND MODIFIED DUPLEX COOLER	3 SETS
5	BEARING CUM COUPLING PULLER	3 SETS
6	CASING LINER	3 SETS

4.0 SEAL AIR FAN

FAN SIZE : NDV 11.8

NO.OF FANS : 2 PER BOILER

The existing fan 'NDM6' is not adequate and hence new fan 'NDV 11.8' with new motor is to be supplied/replaced.

New motor is envisaged with a rating of 37 KW / 1480 rpm for the selected ID fan.

Existing motor is 37 KW / 2880 rpm

Number of fans per boiler is two.

SCOPE OF SUPPLY FOR SEAL AIR FAN

- Suction chamber, spiral casing with supports.
- Fan impeller with hub, shaft and bearings.
- Inlet damper control (manually operated).
- Foundation sole plates, shims and packers with fasteners.
- Duplex rtd for remote indication and for alarm / trip contacts.
- Temperature gauge (mist) for local indication.
- Flexible coupling with guard.
- Ducting.
- Dynavance filter.

SECTION-XI

Annexure – E

ELECTROSTATIC PRECIPITATOR

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Complete Overhauling/restoration of ESP is to be carried out by successful bidder within the quoted price other than replacement of damaged components to achieve the the design efficiency.

1.0 INTRODUCTION

The existing ESP at Units 1 and 2 were commissioned in 1980. The detail of the existing ESP in each Unit is indicated below:

- Size: 2 FAA – 7 X 32 H – 111 90 – 2
- Type of casing: Single casing with middle wall construction, having two chambers
- No. of fields: In each chamber, 7 working fields
- Electrode spacing: 300 mm
- Width of collecting electrode: 400 mm (Nominal)
- Dust load for original design: 60.00 g /NM³
- Emission for original design : 300 mg / NM³
- Collection efficiency : 99.5 %

2. SCOPE OF WORK

Scope of work shall be refurbishment of mechanical system of ESP. All electrical works shall be carried out by KBUNL.

The scope of work considered by BHEL is as follows:

01. Cleaning and water washing of ESP starting from ESP inlet duct (funnel) to ESP outlet duct (funnel), all hoppers, gas distribution baffles, all emitting and collecting electrodes and other allied zones.

02. Inspection of collecting electrodes and replacement of damaged collecting electrodes. Replacement of collecting electrodes is limited to 50%. For replacement of collecting electrodes following activities are to be carried out:

- i. Cutting of outer roof, removal of insulation between outer roof and inner roof, cutting of inner roof,
- ii. Removal of damaged collecting electrodes,
- iii. Inspection and rectification of supporting structures of collecting electrodes/ emitting electrodes.
- iv. Erection and fitting of new collecting electrode and any other component as per requirement.
- v. Restoration of inner roof, re-laying of insulation & restoration of outer roof.

03. Inspection and replacement of damaged emitting electrodes with new ones wherever required.

04. Alignment checking of collecting/emitting electrodes and correction of healthy collecting electrodes by light hammering and spot heating.

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05. Inspection of shock bars, rectification and replacement as per requirement.
06. Inspection of Collecting Electrode Rapping Mechanism (CERM) shaft, Rapping hammer assembly etc. and replacement of damaged components as required.
07. Inspection of Emitting Electrode Rapping Mechanism (EERM) shaft, rapping hammer assembly and replacement of damaged components as required. Checking of pin wheel arrangement.
08. Inspection of Pin Insulator/support insulator/shaft insulator and replacement as required.
09. Servicing of gear boxes of CERM and EERM.
10. Inspection / repair (patch repair) of gas distribution baffle plates.
11. Inspection and replacement of GD screen as required.
12. Inspection and replacement of damaged pipe supports at inlet and outlet funnel of ESP.
13. Inspection and replacement of damaged hopper heaters as required. Repair of heater jackets as required.
14. Assistance during Air load test and rectification if any.
15. Assistance during GD test and Commissioning.

3.0 SCOPE OF SUPPLY:

Scope of supply is limited to supply of the following items only. Any items/materials required over and above shall be supplied by KBUNL and is to be erected by successful bidder within **the** quoted price.

LIST OF tentative items/components

ITEM SL.NO	DESCRIPTION	UNIT	QTY
	Collecting System		
1	Inner arm	NO	75
2	Outer arm	NO	75
3	Plain bearing	NO	10
4	U - Guide	NO	500
5	Shaft I,II &III	SET	10
6	Sleeve	NO	10
7	Set Ring	NO	10
8	Shock Bar	NO	248
9	Shock Bar Guide - Front	NO	49
10	Shock Bar Guide - Rear	NO	80
11	Collecting Electrode	NO	504
	Emitting System		
1	Emitting electrode	NO	7000
2	Inner arm	NO	75
3	Outer arm	NO	75
4	Plain bearing	NO	10
5	Thrust Bearing	NO	10
6	Support Bearing	NO	10

7	Horizontal Shaft I &II	SET	10
8	Sleeve	NO	10
9	Set Ring	NO	10
10	Carbon Bush	NO	10
11	Grip Coupling	NO	20
12	SKF Bearing	NO	14
13	Bearing Adapter Sleeve	NO	14
14	Shaft Insulator Assembly	NO	10
15	Bushing Insulator Assembly	NO	10
16	Heating Element for Shaft Insulator	NO	10
17	Heating Element for Support Insulator	NO	10
18	Heating Element for Hopper	NO	50
19	Thermostat for Hopper	NO	10
20	Thermostat for Support Insulator	NO	10
21	Emitting Frame - Lower (For 4 Field)	SET	1
22	GD Screen Deflection Plate	SET	100

LIST OF SPECIAL TOOLS AND TACKLES

SI No	Item	Qty
01	Safety valve gauges	12 nos
02	ID, FD, PA fan handling motorized hoist	One for each unit
03	Air pre heater motorized hoist	For each APH
04	Earthing rod for ESP	04 nos.

SECTION-XII

Annexure - F

GATES & DAMPERS

TECHNICAL WRITE UP ON GUILLOTINE GATES AND MULTI LOUVER DAMPERS

1. Mill Area - Bowl Mill

The following gates & dampers will be changed.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	Hot air control damper	Control Louver	Pneumatic	
02	Cold air control damper	Control Louver	Pneumatic	
03	Hot air gate	Air operated guillotine gate	Pneumatic	Change to single cylinder design is considered instead of dual cylinder design. Involves layout/ duct
04	Cold air gate	Air operated guillotine gate	Pneumatic	

				modification
05	Hot primary air out	Louver damper	Electrical	

2. Primary Fan to Airheater

Based on assessment, the following gates & dampers will be changed at PA fan outlet to Airheater.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	PA Fan outlet	Guillotine Gate	Electrical	
02	PA Fan to Airheater Inlet	Louver Damper	Electrical	

3. Secondary Fan to Airheater

Based on assessment, the following dampers will be changed at FD fan outlet to Airheater.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	FD Fan outlet	Louver damper	Electrical	
02	FD Fan to Airheater Inlet	Louver Damper	Electrical	
03	SCAPH inlet & outlet damper	Louver Damper	Electrical	

4. ID System

Based on assessment, the following gates & dampers will be changed at ID system.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	Airheater Gas outlet damper	Louver damper	Electrical	
02	ESP Inlet	Guillotine Gate	Electrical	
03	ESP Outlet		Electrical	
04	ID Fan Inlet		Electrical	
05	ID Fan Outlet		Electrical	

5. Hot Secondary Air to Windbox

Based on assessment, the following dampers will be changed at hot secondary air from air heater to windbox area.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	Airheater outlet (secondary air)	Louver damper	Electrical	

6. Gas Economiser to Airheater

Based on assessment, the following dampers will be changed at gas economiser to air heater area.

Sl. No.	Description	Type of damper	Type of actuator	Remarks
01	Airheater Gas Inlet	Louver damper	Electrical	

7. SALIENT FEATURES OF GUILLOTINE GATES

- a. Gates are chain driven type
- b. Guillotine gates are provided with zipper type seals thus providing sealing chamber for supply of seal air. These gates provide 100% sealing with seal air.
- c. Pneumatic actuators are given in guillotine gates at mill area for quick operation. In other locations the guillotine gates are driven by electrical actuators.
- d. Electrical actuators are having provision for local manual operation also from a gallery or floor level.
- e. Gates are fitted with locking devices to permit locking in the fully open and shut conditions.
- f. Seal air blowers are provided wherever flow medium temperature and pressure are high. In locations where medium pressure is below atmosphere, seal air is sucked through isolation valve.
- g. The Gate blade & seals are totally out of flue gas flow path when the gate is in open condition.

8. SALIENT FEATURES OF LOUVER DAMPERS

- a. The dampers are of heavy duty construction
 - b. Control louvers are given in mill inlet area for flow control purposes, to maintain temperature at mill inlet. Control louvers will be operated by pneumatic actuators.
 - c. Louver dampers will be provided in other locations for pass isolation and are operated by electrical actuators with reduction gear box.
 - d. Electric actuators will have provision for manual operation locally in case of requirement.
- Stuffing boxes are provided on all damper blade shafts to prevent flow of medium outside.

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PART B-

TURBINE, GENERATOR AND AUXILIARIES

SCOPE OF WORK FOR OVERHAULING OF UNIT-2 (110-MW) TURBINE, GENERATOR, AUXILIARIES AND MISCELLANEOUS EQUIPMENT FOR R&M AT MUZAFFARPUR TPS, KANTI, BIHAR.

The scope indicated is a tentative guideline only. If any work is required to be carried out for completion of overhauling work but not specifically mentioned is deemed to be included in the scope of work. The scope is to improve the performance of the plant by overhauling/repairing/ replacing components. Even though the work will be carried out under supervision of BHEL, subcontractor has to take total responsibility of the machine in the area indicated below.

A) TURBINE

23.0% OF TOTAL AMOUNT OF PART –B.

- 01 Removal of insulation from HP,MP,LP Turbine casings. Removal of associated pipes (transfer pipe, omega pipe, cross over pipe, gland pipes etc.)& Lifting of HP, MP LP top casings.
- 02 Removal of HP and MP inner top casings, liners, Gland Boxes etc. & removal of LP top casing including LPH 1A, 1B, 2A & 2B.
- 03 Removal of brg. Top halves & recording of SOC & TOC of bearings Recording of Steam flow path, Gland seal clearances and runout of rotors. Decoupling of rotors and its removal. Packing of LP & MP turbine rotors and Bearings 1 to 7.
- 04 Receipt, unpacking and inspection of the bearings after rebabbiting from MUs. DPT & UT of TG bearings.
- 05 Replacement of the defective bearings.
- 05 Receipt, un-packing and handling of rotors and HP-CVSM after repair/refurbishment from MU). Inspection and cleaning of Rotors.
- 06 Dismantling of HP- CVSM (4 nos.). Packing and assistance during dispatch of the same to BHEL/Hyderabad for repair. Arrangement of packing including packing materials are within the scope. However, transportation is not in the scope.
- 07 Removal of all bottom internals etc.
- 08 Over turn top casings and removal of top diaphragms.
- 09 Parting planes matching of all casings and internals and repair, if required.
- 10 FBP and RBP easing (Support and disconnection from casings, lifting of pedestals, cleaning, application of lubricants and restoration of pedestals & casing. (Lubricants & Colloidal solution to be supplied by vendor).
- 11 Preparation of sand/ alumina blasting shed outside TG bay. (Sand / Alumina to be arranged by vendor)
- 12 Cleaning of diaphragms, gland housings; liners and other internal components with alumina/ fine sands as per site condition.

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- 13 Checking of casings and steam chest for any cracks and minor repairing at site.
- 14 Checking of ovality, dishing of diaphragms and glands and minor repairing.
- 15 DPT of casing internals, all studs and nuts of casing parting planes, coupling bolts etc. for detection of cracks and replacement as required.
- 16 Replacement of all labyrinth Rings in front gland, rear gland and all guide wheels (HPC & IPC).
- 17 Replacement of Gland sealing rings of HPC inlet and first leak of & Curtis stage drain.
- 18 Replacement of Nozzle blades/ segments of HPT/ IPT inner casing.
- 19 Replacement of Sealing rigs for inner casing top and bottom (HPC & IPC).
- 20 Replacement of Sealing fins for inner casings & liners - top and bottom (HPC & IPC). Adjustment of clearances.
- 21 Replacement of 3 & 3A Guide wheels (LPC). Machining of Guide wheels to be arranged by Vendor.
- 22 Replacement of Gland steam pipe of LP casings, if found damaged. Repair of crack casing and cross over pipes, if required.
- 23 Replacement of the sealing fins of the rotor glands and its dressing, ensuring design clearances with rotor (HP, IP & LP rotor).
- 24 Adjustment of clearance of inter-stage fins of rotors.
- 25 Dressing/ radial clearance adjustment of HPC & IPC inner casing (top & bottom).
- 26 Blue matching of all bearings.
- 27 In-situ machining of thrust collar if required.
- 28 Alignment of HP-MP and MP-LP coupling of rotors and final polishing and matching of bearings.
- 29 Adjustment of turbine rotor thrust float and dressing of replaced rotor fins between moving wheels.
- 30 Centering of bottom diaphragms and other internals.
- 31 Centering of top diaphragms and internals.
- 32 Check/adjust steam flow path clearances, seal clearances, thermal clearance, casing keys etc.
- 33 Ensuring thoroughness of all casing drains/ extraction lines.
- 34 Box up HP and MP inner top casings, HP & MP outer casings and heat tighten the fasteners including arrangement of induction heating machine with tools / operators etc.
- 35 Box up LP casing, heaters and pipelines, casing and tightening bolts.

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- 36 Check final alignment of rotors. Reaming/Honing of coupling holes, as required and coupling of the rotors.
- 37 Check/adjust bearing oil clearances / interferences.
- 38 Final adjustment of bearing pedestal oil catchers and replacement of oil guards fins and its machining (Machining of fins to be done by vendor).
- 39 Putting TG on oil flushing.
- 40 Assembly of all bearing top halves, restoration and normalization of oil space after oil flushing.
- 41 Assembly of cross over and other inter-connecting steam transfer pipe lines.
- 42 Replacement of safety diaphragms.
- 43 Painting of LP middle top casing, bearing pedestals and control valves.
- 44 Adjust governor characteristics and rotor lift.
- 45 Assistance during putting TG on barring gear operation and release for steam rolling after interlock and protection checks.
- 46 Assistance during steam rolling of turbine.
- 47 Recording of parameters of turbine on load for a period of 72 hours after synchronization.

B) GENERATOR:

8.0% OF TOTAL AMOUNT OF PART -B

- 01 Removal of brush gear of Generator.
- 02 Polishing of slip ring.
- 03 Decoupling of LP-Gen coupling after recording of CRO.
- 04 Dismantling of generator after recording of Bearing No.6&7 clearances, hydrogen seal clearance, air gap, magnetic off set and face run out of generator rotor.
- 05 Threading out of generator rotor after removal of Fan Blades, Winding cover etc.
- 06 Visual inspection of generator stator to check for evidence of oil ingress, corona, distortion of overhang, broken ties, evidence of end winding movement, internal cleanliness, damaged punching wedge system and cleanliness of core to ascertain healthiness of stator.
- 07 Visual inspection of Generator rotor for cleanliness evidence of wedge movement, fan blade damage or erosion, indication of overheating, inspection of ventilation holes etc. to ascertain overall condition.
- 08 **Electrical testing :**
 - a) IR and PI value of Stator (with 5.0 KV megger) and Rotor winding (with 500V megger).
 - b) Measurement of Tan- Delta/Capacitance of stator winding.
 - c) Partial Discharge Test of stator winding.

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- d) ELCID Test of Stator Core (including repeat ELCID Test)
- e) Measurement of DC Resistance of Stator, Rotor windings.
- f) HVDC Test and Leakage current measurement of Stator winding.
- g) Digital RSO Test of Rotor windings.
- h) AC Impedance test of Rotor Winding.
- i) HV test of Generator Bushings.

Note: The vendor will have to arrange Test Kit with operator for the tests to be conducted as per S. No.- a, b, c, d, e, f, g, h, i as above and provide assistance during ELCID Test (S. No.-d) including arrangement of all consumables

- 09 Repair of loose core punching. Rectification hot spots in core detected during ELCID Test by Electrochemical and mechanical process.
Note: Arrangement of all necessary, tools, instruments, consumables and 24V DC supply.
- 10 Checking of slot wedge tightness by Wedge Deflection Test. Rectification of loose slot wedges as required as required and Repeat Wedge Deflection Test.
Note: Vendor will have to arrange Wedge Deflection Test Kit with operator during testing, prior to and after tightening of slot wedges.
- 11 Dismantling of 6 nos. terminal bushing, varnishing and reassembly using new gasket. Replacement of terminal bushing and restoration of flexible connection, as required.
- 12 DP Test of Generator Rotor Retaining Ring (in position only) after paint removal.
- 13 DPT of Hydrogen seal rings (4-nos), fan blades and coupling bolts. Machining of hydrogen seals.
- 14 Record Hydrogen seal (4-nos.) dimensions, replacement as required.
- 15 Receipt, unpacking and inspection of the bearings after rebabbiting. DPT & UT of Bearings 6 & 7. (To and fro transportation is not in the scope)
- 16 Blue matching of seal body, end shield and oil catcher parting planes. Blue matching of bearing 6&7 pads with end shield housing. Replacement of bearing No.6 & 7 as required.
- 17 Replacement of seal body brass fins as required and machining of the same to required dimension.
- 18 Checking of Generator RTDs points and its replacement, if required.
- 19 Dismantling of 6 Nos. Hydrogen Coolers. Painting of water box internal and reassembly of water box using new rubber gaskets, hydraulic test of coolers. Mounting of coolers in stator body and final assembly using gaskets. Replacement of cooler drain vent pipes and providing required size valves on drain and vent pipes. Servicing of Generator Hydrogen water line (inlet & outlet) valves.
- 20 Lamp heating and varnishing of generator stator and rotor. Heating by welding generator to be done for improving IR/ PI, if required.
- 21 CC Bolts checking/ replacement.
- 22 Threading in of generator rotor.

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- 23 Slip ring polishing, if required.
- 24 Assembly of winding cover, end shields, seal body, hydrogen seals and bearings.
Adjustment of air-gap, magnetic off set, bearing and fan blade clearances within design value.
- 25 Alignment of LP-Gen. Grinding/machining of Generator sole plate as required during alignment.
- 26 Coupling of LP-Gen.
- 27 Reaming/honing of LP-Gen coupling bolt holes as per requirement.
- 28 Normalization of all pipe lines.
- 29 Readiness and assistance during TG Bearing Oil flushing and bearing normalization.
- 30 Air tightness test of generator and associated seal system, attending leakage points wherever detected.
- 31 Putting machine on Barring Gear.

NOTE:

- a) After opening the machine, if any major problem/failure is noticed, the same will be inspected jointly and repair/corrections as per the recommendations of the OEM (BHEL) will be taken up separately.
- b) Turbine rotors (MP & LP) are required to be sent to MU for repair. Vendor will have to arrange packing of the rotors for dispatch. Supporting frame will be provided. Any further angle channel required for bracing and wooden planks as required is to be arranged by the bidder.
- c) Bearings which are required to be sent to works for rebarbitting are to be packed/ handled by the bidder for dispatch.
- d) Within the quoted price, the bidder has to arrange induction heating equipments with operator / equipment etc. for loosening & tightening of HP & MP casing parting plane cap nuts.

C) GENERATOR AUXILIARIES 1.8% OF TOTAL AMOUNT OF PART -B

Dismantling, overhauling and servicing of the following equipments and systems including replacement of components with new components/assemblies alignment and other checks.

1. **Generator seal oil system:** Replacement of Seal oil pumps ,AC, DC, Vacuum & Overhauling of seal oil coolers complete with hydraulic test, pipe lines, de-foaming tank, equalizing tank, vacuum tank, DPR (3-Nos.) etc including replacement of all diaphragm valves and regulating valves with new valves. Servicing repair/replacement of components, gaskets, fasteners etc. Installation of new pumps (AC, DC & Vacuum). Alignment of pumps with Drives.
2. **Generator Gas system:** Servicing of system, repair /replacement of components, gaskets, repair of pipe lines, LLD. Repair/replacement of diaphragm valves, other valves etc. Refurbishment of Gas manifolds (H₂ and CO₂ filling racks).

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D) GOVERNING SYSTEM AND VALVES: 3.0% OF TOTAL AMOUNT OF PART -B

1. Dismantling, overhauling and reassembly of HPQCVs (2-Nos.), HPCVs (4-Nos.), LPQCVs (2-Nos.), Interceptor Valves (2-Nos.) including their Servo Motors and replacement of components if required. Replacement of seats if required as per procedure. Lapping and blue matching. Any machining of components is included in the scope. Replacement of studs of LPQC/IV.
2. Dismantling, overhauling and reassembly of extraction valves and their servo drives including replacement of components. Replacement of strainer elements in HRH line.
3. Dismantling, overhauling and reassembly of Change over valves, CRH NRVs and their solenoids including replacement of components.
4. Complete overhauling of MOP including replacement/ repair of components and setting of all clearances.
5. Revisioning of all governing elements in front bearing pedestals, replacement / repair of worn out components/ elements with new one.
6. Hydraulic test of oil system including hoses.

E) OIL SYSTEM: 1.5% OF TOTAL AMOUNT OF PART -B

1. Overhauling/servicing of all pumps (SOPS, AC-DC EOPs), replacement/repair of damaged components, alignment of motor and pumps. Replacement of pumps with new pumps if any.
2. **Oil Coolers (3-Nos.):** Dismantling of oil coolers, replacement of lube oil cooler tube bundles, cleaning of tubes, shell, checking of tubes and reassembly of coolers after repair if any. All gaskets and fasteners are to be changed. Hydraulic test of coolers and plugging of any damaged/leaking tubes.
3. To replace new duplex filter and line filters in the existing system.
4. Servicing of all valves and NRV in the oil line, change of all gaskets, o-rings, level gauges and fasteners including/ up to pedestals.
5. Removing of oil from MOT to drain oil tank/ drums and cleaning of MOT, replacement of gaskets, o-rings. Servicing of oil injectors and repair/replacement of components, if any. Cleaning of clean oil and dirty oil tank.
6. Replacement / servicing, as the case may be, required for Jacking Oil Pumps including replacement of damaged components, gaskets, o-rings. Rectification/relaying of JOP lines if required. Alignment of pump with drives.
7. Servicing/overhauling of Auxiliary oil pump, AOT, its float & associated valves etc.
8. Servicing & assembly of Vapour Exhaust fans and repair of connecting pipelines.
9. Replacement of Oil Centrifuge Unit with new one, replacement of components as required. Assistance of Expert to be arranged from OEM during installation, servicing & commissioning by Vendor.

F) BARRING GEAR: 0.2% OF TOTAL AMOUNT OF PART -B

1. Servicing of barring gear: Replacement of bearing, shafts, gear wheels, hoses, back-lash adjustment etc.
2. Servicing of hand barring gear arrangement, replacement of damaged components and placement and alignment with main barring gear.

G) HEAT EXCHANGERS:

1. **HP HEATERS # 1 & 2 3.0% OF TOTAL AMOUNT OF PART -B**
Cutting of pipe joints/Opening of pipe flanges of inlet and outlet pipes, drain lines and other connecting pipe lines. Removal of existing HP heaters from their position. Placement of U-tube type HP Heaters in position. Edge preparation, joint matching, welding/ connection of pipe lines and other pipe lines to their

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respective position including addition/modification of pipe lines. Welding of level stand pipes etc. Welding of any additional pipe lengths which may be required to be required due to replacement of heaters including edge preparation, joint matching etc. Stress relieving / Radiography/UST as may be required is within the scope of the vendor and is to be carried out as per BHEL's norms. Hydraulic test as per code and requirement. Coordination with the boiler directorate is within the vendor's scope. IBR compliance is also within the scope of the vendor. Restoration of drip/ drain valve along with actuators.

2. **LP HEATERS # 1A, 1B & 2A, 2B:** *0.8% OF TOTAL AMOUNT OF PART -B*
Complete replacement of heaters tube nests. Hydraulic test as per code and requirement. Reassembly of heaters. Repair /rectification of threaded holes of LP casing for fixing of heaters. Cleaning of drip/ drain pipelines of Heaters.

3. **LP HEATERS # 3, 4 & 5:** *0.9% OF TOTAL AMOUNT OF PART -B*
Opening of pipe connections. Cleaning of all pipe & heater flanges, complete replacement of heater tube nests. Checking of pipes etc. servicing and repair as required. Assembly of heaters and pipe connections. Replacement of all gaskets, fasteners etc. with new ones. Repair /replacement of level/stand pipes and other connections. Hydraulic test as per requirement. Servicing of inlet / outlet / drip line and safety valves of LP Heaters.

4. **EJECTORS (Starting & Main):** *2.0% OF TOTAL AMOUNT OF PART -B*
Dismantling of steam jet air ejectors, servicing and overhauling, replacement/repair of components, replacement with new modified nozzles and diffusers, change of gaskets, fasteners etc. Hydraulic test of ejector condensers, replacement of tubes, hydraulic test and repair of ejector shell, if required. Servicing/ replacement of condensate, steam & airline valves float and siphon tube/ pipe.

5. **GLAND STEAM COOLER:** *0.3% OF TOTAL AMOUNT OF PART -B*
Overhauling/servicing, tube cleaning, tube plugging, hydraulic test etc.

6. **CONDENSER** *9.0 % OF TOTAL AMOUNT OF PART -B*
 1. Filling of condenser steam side up to operating level of condenser. Locking of the support springs in both the directions. Cutting the pipes, cutting/removal of railings and floor grills and any other material fouling/ obstructing the opening of water boxes on rear side and front side of condenser. Release of steam space water.
 2. Opening of rear water box and front water boxes and other man-hole covers to carry out the job.
 3. Erecting of scaffolding on rear and front side of condenser at working levels.
 4. Removal of plugs. If necessary, drilling is to be done for removal of these plugs.
 5. Collapsing the expanded portions of the tubes on both ends. Sufficient care should be taken to avoid the distortion of the tube plate ligaments and scoring/scratching of tube plate/baffle plate holes.
 6. Removal of plugged and leaky tubes.
 7. Checking of baffle plates, repair, rectification, replacement etc of damaged/worn out baffle plates where ever required. Checking of welding etc of all baffle plates for crack etc. rectification of the same. Checking the air evacuation pipe and repair/replacement of the same including welding etc.

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- Checking of water boxes for damage etc and its rectification. Cleaning of anodes, its machining of outer layer and their re-fixing.
8. Cleaning of tube plates and support plates of paint, rust etc. Clearing and cleaning of tube plate/baffle plate holes as per requirement.
 9. Reaming of holes of tube plates/baffle plates holes, if pitting/scoring/scratching is observed. Cleaning of holes by compressed air and cleaning agent.
 10. Measure and record the tube plate hole diameters for ascertaining that no ovality or score marks are there. Measure the tube diameters.
 11. Insertion of new tubes after cleaning of tubes on both internal and external surfaces.
 12. Expanding the new tubes on one side in the tube plate as per procedure after keeping required projection.
 13. Expanding the new tubes on other side in the tube plate as per procedure after cutting the excess length and keeping required projection.
 14. Facing the tube ends, if necessary.
 15. All tube ends to be checked for proper expansion by bore gauge etc.
 16. Flaring the tube ends on both sides.
 17. Carrying out leak test of condenser by fluorescent leak detection method with the help of U/V lamp by filling steam side of condenser.
 18. Re-expansion/re-tubing of tubes which are found leaking during leak test and leak test to be repeated to ascertain that no leakage is observed.
 19. Cleaning and painting of front and rear water boxes from inside with appropriate bitumen based paint and complete condenser outside surface with epoxy based paint including supply of paint. Specification and colour of paint will be as per BHEL/customer requirement.
 20. Removing of scaffolding and other materials.
 21. Closing of water boxes on rear & front, manholes and other openings by using new gaskets.
 22. Re-fixation of floor grills, railings and other such components removed for opening of rear water box.
 23. Re-welding / re-fixing of pipelines.
 24. Hotwell cleaning and replacement of gaskets on manholes etc.
 25. Servicing of Gauge glass and associated valves of Condenser.
 26. Replacement of condenser compensator bellows connected to condenser.
 27. Repair/replacement of clamp inserts on covers of water box.
 28. Blanking and restoration of CW inlet / outlet lines to condenser wherever required.
 29. Checking and repair of spray line inside condenser for proper functioning & servicing / replacement of associated valves.
 30. Servicing / replacement of condenser inlet and outlet Butterfly valves, Actuator, gearboxes (4 nos.). replacement of components wherever required.
 31. *Final commissioning and testing.*

H) PUMPS:

1. **BOILER FEED PUMPS: 2-NOS., BFP Voith Hydro-coupling: 2-Nos. : 6.0% OF TOTAL AMOUNT OF PART-B**
 - a) Cleaning of Hydraulic Coupling internals. Repair replacement of components, if any.
 - b) Inspection of BFP, overhauling of hydraulic couplings, alignment etc.
 - c) Alignment of motor with Voith Coupling, voith coupling with pump and coupling of rotors.
 - d) Overhauling of BFP Lube oil system, pipes, replacement of tube nests of Lube oil, working oil and seal coolers.
 - e) Checking of suction strainers, repair/replacement of strainers as required.

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f) Changing of gaskets wherever required.

g) Replacement of BFP Recirculation valves along with actuators.

NOTE:

- a) Vendor will have to arrange expert from M/s Voith during dismantling, spare assessment and overhauling/ assembly of Voith Coupling within the quoted price.
- b) Vendor will have to arrange OEM expert (e.g.- Ex BHEL duly accepted by BHEL site I/C) for supervision during dismantling, spares assessment and overhauling/assembly of BFPs within the quoted price. Cumulative duration for such supervision is Max. 45 days.

2. CONDENSATE EXTRACTION PUMPS: (3-NOS.) 3.2% OF TOTAL AMOUNT OF PART-B
(Readiness of total 3-Nos of pumps by cannibalizing the spares from old existing pumps supplied new pump / spares)

- a) Dismantling, servicing and reassembly of CEPs after decoupling and removal of motors. Repair /replacement of defective components wherever required.
- b) Inspection of canisters, checking of bearings. Repair/ replacement of components.
- c) Reassembly of pumps.
- d) Placement of motor in position. Alignment and coupling.
- e) Checking of suction strainers, repair/replacement of strainers if required.
- f) Replacement of new pump assembly, if found necessary.
- g) Changing of gaskets etc. wherever required.
- h) **Condensate Booster pumps (2 nos.):** Dismantling, servicing, repair/ replacement of components. Re-assembly of pumps. Alignment with drives.

I) CHIMNEY STEAM EXHAUST FANS (2-Nos.): 0.6% OF TOTAL AMOUNT OF PART -B

- 1. Dismantling the present chimney steam exhaust fan and connected pipe/duct. Cleaning of pipe, valve and erection-alignment of new chimney fan along with motor drive unit and associated valves. Connection of ducts etc.

J) TURBINE GLAND SEALING SYSTEM: 2.0% OF TOTAL AMOUNT OF PART -B

- 1. Refurbishment of the system by replacing all pneumatic control valves along with actuators by new ones. Servicing of isolating valves (Manual and Motorised). Servicing of HPFT and Expander.

K) VALVES & ACTUATORS: 4.0% OF TOTAL AMOUNT OF PART -B

VALVE SCHEDULE ATTACHED AS ANNEXURE – I

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d) Hot setting of hanger supports.

e) Removal of scaffoldings.

N) ASSISTANCE DURING CONDITION ASSESMENT OF TG COMPONENTS AND AUXILIARIES:

0.2% **OF TOTAL AMOUNT OF PART -B**

Assistance during condition assessment to be conducted of TG components (other than Turbine rotors) and its auxiliaries. Consumables are within the scope of work.

O) COMMISSIONING: 10.0% OF TOTAL AMOUNT OF PART -B

1. Assistance during Testing and commissioning of individual systems from time to time, oil flushing of systems, replacement of oil and assistance during commissioning of C&I system.
2. Assistance during rolling.
3. Assistance during in-situ trim balancing of individual drives and TG Set.
4. Assistance during synchronization and loading of the Unit.
5. Round the clock observation for 72 Hours in full load and 60 days thereafter till stabilization and PG Test and attending of any defects.

P) PG TEST: 1.0% OF TOTAL AMOUNT OF PART -B

2. Receipt and safe keeping of Instruments of BHEL received from MUs and PSER.
3. Erection/fixing of PG Test instruments, impulse piping, cabling, thermo-well, Flow nozzles etc.
4. Recording of parameters during PG Test as per instruction of BHEL Engineer and assistance during PG test.
5. Removal of all PG Test instruments, cables and accessories after PG test and restoration of the system
6. Packing of all Instruments, cables and accessories for dispatch to BHEL MUs and PSER HQ/ PSER sites as per the directive of BHEL Engineer.
7. Attending to any defects found during PG test.

**Q) ESP CONTROL PANELS , CABLES AND ACCESSORIES AT U#1 & 2 3.0%
(1.5% PER UNIT) OF TOTAL AMOUNT OF PART -B**

SCOPE OF WORK : PER UNIT & JOB DURATION : 45 Days each unit

01. DISMANTLING (Per unit) : Dismantling of existing panels at control room, disconnection of each cable from panels, tag marking of the same and should be identified for each unit .Transportation of dismantled panels, hardwares and cables to the waste bay assigned by customer.
 02. ERECTION (Per unit): a)Transportation of panels from store, erection of the same at ESP Control Room. The following panels are to be erected :
 - i) ESP PCC PANEL : 01 No./Unit : 01 No.
Dimension of panel(tentative): 5000 mm x 630 mm x 2000 mm
 - ii) ACP PANELS : 02 Sets./Unit : 02 Sets
Dimension of panel (tentative):4000 mm x 380 mm x 2000 mm (per set)
 - iii) RECTIFIER PANEL : 14 Nos./Unit : 14 Nos
 - iv) Dimension of panel (tentative):625 mm x 500 mm x 1700 mm
 - v) RAPPER CONTROL PANEL:01 No./Unit :01 Nos.
Dimension of panel (tentative):550 mm x 650 mm x 2000 mm
- HT ISOLATORS : 14 Nos./ : 14 Nos.

Physical and electrical (Continuity and IR value) Checking of each dismantled cable and restoration of the same as per cable schedule after proper cable glanding (DOUBLE COMPRESSION CABLE GLAND), lugging and cable dressing. The vendor has to replace the defective cable with new cable or as supplied by KBUNL authority. A list of cable with specification and tentative length is given below:.

03. COMMISSIONING ASSISTANCE (Per unit)

Sl No	Size of Cable	From	To	Avg.Length(In Mtr.)	Total No. of feeder/unit	Total Length (In Mtr.)/Per unit (mtrs.)
1	2Cx70 sq.mm Al	ESP PCC	Controller	30	14	420
2	2Cx70 sq.mm Al	Cotroller	Rect.Trans.	150	14	2100
3	5Cx2.5 Sq.mm Cu	Cotroller	Rect.Trans.	150	14	2100
4	10Cx2.5 Sq.mm Cu	Cotroller	Rect.Trans.	150	28	1700
5	3Cx6 sq.mm Al	ACP	Rapper Motor	100	28	2800
6	7Cx2.5 sq.mm Cu	ACP	Rapper Motor LCC	100	28	2800
7	4Cx6 sq.mm Al	ACP	Hopper Heater	100	14	1400
8	4Cx16 sq.mm Al	ACP	Shaft Insulator Heater	150	2	300
9	4Cx35 sq.mm Al	ACP	Support Insulator Heater	150	2	300
10	Ethernet Cable					100

ESP PCC (ELECTRICAL POWER CONTROL PANEL)

The following feeders are already installed at site and to be connected with new panels only.

Description of Item	Rating	Size of Cable
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SPARE	250A	2 Nos. 2Cx70sq.mm Al
SUPPLY TO ACP PANEL PATH-A	400A	31/2Cx300sq.mm Al
SPARE	400A	-do-
SPARE	250A	-do-
ELECTRONIC CONTROLLER FIELD-1A	250A	-do-
ELECTRONIC CONTROLLER FIELD-2A	250A	-do-
ELECTRONIC CONTROLLER FIELD-3A	250A	-do-
ELECTRONIC CONTROLLER FIELD-4A	250A	-do-
ELECTRONIC CONTROLLER FIELD-5A	250A	-do-
ELECTRONIC CONTROLLER FIELD-6A	250A	-do-
ELECTRONIC CONTROLLER FIELD-7A	250A	-do-
Bus PT Module-1		2Nos.5Cx2.5 sq.mm, Cu
Voltmeter Module-1		
INCOMER#1 (FED THROUGH BUS DUCT)	3200A	Bus duct, 2cx35, 2Nos.7Cx2.5 Cu
BUS COUPLER	3200A	2Nos.7Cx2.5 Cu
NCOMER#2 (FED THROUGH BUS DUCT)	3200A	Bus duct, 2cx35, 2Nos.7Cx2.5 Cu
ELECTRONIC CONTROLLER FIELD-5B	250A	2Nos. 2Cx70sq.mm Al
ELECTRONIC CONTROLLER FIELD-6B	250A	-do-
ELECTRONIC CONTROLLER FIELD-7B	250A	-do-
ELECTRONIC CONTROLLER FIELD-1B	250A	-do-
ELECTRONIC CONTROLLER FIELD-2B	250A	-do-
ELECTRONIC CONTROLLER FIELD-3B	250A	-do-
ELECTRONIC CONTROLLER FIELD-4B	250A	-do-
Bus PT Module-2 & DC Supply Scheme		2Nos.5Cx2.5 sq.mm Cu
Voltmeter Module-2		VM
SPARE	400A	-----

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SUPPLY TO ACP PANEL PATH-B	400A	31/2Cx300sq.mm Al
SPARE	250A	-----
SPARE	250A	-----

ESP ACP X 2 PANELS PER UNIT

The following materials are already installed at site and to be connected with new panels only

MATERIALS PER PANEL

Description of Item	Rating	Size of Cable
HEATING ELEMENT FOR HOPPER ZONE-1	3P, 63A,6KW	4Cx6sq.mm
HEATING ELEMENT FOR HOPPER ZONE-2	3P, 63A,6KW	-do-
HEATING ELEMENT FOR HOPPER ZONE-3	3P, 63A,6KW	-do-
HEATING ELEMENT FOR HOPPER ZONE-4	3P, 63A,6KW	-do-
HEATING ELEMENT FOR HOPPER ZONE-5	3P, 63A,6KW	-do-
HEATING ELEMENT FOR HOPPER ZONE-6	3P, 63A,6KW	-do-
HEATING ELEMENT FOR HOPPER ZONE-7	3P, 63A,6KW	-do-
SPARE FOR HEATING ELEMENT FOR HOPPER ZONE	3P, 63A,6KW	
HEATING ELEMENT FOR SHAFT INSULATOR	3P, 63A,6KW	4Cx16sq.mm
HEATING ELEMENT FOR SUPPORT INSULATOR	3P, 63A,6KW	4Cx35sq.mm
SPARE MODULE FOR HEATING ELEMENT FOR SUPPORT /SHAFT INSULATOR	3P, 63A,6KW	
INCOMER	400A	31/2Cx300sq.mm
COLLECTING ELECTRODE RAPPING MOTOR ZONE-1	0.25 KW	3Cx6sq.mm, 7Cx2.5sq.mm
COLLECTING ELECTRODE RAPPING MOTOR ZONE-2	0.25 KW	-do-
COLLECTING ELECTRODE RAPPING MOTOR ZONE-3	0.25 KW	-do-
COLLECTING ELECTRODE RAPPING MOTOR ZONE-4	0.25 KW	-do-

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Size of Power Cable in Rectifier controller- 4Nos. 2Cx70 sq.mm, Al Size of Control Cable
in Rectifier controller-5Cx2.5 sq.mm & 10Cx2.5 sq.mm Cu

Total Nos. of rectifier controller-14 Nos. in each unit

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CALIBRATING INSTRUMENTS

01. Digital multimeter (4 ½ Digit)	: 04Nos.
02. Continuity tester	: 04 Nos.
03. Tong tester	:01 No.
04. Phase sequence meter	: 01 No.
05. Variable DC Voltage source (0 to 24 V DC/0-48 V DC)	:02 Nos.
06. Calibrator (mA / mV generator)	: 02 Sets
07. Portable oscilloscope	: 01 No.
08. Phase Sequence meter	01 No.
09. Variac (AC) (3 Phase 415 V)	01 No

T&Ps

01. DE Spanner set ,	: 02 sets.
02. Box spanner	: 02 sets,
03. Terry spanner set	: 02 sets,
04. Hammer (upto 25 kg)	: 01 set.
05. Screw driver set	: 03 sets,
06. Winch (upto 25 ton)	: 02 Nos.
07. Soldering iron	: 02 Sets
08. Grease Gun	01 NO..

Please note that , successful bidders should bring above mentioned Calibrating instruments and T&Ps with valid (for 01 year) Test certificates (Accuracy:+/- 5%) from a recognized test house.

CONSUMABLES

01. Cable glands, lugs, cable dressing materials,
02. Grease, paints,
03. Aluminium tag plate,
04. Rustolin,
05. Petrol/Diesel/Kerosene/CTC/CRC

SUCCESSFUL BIDDER HAS TO ARRANGE ABOVE CONSUMABLES

R) E& C OF DAVR AT U#1 & 2 3.0 % (1.5% PER UNIT) OF TOTAL AMOUNT OF PART -B

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SCOPE OF WORK : PER UNIT & JOB DURATION : 45 Days each unit

01. DISMANTLING , IDENTIFICATION & TAG MARKING OF EXISTING CABLE (Per Unit):

Dismantling of old panels, cables (AS IDENTIFIED BY KBUNL AUTHORITY AND BHEL) and to be transported at waste bay assigned by KBUNL.

Please note that, all the cables which are not allowed to be dismantled by KBUNL & BHEL, are to be restored in new system. Therefore, those cables are required Identification marking with proper Aluminium Tag.

02.ERECTION: (Per Unit)

Transportation of panels, Cables and other erection hardware from store to site (TG floor) for erection of the same with following details:

i)Erection of following Panels:

a) REGULATION PANEL : 01 No.

Dimension (Tentative): 2350 mm x 1250 mm x 2295 mm,

b) FIELD BREAKER & FIELD FLUSHING PANEL : 01 No.

Dimension (Tentative): 1500mm x 1250 mm x 2295 mm,

c) THYRISTOR PANEL : 02 Nos.

Dimension (Tentative): 680 mm x 1250 mm x 2295 mm,

d) TRUNKING CUBICLE: 01 No.

Dimension (Tentative): 1500 mm x 1250 mm x 2295 mm.

ii) Laying of new cable, glanding (Double compression), lugging, inter panel, intra panel cabling, hooking with GCP/GRP/Electrical Control Panel and cable dressing

(new and

old cables) of the following:

Sl.No.	Cable Specification	Qty (mtrs.)
01	1C x 300 mm ² , Cu, PVC, Armoured	1100
02	1C X 70 mm ² , Cu, PVC, Armoured	300
03	6C x 4/6 mm ² , Cu, PVC, Armoured	250
04.	14C x 1.5 mm ² , Cu, PVC, Armoured	2750
05	4C x 25 mm ² , Cu, PVC, Armoured	300
06	1P x 1.5 mm ² ,Screened, Cu, PVC, Armoured	500

iii) Fabrication : Cut out development at control panels, fabrication for mounting brackets different modules at cotrl room panels ,as per requirement .

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02. COMMISSIONING ASSISTANCE (Per Unit):

Commissioning assistance is to be provided by the vendor till the system achieves FULL LOAD **OR** 72 Hrs from synchronization of the unit

NOTE: IN CASE ANY PART OF THE JOB IS NOT REQUIRED TO BE CARRIED OUT, A DEDUCTION WILL BE EFFECTED AS PER PERCENTAGE SHOWN AGAINST THOSE ITEMS.

MANDATORY SCOPE

Erection and commissioning of Excitation Transformer cubicle for 2 x 110 MW at U#1 & 2, KBUNL

SCOPE OF WORK (PER UNIT):

01. Transportation of material from store to site
02. Erection of the Excitation Transformer cubicle
03. Commissioning of the Tr. Cubicle

S) E& C OF OF LARGE VIDEO SCREEN(FOR UNIT-2 ONLY) : 04 Nos (1.0% OF TOTAL AMOUNT OF PART -B)

SCOPE OF WORK : E&C. AT U#2, MUZAFFARPUR TPS.

Job duration : 45 Days

SCOPE OF WORK :(E&C of LVS:04 Nos)

01. Transportation of materials from store to site.
02. Development of floor cut out as per requirement,
03. Erection of :
 - a) panels , CPU cum Projector and LVS (04 Nos.) ,
 - b) Laying of Ethernet cable , power /contro/signalcable: 500 mtrs (approx)
 - c)shielding of Ethernet cable with SS Spiral conduit coated with graphite powder
04. Commissioning of the LVS system,

T) GENERAL: 10.0% OF TOTAL AMOUNT OF PART -B

1. All welding electrodes including TIG wires are included in the scope and as per approved list of BHEL. All joints of pipe and tube will be carried out with root by TIG and subsequent root by ARC welding.
2. Edge preparation, joint matching, welding by relevant electrodes, radiography, stress relieving etc. are in the scope. All HP welding shall be done by IBR qualified having valid IBR certificate and approved HP welders using BHEL approved consumables, equipments and processes. All HP and Structure welders are to be qualified at site by BHEL/ KBUNL before engaging them on work. Cutting of tubes and edge preparation on all tubes/pipes shall be done by grinder/edge preparation machines only. No gas cutting shall be allowed.

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3. Receipt, Transportation including loading and unloading of new equipments/materials from place of storage to site and for further erection to location is included in the scope of work. Transportation including loading and unloading of dismantled equipments/parts/components/scrap materials to store or designated areas is included in the scope.
4. Removal of all temporary structure, surplus materials etc. from the place of erection/work to store or designated areas is included in the scope.
5. Supporting of all pipe lines as per drawing/engineers instructions is included in the scope.
6. Modification of pipe lines wherever new/modified equipments are installed.
7. This is an R&M work and may require carrying out some kind of additional jobs to complete the system and is included in the scope.
8. Painting including supply of paints of all new and overhauled components/ equipments/ system/ auxiliaries exposed to atmosphere after erection are included in the scope. Colour coding of each equipments, pipe lines will be given by BHEL.
9. 100% Radiography of HP welding pipe joints. Preheating, PWHT as per BHEL norms, wherever applicable. Radiography of tube joints will be as per BHEL norms.
10. Locking of components wherever required for dismantling /erection.
11. Servicing/repair of piping hangers including spring hangers wherever required.
12. Machining of TG components if required during assembly is in the scope.
13. DA & oxygen gas for heating & cutting are within the scope of work.
14. Arrangement of Permanite oil, water and steam line gaskets (metallic/ non-metallic) 1 to 6 mm thick sizes as required are within the scope.
15. Gland packing for valves as required is within the scope.
16. Aluminium sheet of 0.25 to 0.30 mm thickness for LPC safety diaphragm valves are within scope of work.
17. Circular rubber cord for 'O' ring of 2.0 to 6.0 mm sizes (10-metres each) are within scope of work.
18. Arrangement of Stag-B, Holdiite, Molykote, Hylomer, Jointing paste, graphite powder, High temperature grease, Araldite, RTV silicon compound, HGL packers etc. and other consumables as required are within the scope.
19. Arrangement of PVC/RUBBER Sheets 3-mm & 5-mm and Neoprene rubber sheet 3-mm & 5-mm as required are within the scope. Insulating sleeve and washers are within scope.
20. Arrangement of Stainless steel Shims (for alignment of various rotors) Sizes 0.05, 0.1, 0.2, 0.3, 0.5, 1, 2 & 3 mm as required are within the scope.
21. Insulating varnish (Dr Beck-make) for Generator stator and rotor is within the scope.
22. Neoprene Rubber (4.0 mm and 6.00 mm) for Generator end shield and Hydrogen coolers are within the scope.
23. Arrangement of Material handling equipment with operator and consumables (Tier Mounted Crane , Hydra , Truck etc.) for shifting of various spares from KBUNL stores to plant and shifting of dismantled components and scraps generated from work site to designated place is within the scope.
24. Scaffolding/platform materials are in the scope of contractor.
25. Arrangement of DPT, UT and MPI Kits with instruments, consumables and experienced operator s for any NDT work.
26. Restoration of all systems after erection including walkways, stairways, handrails, beams, structure etc. cut and locked earlier for erection purpose.
27. Arrange of portable pump of capacity up to pressure of 400 Kg/cm² for conducting hydraulic test of HP Heater.
28. Servicing and upkeep of the EOT crane during execution R&M job (including spares) shall be the scope of contractor.
29. Checking of all connected pipe lines for any blockages if any and removal of the same.
30. Contractor shall have to arrange illumination required for day and night working, electric boards with switch, fuse and earthing separate for 15 amps, 63/100 amps connections at the areas wherever work is in progress, including 24-V supply.
31. Contractor will have to provide EOT crane operators for round the clock duty during the entire duration of work.

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32. Vendor will have to arrange/ hire services of two Ex-BHEL supervisors /Engineers having experience in 110 MW Turbine, Governing system and auxiliaries and acceptable to BHEL, who will be under exclusive control of BHEL Engineers at site. Maximum cumulative requirement will be around 120 mandays.
33. Reconciliation of all materials received from stores and reconciliation of handed over of dismantled components and scraps are within the scope. This to be carried out from time to time during the course of work and after completion of work.

**PROCEDURE OF CHEMICAL CLEANING WITH EDTA
FOR
MUZAFFARPUR 110 MW UNIT BOILER**

CUSTOMER : KBUNL
PROJECT: MUZAFFARPUR TPS, 110 MW R&M PROJECT
UNIT : 2

BOILER DESCRIPTION:

NATURAL CIRCULATION, RADIANT REHEAT, OUTDOOR, PULVERISED FUEL BOILER WITH SINGLE DRUM, DRY BOTTOM, BALANCED DRAUGHT, TANGENTIAL FIRING.

BOILER PARAMETERS:

STEAM PR. AT SUPERHEATER OUTLET : 130 KG/CM²
STEAM TEMP.AT SUPERHEATER OUTLET : 540^o C

WATER HOLDING CAPACITY :

1. WATER WALL + DRUM (FULL)	91.5 M ³
2. ECONOMIZER ..	30 M ³
3. SUPERHEATER ..	47 M ³
4. REHEATER ..	15 M ³

CHEMICAL CLEANING

SUCCESSFUL BIDDER HAS TO DO THE EDTA ACID CLEANING OF BOILER ON TURNKEY BASIS DEPLOYING ACID CLEANING PARTY FROM THE APPROVED BHEL ACID CLEANING VENDORS WHO ARE REGULARLY DOING ACID CLEANING JOB .

1

2. **SCOPE OF CLEANING:**

- A) ECONOMISER
- B) TOTAL EVAPORATIVE SYSTEM.

OTHER PRESSURE PARTS OF BOILER LIKE SUPERHEATER & RREHEATER AND POWER CYCLE PIPING ARE CLEANED BY STEAM BLOWING OPERATION AT A LATER STAGE SUBSEQUENT TO CHEMICAL CLEANING OPERATION.

3. **SPECIFICATION AND QUANTITY OF CHEMICALS TO BE PROVIDED BY SUCCESSFUL BIDDER WITHIN THE LUMP SUM QUOTED PRICE :**

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- | | | |
|----|--|------------|
| A. | TRISODIUM PHOSPHATE, IS: 573: 1992
PURITY AS P2O5: 17.5% | 200 KG |
| B. | DISODIUM PHOSPHATE, IS: 566: 1994,
AFFM-1 REV-04, PURITY 99% | 100 KG |
| C. | Tetra ammonium EDTA (40% w/w conc)
pH: 9.8 (Max), Sp Gr: 1.18, STRAW YELLOW LIQUID
(EDTA : ETHYLENE DIAMINE TETRA ACETIC ACID) | 18 Tons |
| D. | AMMONIA SOLUTION (20 % w/w conc)
To IS 799 / 1990, Sp Gr 0.91 | 600 LITRES |
| E. | HYDRAZINE HYDRATE
(80% MIN.CONC). To IS 12086/1991 | 500 LITRES |
| F. | BHELMAX | 300 KG |
| G. | BHELSOL | 300 LTRS |

4. ARRANGEMENTS TO BE DONE BY ACID CLEANING PARTY TO BE DEPLOYED BY SUCCESSFUL BIDDER WITHIN THE LUMP SUM QUOTED PRICE:

- A) ALL FABRICATION WORK OF TEMPORARY TANK OR BRINGING READYMADE TANK AND PIPING SYSTEM IS TO BE COMPLETED AS PER ATTACHED SCHEME AND BOM. MATERIALS IS ALSO TO BE ARRANGED BY SUCCESSFUL BIDDER WITHIN LUMP SUM QUOTED PRICE. PROVIDING AND LAYING OF EFFLUENT TREATMENT PIPE LINE UP TO EXISTING DM WATER EFFLUENT TREATMENT PIT ALONG WITH DRAINAGE ARRANGEMENT TO AND FROM PIT. BOILER DRAINAGE CANAL IS ALSO TO BE MADE AVAILABLE.
- B) ALL CLEARANCES FOR BOILER LIGHT UP AND SUBSEQUENT RAISING OF TEMPERATURE ARE TO BE MADE AVAILABLE. IT IS TO BE ENSURED THAT NO RESTRICTION IS THERE FOR FREE EXPANSION OF BOILER.
- C) EXPANSION TRAMELS ARE TO BE INSTALLED AT UPPER DRUM, BOTTOM RING HEADER, BUCKSTAY CORNERS IN BOTH 1ST & 2ND PASS.
- E) ALL THE PERMANENT BOILER INSTRUMENTS ARE TO BE ISOLATED EXCEPT PROVIDING A TEMPORARY PRESSURE GAUGE OF **0 TO 15 KG/ CM²** IN THE DRUM FOR MONITORING PRESSURE IN THE DRUM DURING CHEMICAL CLEANING. ALL IMPULSE LINES CONNECTION WITH DRUM ARE ISOLATED IN THE ROOT VALVE ITSELF TO PREVENT CHEMICAL SOLUTION INGRESS.
- F) PROVISIONS SHOULD BE MADE AT THE FOLLOWING LOCATIONS FOR THE MEASUREMENT OF TEMPERATURE :
- A) TWO LOCATIONS IN THE DRUM (LEFT & RIGHT) FOR THE MEASUREMENT OF BOILER WATER TEMPERATURE. LONG THERMOCOUPLES OF AROUND 400 MM LENGTH SHALL BE INSTALLED DIRECTLY IN THE SPARE / UNUSED STUBS IN THE DRUM.

- B) WATER WALL & ECO METAL TEMPERATURE MEASUREMENTS AT THE FOLLOWING

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LOCATIONS:

1. AT AB ELEVATION, 4 NUMBER THERMOCOUPLES SHALL BE INSTALLED ON CORNER WATER WALL TUBES (OUTSIDE THE FURNACE). AT CD ELEVATION 2 NUMBERS THERMOCOUPLES SHALL BE INSTALLED IN THE FRONT AND REAR WATER WALL (OUTSIDE THE FURNACE) AT ACCESSIBLE LOCATIONS.

2. TWO MORE THERMOCOUPLES WITH PADS ONE EACH AT LEFT AND RIGHT SIDE

OF ECO COIL SHALL BE WELDED AT SUITABLE LOCATIONS, INSIDE THE BOILER (OR PENTHOUSE) TO MEASURE THE METAL TEMP. IN THE GAS SIDE.

(TOTAL 6 NOS THERMOCOUPLES WILL BE USED FOR MEASUREMENT OF WATER WALL TUBE METAL TEMPERATURE AND TWO NOS FOR ECONOMIZER TUBE TEMPERATURE)

PEENING TYPE TEMPORARY THERMOCOUPLES ARE TO BE PROVIDED IN THE TEMP MEASUREMENT POINTS ON THE WATER WALLS AND ECONOMIZER. HALF CUT TUBES WITH ID MATCHING WITH WATERWALL/ ECONOMISER TUBE OD WITH A THROUGH HOLE ARE THE MOST SUITABLE ONES. ALTERNATIVELY SPARE MTM PADS CAN BE USED.

PROVISION HAS TO BE MADE FOR DIRECT MONITORING OF TEMPERATURE IN THE CONTROL ROOM (CRT).

REGULAR METAL TEMP INDICATORS FOR SH/RH/DRUM ARE ALSO TO BE MADE AVAILABLE.

G) TO GET REPRESENTATIVE SAMPLES OF THE PROCESS SOLUTION, SAMPLING POINTS WITH SAMPLE COOLERS ARE TO BE PROVIDED AT THE FOLLOWING LOCATIONS:

A) DRUM WATER SAMPLE TO BE DRAWN FROM CBD SAMPLING COOLER OR ADDITIONALLY FROM A SPARE TAPPING POINT (E.G. PHOSPHATE DOSING LINE).

b) TWO NUMBERS OF SAMPLING POINT ARE TO BE PROVIDED DIRECTLY FROM BOTTOM RING HEADER (FROM THE EXISTING HANDHOLE STUBS BY DIRECTLY DRILLING HOLE OF SIZE OF SAMPLING TUBE OD).

H) TEMPORARY DRUM WATER LEVEL GAUGE GLASS AND (TEL-TALE LAMP INDICATION) AT CONTROL ROOM AND LOW POINT DRAIN AREA. IBD OR CBD TANK LEVEL GAUGE CAN BE USED TEMPORARILY FOR THIS PURPOSE. PERMANENT DWLI CAN BE USED AS A LAST RESORT IF NO OTHER LEVEL GAUGE CAN BE ARRANGED.

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- I) OTHER THAN MASTER DRAIN ALL OTHER DRAINS OF WATERWALL AND ECONOMIZER CONNECTED TO COMMON LOW POINT HEADER CAN BE KEPT OPEN FOR ECO RECIRCULATION PURPOSE.
- J) ALL DRUM INTERNALS CAN BE KEPT INSTALLED.
- K) CHEMIST/EXPRESS LAB TO BE MADE AVAILABLE FOR TESTING DURING THE PROCESS NEAR THE PUMPING STATION.
- L) FLOOD LIGHTS AT ALL WORKING SPOTS SHOULD BE MADE ARRANGED AND MADE AVAILABLE.
- M) FOR EFFLUENT TREATMENT, COMPRESSED AIR FACILITY AND SUITABLE PERFORATED CARBON STEEL / POLYTHENE TUBING ARRANGEMENT SHALL BE MADE AVAILABLE FOR DISTRIBUTION OF AIR THROUGHOUT THE TEMPORARY EFFLUENT PIT.
- N) SUFFICIENT AMOUNT OF FUEL OIL, DM WATER AND SPECIFIED CHEMICALS ARE TO BE MADE AVAILABLE.
- O) FOR ALKALI FLUSHING, HOT WATER FLUSHING, CHEMICAL CLEANING AND PASSIVATION PROCESSES, ESSENTIAL CONTROL AND INSTRUMENTS VIZ. PROTECTIONS, INTERLOCK, ALARMS, MEASUREMENT, ANNUNCIATION ETC. REQUIRED FOR SAFE LIGHT-UP OF BOILER ARE TO BE MADE AVAILABLE, AS PER MUTUALLY AGREED LIST BETWEEN M/S BSEB AND BHEL SITE.
- P) ONE SET OF BOILER AUXILIARIES (ID/FD/AH) ARE TO BE MADE READY AND AVAILABLE FOR BOILER LIGHT UP. THESE ALSO INCLUDE CHEMICAL DOZING PUMPS, TANKS, BOILER WATER FILLING PUMP, OIL PUMPS ETC. A CHECKLIST, CONTAINING MINIMUM REQUIREMENTS TO BE MADE READY PRIOR TO COMMENCEMENT OF CHEMICAL CLEANING.
- Q) AT LEAST ONE ELEVATION OIL GUNS, SCANNERS & IGNITORS ARE TO BE COMMISSIONED THROUGH FSSS AND AVAILABLE FOR REMOTE OPERATION. LDO PUMPING SYSTEM ALONGWITH PIPING AND CONTROL STATION ARE ALSO TO BE MADE AVAILABLE AFTER CLEANING/FLUSHING OPERATION.
- R) COMMUNICATION SYSTEM BETWEEN CONTROL ROOM, DRUM LEVEL, FIRING FLOOR, BOILER ZERO METER LEVEL AND CHEMICAL PUMPING STATION IS COMMISSIONED AND MADE AVAILABLE FOR REGULAR USE. WALKI TALKIES CAN ALSO BE UTILIZED AS AN ALTERNATIVE COMMUNICATIONAL AID.
- S) ALL THE SAFETY MEASURES DISCUSSED AND IMPLEMENTED IN ADVANCE WITH SUITABLE INSTRUCTION/CAUTION TAGS PROVIDED AT STRATEGIC PLACES/ EQUIPMENT.
- T) WATER WALL TEST TUBE COUPONS ARE PLACED AT TWO ENDS INSIDE THE DRUM TO SEE THE EFFECTIVENESS OF THE CLEANING. THE COUPONS SHALL BE HUNG USING STAINLESS STEEL WIRES.
- U) EASY ACCESS AND APPROACHES TO BE ENSURED FOR ALL THE OPERATING EQUIPMENTS.
- V) FIRE FIGHTING SYSTEM FOR ALL THE OPERATING SYSTEM IS TO BE MADE AVAILABLE.

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W) EMERGENCY POWER SUPPLIES MAY BE ARRANGED.

X) BLOWDOWN SYSTEM AND PROPER DRAINAGE SYSTEM OF THE BOILER AREA ARE TO BE ENSURED.

6. SAFETY PROVISIONS

A) SAFETY EQUIPMENTS:

ENSURE THE AVAILABILITY OF

- | | |
|---|---------|
| 1. GUM BOOTS (VARIOUS SIZES) | 6 PAIRS |
| 2. RUBBER GLOVES | 6 PAIRS |
| 3. RUBBER OR POLYTHENE APRONS | 6 NOS. |
| 4. HELMETS | 12 NOS. |
| 5. SAFETY GOGGLES PLAIN GLASS | 6 NOS. |
| 6. FACE MASK (TRANSPARENT , PLASTIC) | 4 NOS. |
| 7. FIRST AID BOX (CONTAINING DILUTE AMMONIUM HYDROXIDE, 50% SODIUM BICARBONATE SOLUTION, EYE LOTION, BANDAGES, TINCTURE IODINE, COTTON, BURNOL ETC) | |

B) Emergency provisions

A. FLUSHING AND WASHING WATER SUPPLIES

1. AMPLE SUPPLIES OF TEPID FLUSHING AND WASHING WATER SUPPLIES SHALL BE PROVIDED AT ALL POSSIBLE POINTS OF DISCHARGE, SPILLAGE OR ESCAPE OF CHEMICALS.

2. ADEQUATE PROVISIONS SHALL BE MADE FOR EMERGENCY TREATMENT OF THE EYES, COMPRISING EYE WASH BOTTLES, LOCATED CONVENIENTLY TO PLACES WHERE DISCHARGE, SPILLAGE OR ESCAPE OF CHEMICALS CAN OCCUR.

3. SAFETY SHOWER SHALL BE PROVIDED.

4. SUITABLE FIRST AID TREATMENT ROOM WITH OUTSIDE TELEPHONE FACILITIES SHALL BE PROVIDED WITHIN A REASONABLE DISTANCE OF THE PLACE WHERE CHEMICALS ARE BEING USED.

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5. THE PROTECTIVE CLOTHING AND APPARATUS REQUIRED FOR EMERGENCY USE SHALL BE MADE AVAILABLE NEAR THE ACID CLEANING AREA.

b. first aid treatment

1. SPLASHES OF THE EYE
2. IMMEDIATELY FLOOD THE EYE WITH WATER. TO BE EFFECTIVE THE EYELIDS MUST BE OPENED. THE EYELIDS SHOULD BE PUSHED APART USING THE THUMB AND INDEX FINGER OF THE LEFT HAND. THE CASUALTY WILL PROBABLY NOT BE ABLE TO OPEN THE EYE HIMSELF BECAUSE OF PAINFUL SPASMS.
3. IF AN EYE WASH BOTTLE IS USED THE JET SHOULD NOT BE DIRECTED AT THE FRONT OF THE EYE. IT SHOULD BE DIRECTED IN FROM THE SIDE, SO THAT FLOW IS OVER THE SURFACE OF THE EYE.
4. IRRIGATION SHOULD BE CONTINUED FOR 5 – 10 MINUTES AFTER WHICH THE CASUALTY SHOULD BE TAKEN TO THE FIRST AID ROOM.
5. IRRIGATION SHOULD BE CONTINUED IN THE FIRST AID ROOM. REMEMBER VISION IS SAVED BY THOROUGH IRRIGATION, NO OTHER TREATMENT CAN PREVENT DAMAGE IF THIS IS OMITTED.
6. AFTER THOROUGH IRRIGATION THE EYE SHOULD BE COVERED WITH A PAD; THE PATIENT SHOULD BE REFERRED FOR MEDICAL OPINION.

C. Irritation of the skin

1. IF SIGNS OF SKIN IRRITATION OCCUR THE PERSONS SHOULD BE REMOVED FROM CONTACT AND REFERRED FOR MEDICAL OPINION. IN THE EVENT OF THE SPLASHING OF THE SKIN WITH CHEMICALS THE EFFECTED AREA SHOULD BE WASHED THOROUGHLY AVOIDING SPREADING CONTAMINATION TO THE FACE AND EYES.

C) GENERAL

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1. TEST AREA WILL BE CORDONED OFF AND UNAUTHORIZED PERSONS ENTRY SHALL BE PROHIBITED. SUITABLE SIGNBOARD SHALL BE DISPLAYED.

2. WHENEVER ANY INSPECTION IS MADE DURING THE CLEANING PROCESS, THE LOCATION SHOULD BE ADEQUATELY VENTILATED.

D) SAFETY OF PLANT:

- A) IF THE LIGHT UP AFTER CLEANING COULD NOT BE DONE WITHIN 4 WEEKS AFTER COMPLETION OF CLEANING, THE SYSTEM WILL BE SUITABLY PRESERVED.

- B) TEMPERATURE LIMITATIONS SPECIFIED FOR VARIOUS STEPS SHOULD NOT BE EXCEEDED.

E) EMERGENCY PROCEDURES:

1. THE TESTING TEAM SHOULD BE AWARE OF THE OPERATING PROCEDURES OF FIRE EXTINGUISHERS TO BE USED FOR QUENCHING MINOR OR MAJOR FIRES.

2. THE TESTING TEAM SHOULD BE AWARE OF THE PROCEDURE TO BE FOLLOWED IN CASE OF ACCIDENTS INVOLVING PERSONNEL INJURY.

3. IN CASE OF FAILURE OF RUNNING PUMP THE STAND BY PUMP SHOULD BE STARTED IMMEDIATELY WITHOUT DELAY.

4. AN OPERATOR POSTED AT THE PUMP AREA, SHOULD BE INSTRUCTED TO STOP THE PUMPS AND PROPERLY ISOLATE THE SYSTEM IN THE EVENT OF EMERGENCY. ALL OPERATORS SHOULD BE WELL CONVERSANT WITH THE EMERGENCY OPERATING.

7. PROCEDURE AS PER INSTRUCTION OF BHEL ENGINEER

THE QUANTITIES OF VARIOUS CHEMICALS THAT ARE TO BE MIXED PER BATCH OF 20 M³ IS GIVEN BELOW:

1. EDTA AMMONIATED (40 %) CONCENTRATE: 1.5 TO 2 M³

2. BHELMAX : 30 KGS

3. BHEL SOL : 30 LIT

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4. N₂H₄.H₂O (80%) : 30 LITRES

1. AMMONIA WILL BE ADDED IF REQUIRED TO ADJUST THE PH BETWEEN 9.0 TO 9.8. DM WATER WILL BE USED TO MAKE UP TO 20 M³.
2. THIS SOLUTION WILL BE FILLED INTO THE BOILER THROUGH LP DRAIN HEADER BOILER FILL LINE WITH THE TEMPORARY CHEMICAL FILL PUMP.
3. THE CLEANING SOLUTION IS QUITE HARMLESS W.R.T CORROSION AND HENCE THERE IS NO TIME LIMITATION FOR FILLING THE BOILER AND RETAINING THE SOLUTION INSIDE THE BOILER.
4. REPEAT THE PREPARATION OF CHEMICAL SOLUTION AND BATCH FILLING AS EXPLAINED ABOVE TILL WATER LEVEL IN THE DRUM REACHES THE CENTER LINE OF THE GAUGE GLASS.
THE COMPOSITION OF THE FILLING SOLUTION SHALL BE AS BELOW:

EDTA CONTENT : 4 ± 1% W/V

HYDRAZINE : 1000 PPM (MIN)

PH : 9.0 TO 9.8

5. A reserve of 20 tons of process solution may be kept ready always during the boiler operation until the end for any emergency requirement.
6. If there is a fall in EDTA residual concentration, (as evidenced by the analysis) adequate make-up of the process solution has to be injected into the system as explained above.
7. When the temperature comes down to 95 °C, all drain valves shall be opened and the system drained completely in hot condition to the effluent pit.

NOTE (Refer Drawings attached)

1. DRAINS TO BE PROVIDED AT LOWEST POINTS OF TEMPORARY PIPING.
2. ALL TEMPORARY CONNECTIONS TO BOILER SHOULD BE OF SOUND QUALITY.
3. WATER SUPPLY SHOULD BE AVAILABLE NEAR THE PUMP OPERATING AREAS.
 - a) WHEN THE IRON CONCENTRATION IN THE CLEANING SOLUTION IS CONSTANT, IT INDICATES THAT ALL THE OXIDES HAVE BEEN DISSOLVED. HOWEVER, A MINIMUM EDTA CONTACT PERIOD OF 6 HOURS FROM THE TIME OF ATTAINING THE REQUIRED TEMPERATURE (110 DEG. C) SHALL BE ALLOWED.
4. ADDITIONAL CHECK LISTS/MODIFICATIONS IN THE LAY-OUT, IF FOUND NECESSARY,
TO BE MADE AT SITE IN CONSULTATION WITH SITE IN- CHARGE.

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3. ALL THE SAMPLING POINTS ALONG WITH SAMPLE COOLERS AND THE TEMPERATURE MEASUREMENT POINTS WITH NECESSARY THERMOCOUPLES SHALL BE PROVIDED

MEASUREMENT POINTS WITH NECESSARY THERMOCOUPLES SHALL BE PROVIDED.

10. APPENDICES

1. PROCEDURE FOR DETERMINATION OF TOTAL EDTA CONCENTRATION IN WATER SAMPLES DURING CHEMICAL CLEANING.

1. PRINCIPLE OF THE METHOD :

EDTA REACTS WITH ZIRCONIUM IONS UNDER STRONG ACID CONDITIONS TO FORM A CHELATE. THE END POINT OF THE TITRATION IS INDICATED BY A XYLENOLORANGE INDICATOR.

2. REAGENTS AND APPARATUS REQUIRED:

APPARATUS.

1. ERLLENMEYER FLASK 300 ML CAPACITY.
2. PIPETTES
3. HOT PLATE
4. MAGNETIC STIRRER

REAGENTS

1. HYDROCHLORIC ACID (CONC.)
2. STANDARD ZIRCONIUM OXY CHLORIDE ($ZrOCl_2 \cdot 8H_2O$) 0.1 M SOLUTION IN 1 N HCL. (TAKE A 1000 ML VOLUMETRIC FLASK AND ADD 32.23 GRAM OF $ZrOCl_2 \cdot 8H_2O$ AND ADD DM WATER TO ABOUT 500 ML. TO THIS ADD 85 ML OF CONC. HCL. MAKE UP TO 1000 ML MARK WITH DM WATER AND MIX WELL)
3. ASCORBIC ACID

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4. XYLENOLORANGE INDICATOR.

3. TEST PROCEDURE :

1. PIPETTE OUT 100 CC OF THE WATER SAMPLE INTO A 300 ML ERLLENMEYER FLASK.
2. ADD 10 ML OF CONC. HCL (THE PH VALUE IS ABOUT 1.0)
3. ADD A SPATULA OF ASCORBIC ACID.
4. BOIL OF THE SOLVENT ON THE HEATING PLATE FOR ABOUT 5 MINUTES.(THE YELLOW COLOUR OF THE FERRIC ION SHOULD DISAPPEAR DUE TO REDUCTION TO FERROUS IRON.
5. IMMEDIATELY AFTER THE ADDITION OF 0.05 ML OF 0.05 % XYLENOL ORANGE INDICATOR THE SAMPLE IS TITRATED WITH 0.1M ZROCL₂ UNTILL THE COLOUR CHANGES FROM YELLOW TO RED VIOLET; THE COLOUR CHANGES FROM YELLOW TO RED VIOLET. THE COLOUR CHANGE SHALL REMAIN CONSTANT FOR AT LEAST 3 MIN.

2. PROCEDURE FOR THE DETERMINATION OF IRON CONCENTRATION

IN WATER SAMPLES DURING CHEMICAL CLEANING.

1. APPARATUS REQUIRED:

1. SPECTROPHOTOMETER.
2. HOT PLATE
3. VOLUMETRIC FLASKS
4. PIPETTES

2. REAGENTS REQUIRED:

1. THIOGLYCOLIC ACID (PURE GRADE)
2. AMMONIA SOLUTION (25%) AR GRADE

3. TEST METHOD:

1. PIPETTE OUT 25 ML OF THE WATER SAMPLE INTO A 50 ML CAPACITY VOLUMETRIC FLASK.
2. ADD 2 ML OF THIOGLYCOLIC ACID USING PRO-PIPETTE. MIX WELL.
3. HEAT IT TO 70 – 80 DEG C FOR ABOUT 10 MINUTES.
4. COOL IT TO ROOM TEMPERATURE AND MAKE IT UP WITH DM WATER TO THE 50 ML MARK AND MIX WELL.
5. MEASURE THE EXTINCTION OF THE SAMPLE AGAINST A BLANK USING DM WATER TREATED AS THE SAMPLE AT 532.5 NM USING SPECTROPHOTOMETER.
6. PLOT A CURVE TAKING STANDARD IRON SOLUTION AND MEASURING THE EXTINCTION IN THE SAME WAY AS THAT OF THE WATER SAMPLE.
7. READ THE IRON CONCENTRATION OF THE SAMPLE FROM THE CALIBRATION GRAPH PLOTTED.

3. ESTIMATION OF HYDRAZINE.

1. REAGENTS .

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- a. STANDARD POTASSIUM BROMATE 0.1 N

DISSOLVE 2.7836 GRAM OF POTASSIUM BROMATE (KBrO₃) AND 10 GRAM OF POTASSIUM BROMIDE (KBR) IN DM / DISTILLED WATER AND MAKE UP TO 1000 ML.

0.1 % METHYL ORANGE INDICATOR SOLUTION.

- b. HYDRCHLORIC ACID (CONC.) AR.

2. PROCEEDURE.

- a) PLACE 10 ML OF SAMPLE IN A TITRATION FLASK.
- b) ADD 10 ML OF CONC. HCL.
- c) ADD ABOUT 5 DROPS OF METHYL ORANGE INDICATOR.
- d) TITRATE WITH STANDARD KBrO₃ TITRANT TO THE FIRST APPEARANCE OF YELLOW COLOUR.

LOG SHEET

PROJECT :MUZAFFARPUR TPS/KBUNL

DATE : / /

UNIT NO. :

ACTIVITY : EDTA ACID CLEANING AND PASSIVATION

I. ADDITION OF CHEMICALS:

SL. No.	DATE	TIME	NAME OF CHEMICAL ADDED	QUANTITY
---------	------	------	------------------------	----------

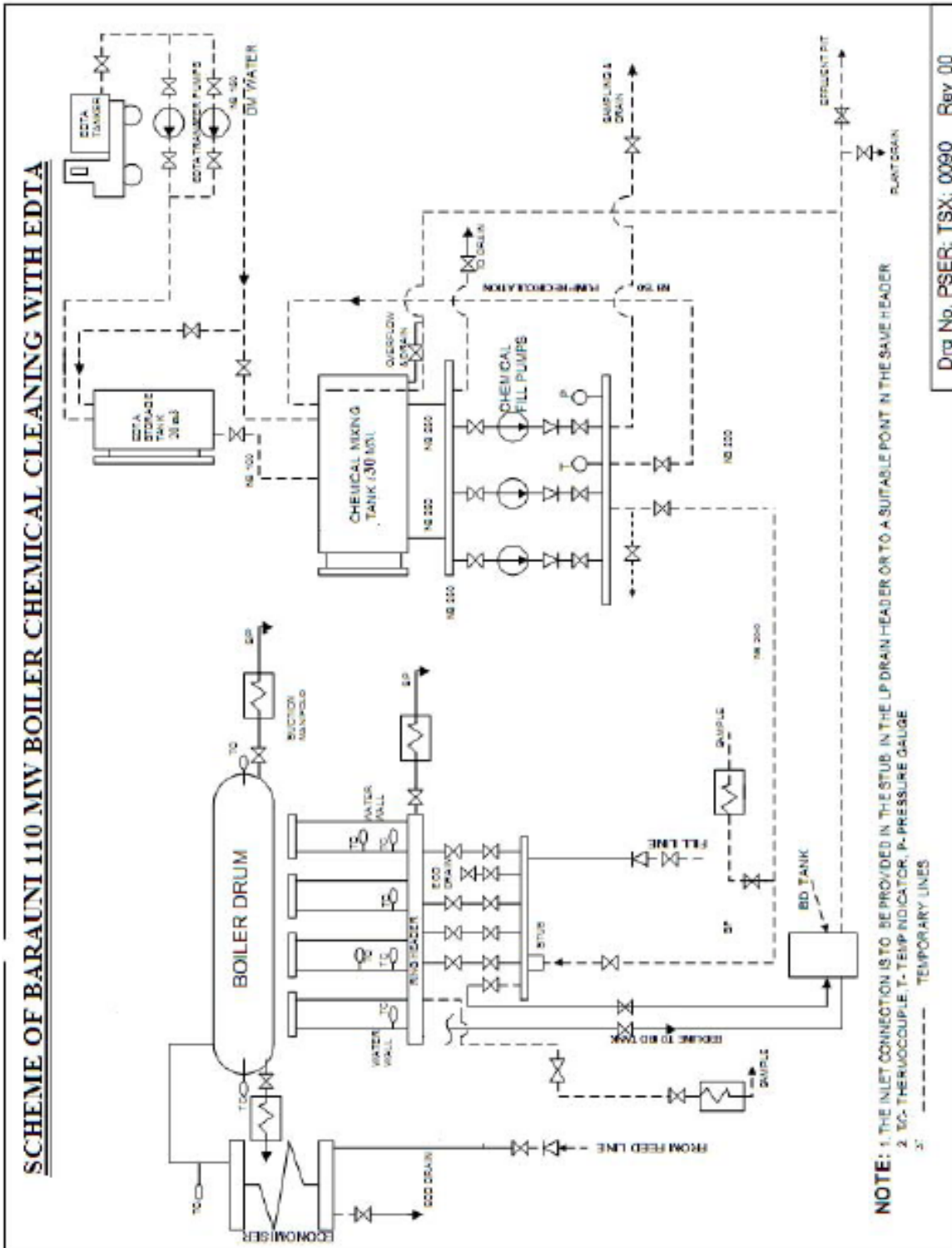
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II. ANALYTICAL DATA:

SL. No.	DATE	TIME	SAMPLE POINT	TOTAL EDTA %	IRON PPM	PH
---------	------	------	--------------	--------------	----------	----

- 1.
 - 2.
 - 3.
 - 4.
 - 5.
-

SIGNATURES.



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**STEAM BLOWING PROCEDURE
FOR
Muzaffarpur TPS,U-2, 110 MW R&M PROJECT BOILER**

NOTE :All the works related to Steam Blowing like cutting of Main Steam, CRH , HRH LINES etc., fabrication of mitre bends for RH circuit steam blowing, welding ,fitting if targets plates holder, welding of temporary steam blow pipes,policing of target plates etc. and any other job related to steam blowing and restoration of all the critical pipelines and hangers and all the manpower assistance during steam blowing operation round the clock are within the quoted price of successful bidder .

STEAM BLOWING PROCEDURE FOR BARAUNI 110 MW R&M PROJECT BOILER

Successful Bidder has to do all the arrangement for steam blowing operation i.e. cutting of critical pipes, fabrication of miter bend etc. and any other requirement as per details given below and normalization of critical pipes as required as per instruction of BHEL engineer within the lump sum quoted price

SCHEME

STEAM BLOWING WILL BE DONE IN STAGES AS SHOWN IN THE SCHEME ENCLOSED WITH THIS WRITE-UP. FOLLOWING ARE THE STAGES:-

STAGE - 1 :

SUPERHEATERS AND MAIN STEAM LINE UPTO SPECIFIED CUTOFF POINT BY PUFFING METHOD.

STAGE - 2 :

REHEATERS, CRH AND HRH LINE UPTO SPECIFIED CUTOFF POINT BY PUFFING METHOD.

PREPARATIONS

1. TEMPORARY PIPES ARE TO BE LAYED AS FOLLOWS:

(1) STAGE – I : a) BEND AFTER FIRST HORIZONTAL PART OF MS LINE LOCATED IMMEDIATELY AFTER MS STOP VALVE IS TO BE REMOVED (PREFERABLY AT EARLIER WELD JOINTS)

b) A TEMPORARY EXHAUST LINE IS TO BE WELDED AT THE HORIZONTAL CUTOFF POINT TO ACT AS BLOW EXHAUST.

(2) STAGE – II : a) TEMPORARY EXHAUST LINE IS TO BE REMOVED FROM MS LINE

b) BEND AFTER FIRST HORIZONTAL PART OF CRH LINE LOCATED IMMEDIATELY AFTER DSH OR A PART OF ABOVE HORIZONTAL LINE IS TO BE REMOVED (PREFERABLY AT EARLIER WELD JOINTS)

c) A TEMPORARY LOOP CONNECTING CRH LINE AT ABOVE POINT AND MS LINE CUTOFF POINT IS TO BE WELDED.

d) BEND OF FIRST HORIZONTAL PART OF HRH LINE LOCATED AFTER OULET HEADER IS TO BE REMOVED AND A TEMPORARY EXHAUST LINE IS TO BE WELDED AT THE CUTOFF POINT TO ACT AS BLOW EXHAUST.

THE LENGTH AND DIA OF TEMPORARY PIPE AND BENDS ARE TO BE OPTIMIZED PROPERLY.

2. TEMPORARY LINES SHOULD HAVE 1 IN 100 SLOPE TOWARDS EXHAUST FOR EFFECTIVE REMOVAL OF CONDENSATE.

3. DRAIN LINES ARE TO BE INSTALLED IN TEMPORARY PIPES' LOW POINTS.

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4. open mouth of cut off part of ms/crh/ hrh lines (non-blow side) is to be covered properly to prevent foreign material entry.
5. CARE SHOULD BE TAKEN WHILE CUTTING PERMANENT PIPING TO INTRODUCE TEMPORARY EXHAUST OR BENDS. CUTTING/GRINDING WHEELS INITIALLY AND THEN HACKSAW AT LAST INNER PART OF PIPING THICKNESS ARE TO BE UTILISED FOR CUTTING THE PERMANENT LINES.
6. TEMPORARY ELECTRICALLY OPERATED VALVES MAY BE USED AS BLOWING VALVES. ALTERNATIVELY MS VALVES CAN BE UTILISED IF ABOVE VALVES ARE NOT AVAILABLE.
7. TEMPORARY BLOWING PIPE SHOULD BE WELL SUPPORTED TO WITHSTAND REACTION FORCES DURING BLOWING AND PROPER THERMAL EXPANSION PROVISION HAS TO BE GIVEN. EXHAUST LINES' OUTLET SHOULD BE SUCH THAT PERSONNEL AND EQUIPMENT ARE NOT ENDANGERED.
8. ALL THE PERMANENT PIPELINES AND TEMPORARY LINES PASSING THROUGH WORKING AREA SHOULD BE INSULATED.
9. ENSURE SMOOTH OPERATION OF THE TEMPORARY STOP VALVE OR MS STOP VALVES FOR FULL OPEN & CLOSE POSITION SEVERAL TIMES.
10. ALL PERMANENT HANGERS FOR VARIOUS LINES ARE TO REMAIN IN PLACE WITH NECESSARY SET VALUES.
11. TARGET PLATE AND ITS HOLDING ARRANGEMENT ARE TO BE FABRICATED/ ARRANGED AS PER ENCLOSED DRAWING. MATERIAL FOR TARGET PLATE SHOULD BE MILD STEEL. TARGET PLATE SURFACE(BLOW FACING) IS TO BE MADE MIRROR FINISH BY BUFFING AND SHOULD NOT HAVE ANY DENT OR SCRATCH.
12. SUFFICIENT STORAGE OF DM WATER IS TO BE ENSURED.
13. EFFECTIVE COMMUNICATION AND LIGHTING SYSTEM SHOULD BE ENSURED AT VULNERABLE AREAS.

SAFETY ARRANGEMENT

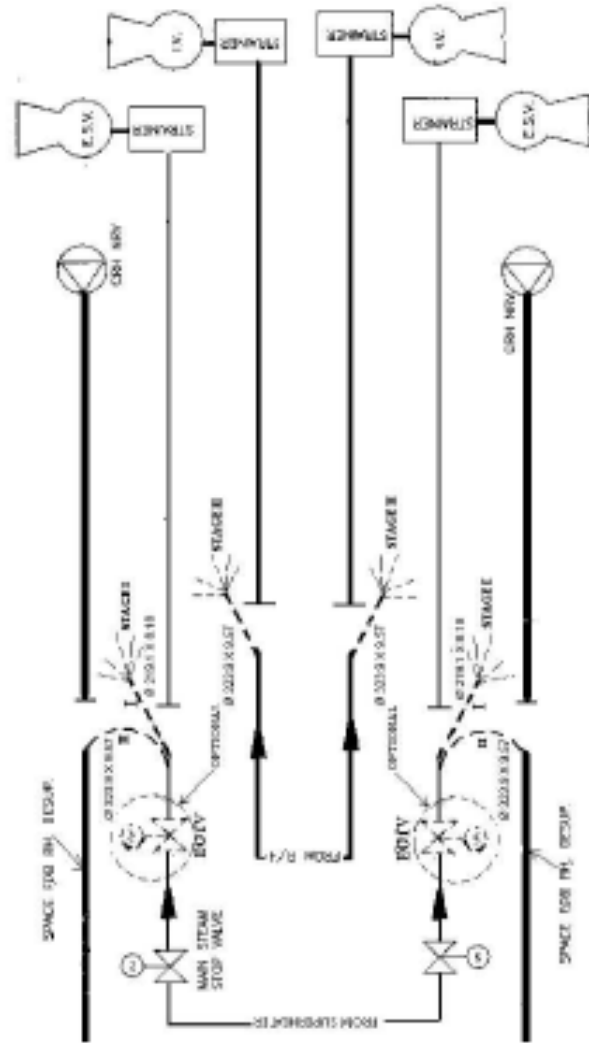
1. THE AREA AROUND THE EXHAUST POINT SHOULD BE CORDONED OFF. SIGN BOARD & NOTICES ARE TO BE DISPLAYED AT VULNERABLE POINTS.
2. AS A WARNING SOUND PRIOR TO BLOW, SIREN OR PA SYSTEM IS TO BE UTILISED.
3. personnel working near the blow area are to be provided with ear muff.

BARAUNI 110 MW R&M PROJECT BOILER STEAM BLOWING SCHEME



BLOWING SYSTEMS COVERED

- I SUPERHEATER
- II REHEATER



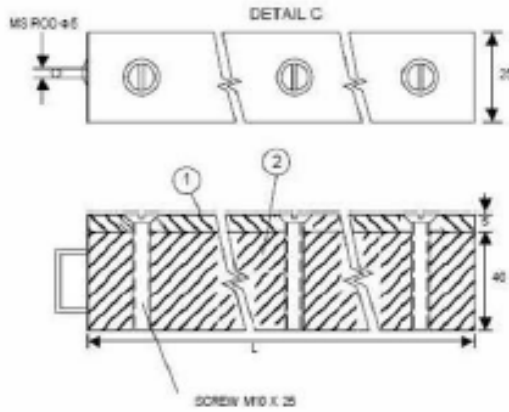
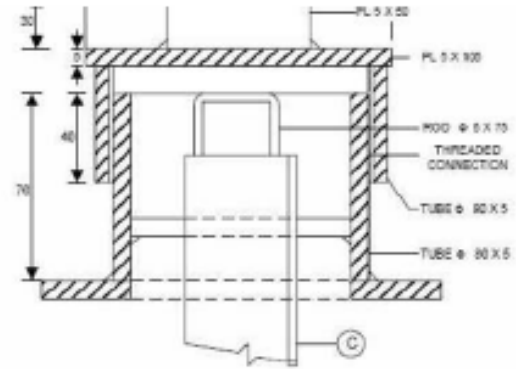
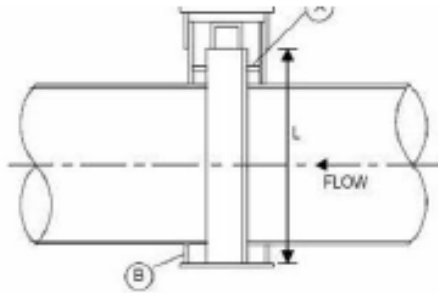
LEGEND

- MAIN STEAM PPG.
- HOT REHEAT PPG.
- COLD REHEAT PPG.
- - - - - TEMPORARY PPG.

FIG 1: AFTER CONDUCTANCE OF STAGE I BLOWING, TEMPORARY PIPE I IS TO BE REMOVED AND LOOP II IS TO BE ERRECT FOR STAGE II BLOWING.

2. STEAM DUMPING IS TO BE CONDUCTED THROUGH NORMAL FEEDING SCHEME OF

MS, TURBINE START UP VENT, CSDH, MP START UP AND HRH



1. TARGET PLATE (POLISHED) - 20 NOS/STAGE
2. TARGET PLATE RETAINER - 2NOS
3. SCREWED ON CAP - 4 NOS

BARAUNI 110 MW R&M PROJECT

TARGET PLATE ASSEMBLY

DRG NO.4:PSER:TSX:00520 REV 00

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Annexure – SAS – 1A

ESSENTIAL CONDITIONS TO BE FULFILLED BY SUCCESSFUL BIDDER

01. Successful bidder has to arrange 08 copies of overhauling reports which will include various protocols with necessary data / MOMs / important correspondence / log sheets etc. and the books shall be spiral bound with thick acetate papers in front and back along with BHEL logo printed suitably on thick art paper at the front.
02. Successful bidder is to render services for proper up-keepment of BHEL site office as required.
Fulltime office boy is required to be provided by the successful bidder at site for upkeepment of site office.
03. Successful bidder is to obtain necessary "No Dues" certificates before de-mobilisation from site.
04. Successful bidder is to comply with all the statutory and regulatory norms, rules and practices as applicable for the job/site.
05. Successful bidder shall provide valid calibration certificates for IMTEs, fitness certificates for T&Ps and Construction Equipment (e.g. wire ropes, hand operated chain pulley blocks, pulling and lifting machines, electric welding generators are welding transformers etc.). Calibration of IMTEs is to be arranged from the accredited agencies. Calibration certificates should have the traceability as per national/international standards. At work site the IMTEs, T&Ps and construction Equipment shall be checked/tested/inspected by BHEL engineers.
06. Provision of hygienic filtered drinking water facility at BHEL site office.
07. The successful bidder is to arrange a full set of First Aide kit for attending to manpower deployed by him at site as per requirement.
08. The successful bidder is to arrange extra illumination at work site to augment the existing site illumination if required to enable round-the-clock safe working.



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ANNEXURE- SAS-1B

SPECIAL INPUTS TO BE DEPLOYED TO SITE ALONGWITH SITE MOBILISATION BY SUCCESSFUL BIDDER AS ESSENTIAL PART OF THE CONTRACT CONDITION FULFILMENT.

- 01) Furnishing of quarters issued by Muzaffarpur TPS/KBUNL at their township for temporary stay of BHEL personnel as per following details:-
- a) Wooden cots with mosquito curtain frame having normal size of 4.5' x 6.5' (costing not less than 2500/- each) and mattresses for cots of 2.5' coir topped with 1" soft foam.-----
10 nos
- b) Bed linen (New Bombay Dyeing) ----- 20 nos
(10 nos in use and 10 nos standby)
- c) Pillow (M foam or equivalent) standard size ----- 10 nos
- d) Woolen blanket of Raymond make or equivalent---- 10 nos
- e) Pillow covers for above (Bombay Dyeing)----- 20 nos
(10 nos in use and 10 nos standby)
- f) Steel folding chairs (costing not less than Rs 250/-)----- 10 nos
- g) Wooden table (4' x 3' min size) with plastic cover ----- 10 nos
(Cost not less than 650/- each)
- h) Glass tumblers for drinking water ----- 03 dozens
- i) Plastic jugs for drinking water (2 lit. Capacity)------ 10 nos
(Bharat / brite make or equivalent)
- j) Aquaguard/water filter for drinking water----- 01 no
(to be installed in Mess)
- k) Plastic buckets 2 nos per bathroom with suitable plastic mugs----- 20 nos
- l) New mosquito nets to suit sl no (a) above of nylon fabric ----- 10 nos
- m) Door mats at entrance of the main door and bathroom door ----- 20 nos
- n) Messing arrangement with (tables & chairs) cook & helper, utensils including Gas burner and cooking gas for 16 nos. personnel throughout overhauling period .
- o) Cleaning of rooms regularly including bathrooms etc. must be arranged. One person to be deployed for the above.
- p) Bed sheets ,pillow covers must be changed with washed ones at least once in 4 days.
- q) Cleaning, washing of bed sheets and pillow covers regularly.
- r) All aforesaid furnishing items are to be removed after the work is completed at site by the contractor at his own cost.
- s) Contractor to hand over the quarters to Muzaffarpur TPS/KBUNL authorities with the help of BHEL representative.
- t) Initial quantity bulbs (60W/100W) as required is to be arranged by the contractor and also subsequent replacement of fused bulbs.
- u) Arrangement of locking the rooms if not existing and provision of suitable locks with 2 keys min. Per lock (Godrej) Navtal 6 levers or equivalent).
- v) Woolen Blanket (during winter)----- 10 nos
- w) Suitable security of the quarters round the clock.
- x) Colour TV (21 inch) with cable TV connection to be provided as per instruction in BHEL Residential flat/mess.

Note : any shortage in the above amenities may be made up from time to time.

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SPECIAL NOTE TO BIDDERS

01. Compliance to Annexure SAS – 1A & 1B is mandatory. If Successful bidder fails for compliance of Annexure SAS 1, then total expenditure incurred at actuals plus BHEL Overheads (presently 30%) towards the said items shall be deducted from the successful bidder's RA bill.

02. Successful bidder has to submit the following documents on and during execution of the job:

- a) Labour license for the subject work.
- b) Insurance coverage of the total workers engaged for the job.
- c) Monthly wage certificate of the total work force.
- d) EPF for the workers engaged.
- e) Submit safety plan.
- f) Submit bar chart / job completion schedule as & when asked for.

Successful bidder has to obtain "No Objection Certificates" from concerned deptts and P&A deptt. of customer.

The scope under the specification (as per scope of work) is not exhaustive but indicative only. However, any activity covered under the normal course of capital overhauling of the turbine generator of unit no.# 2 , 110 MW set at MTPS/ KBUNL shall be deemed to be within the scope.

Transportation of materials from MTPS/KBUNL site stores to work spot as per requirement and also transportation of the T & P's /Instruments etc. from BHEL-CAL HQ/ Other Eastern Region sites to MTPS/KBUNL & back, is included in the scope of the vendor at their own cost.

03. Any related work not detailed under the above schedule of work but found essential for completion of the job has to be executed by vendor free of cost.

04. EXPERIENCED EOT CRANE OPERATORS FOR ROUND THE CLOCK WORKING AT MTPS/KBUNL, TOOLS & TACKLES/CONSUMABLES ETC. ARE TO BE ARRANGED BY THE VENDOR, WITHIN THEIR QUOTED PRICE.

05. Assistance to be provided including supply of consumable etc. during carrying out of electrical testing viz/ HV TEST, ELCID test TAN DELDA TEST / RSO and MPI / NFT of turbine –generator components including LP rotor blades and also provide assistance during valve seat cutting / assembly works.

06. Within the quoted price of the vendor, the vendor has to arrange instrument along with operator to carry out the following tests: TAN DELTA TEST, RSO TEST, PARTIAL DISCHARGE TEST.

07. The vendor has to strictly comply with the safety rules & procedures of the MTPS/KBUNL. It is suggested that the prospective bidders may visit & contact MTPS/KBUNL to know further details of their safety rules before quoting their price. The successful bidder has to mobilize at site with sufficient manpower for different areas for round the clock working in 12 hours shifts (More than 12 hrs. working per day per employee is strictly prohibited at site).

08. Induction heating equipment along with experienced technicians for loosening/tightening / ovality checking of HP & IP inner / outer parting plane studs, has to be arranged by the contractor at their own cost.
09. Disposal of scrap /waste/insulation generated while overhauling work to be disposed off at predetermined place as indicated by MTPS/KBUNL by the bidder including transportation of the waste.
10. Defect liability period against bad workmanship shall be 12 (twelve) months from the date of synchronisation of the machine. During this period if any reworks are required to be carried out, then the same are to be done by the successful bidder. The successful bidder shall be responsible for timely execution and quality of overhauling job and stand guarantee against any defect due to bad workmanship. Once defect is registered within defect liability period, the successful bidder has to rectify the same free of cost during next available opportunity without any time limitation.

ANNEXURE-1 (BLR)

TENTATIVE LIST OF T&P TO BE PROVIDED BY CONTRACTOR

Contractors may please note that this list is not exhaustive & given for guidance purpose. The contractor may require deploying additional T&Ps not mentioned in this list at their own cost for proper execution of the job.

<u>Sl</u>	<u>Description</u>	<u>Quantity</u>
1.	75 T mobile crawler crane with long boom & jib	1 no.
2.	18/25 T mobile Crawler Crane	1 no.
3.	Pick and Carry Crane – 8/10/12T Hydra	2 nos.
4.	Tractor-Trailor 15T (with long bed)	1 no.
5.	Tractor-Trailor 30T/20 T (with long bed)	1 no.
6.	Truck – 10T	1 no.
7.	Wheel Barrows	1 no.
8.	Oil Filtration machine - 500 LPM	1 no.
9.	Electrical winch 2T	2 nos.
10.	Electrical winch 5T	2 no.
11.	Electrical winch 3T	3 nos.
12.	Hand winch	1 no.
13.	Welding Generator K320	6 nos.
14.	Welding Transformer	5 nos.
15.	Straight Edge	1 no.
16.	Master surface	1 no.
17.	Master level (0.2 mm/Meter accuracy)	1 no.
18.	V Blocks	1 set
19.	Milling cutters	2 sets
20.	Multimeter	2 nos.
21.	Michro-Ohm meter (calibrated)	1 no.
22.	Motorized Megger (1 KV/5KV)	2 nos.
23.	Hand operated 1000/500 V megger	2 nos.
24.	3 ½ Digit digital multimeter	4 nos.
25.	Analogue Multimeter (Motwane)	2 nos.
26.	Suitable Tong tester	2 nos.
27.	Crimping Tool	2 nos.

- | | | |
|--|--|------------------------------------|
| <ul style="list-style-type: none"> 28. Chain pulley block 5T, 3T, 2T ----- 29. Pull lift 6T, 5T, 3T, 1.5T 30. Hydraulic jack 20T, 10T, 5T 31. Hydraulic Jack 100T, 50T (Gang operated) 32. Screw jack 10T 33. Screw jack 50T, 25T 34. Grease Gun (heavy duty) 35. Single sheave snatch pulley 10T, 5T 36. Double sheave snatch pulley 10T, 5T
 37. D shakles 10T, 20T, 50T 38. Turn buckles 3T, 5T, 8T, 10T, 15T, 20T 39. TIG welding set 40. Oxygen regulator 41. Acetylene regulator 42. Cutogen 5 43. Oxygen hose 10 mm 44. Acetylene hose 10 mm 45. Electrode drying oven 46. Electrode baking oven 47. Portable electrode drying oven 48. Copper welding cable 600 amp, 400 amp 49. Aluminium cable 600 amp, 400 amp 50. Theodolite – 1 sec. accuracy ----- 51. Dumpy Level 52. Spirit Level – 12 inch, 0.1mm accuracy 53. Combination squares 54. Micrometer of different sizes 55. Vernier Callipers of different sizes 56. Flood light with bulbs 57. Trip torque wrench 58. Steel Guy ropes of different sizes 59. Manila ropes of different sizes 60. Combination square 61. Dial gauge with magnetic base 62. Drilling machine of different sizes 63. Grinding machine of different sizes 64. Grinding m/c of different sizes 65. Aluminium telescopic ladder 66. Dye penetrant test kit 67. Sheet grooving m/c for outer sheet casing 68. Sheet bending m/c for outer sheet casing ----- 69. Standard Tools ----- | | <p>Quantity As Required</p> |
| <ul style="list-style-type: none"> 51. Dumpy Level 52. Spirit Level – 12 inch, 0.1mm accuracy 53. Combination squares 54. Micrometer of different sizes 55. Vernier Callipers of different sizes 56. Flood light with bulbs 57. Trip torque wrench 58. Steel Guy ropes of different sizes 59. Manila ropes of different sizes 60. Combination square 61. Dial gauge with magnetic base 62. Drilling machine of different sizes 63. Grinding machine of different sizes 64. Grinding m/c of different sizes 65. Aluminium telescopic ladder 66. Dye penetrant test kit 67. Sheet grooving m/c for outer sheet casing 68. Sheet bending m/c for outer sheet casing ----- 69. Standard Tools ----- | | <p>Quantity As Required</p> |
| <ul style="list-style-type: none"> 69. Standard Tools ----- | | <p>Quantity As Required</p> |

Annexure – I

VALVES SCHEDULE

OVERHAULING OF VALVES & ASSOCIATED ACTUATORS.

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1.1 **DEAERATOR AREA (80-Nos.)**

01.	NRV Nb250	04 Nos
02.	NRV Nb100	02 Nos
03.	NRV Nb150	01 Nos
04.	GV Nb 250	03 Nos
05.	GV Nb 100	06 Nos
06.	GV Nb 25	09 Nos
07.	GV Nb 15	09 Nos
08.	GV Nb 50	01 Nos
09.	SFV Nb 100	01 Nos
10.	NRV Nb125	02 Nos
11.	GV Nb 150	03 Nos
12.	GV Nb 125	02 Nos
13.	SFV Nb 100	01 Nos
14.	GV Nb 150	04 Nos

1.2 **OVERHAULING OF VALVES IN TG AREA:**

- a) LP Heater Drain/ interconnecting Valves (Nb-100): 40-Nos. (at '0' Meter)
- b) LP Heater Drain/ interconnecting Valves (Nb-100): 10-Nos. (at '4' Meter)
- c) LP Heater Drain/ interconnecting Valves (Nb-50): 02-Nos. (at '0' Meter)
- d) LP Heater safety Valves: 03-Nos.
- e) HP Heater inlet/ outlet, bypass Valves (Nb-150 to Nb-250): 08-Nos.
- f) HP Heater safety Valves: 02-Nos.
- g) Main Steam valves including bypass: 2+2 – Nos.
- h) BFP discharge and suction valves with NRV.
- i) Change Over valve for HP leak-off to LPH/ Condenser with drive.
- j) Hot well, Deaerator & Expander level control valves.
- k) Condenser make-up Line (Nb-100): 5 – Nos.
- l) Condenser drain Line (Nb-100): 4 – Nos.
- m) Condensate pumps suction, discharge valves & associated NRV
- n) Condensate Booster pumps suction, discharge valves & associated NRV.
- o) Servicing of water line and oil line suction, discharge valves (12-Nos.) of lube oil coolers.
- p) Servicing of Gland steam cooler, Chimney steam condenser (GSC & CSC) associated inlet/ outlet valves.
- q) HRH Inter connection Valve (Nb-150): 10 - Nos.

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- r) Condensate line valves (>50-mm and up to 250-mm size): limited to 20-Nos.
- s) Servicing/ replacement of valves of HPFT and Expanders valves up to 50 mm inlet / outlet valves. Servicing of valves (>150-mm and up to 250-mm size) limited to 10-Nos.
- t) Cleaning of Turbine drains / dynamic separator steam pipelines (OD-½", 1", 1½"); Replacement of pipelines for maximum of 100-Meter length of each size where pipelines are choked/ damaged.

Annexure – II & IIA

List of T&P & INSTRUMENTS

Following T&P is to be mobilised by the contractor. These shall be verified physically by BHEL. If these T&P are not mobilised in good condition in time, BHEL may cancel the contract on this account. However, it may be noted that the T&P list in only a guide for bidding and other T&P as may be required for the job has to be mobilised by the successful bidder.

Sl. No.	Measuring tools	Quantity
1.01.	Dial indicator with magnetic base (10mm travel – L.C. = 0.01 mm)	10-Sets
1.02.	Dial indicator – Button type and LASTWARD (3 mm travel, 25 mm dia dial with links for coupling alignment)	2 set each
1.03.	Slip gauge upto 10 mm	1 Set
1.04.	Micro-head level (Accuracy 0.1mm/meter, 150 mm long)	1 no.
1.05.	Square level for levelling major part for installation. (Accuracy 0.1 mm 150 mm x 150mm).	1 no.
1.06.	Vernier calliper 150 mm and 300 mm	1 no. each
1.07.	Set of spring calliper and divider (150mm)	1 set
1.08.	Zenith callipers for marking (150 mm)	1 no.
1.09.	Steel scale 150 mm, 300 mm, 1000 mm	2 nos. each
1.10	Telescopic gauge upto 150 mm	1 set
1.11.	Bore dial gauge upto 75 mm	1 set
1.12.	Inside micrometer upto 1500 mm	2-sets
1.13	Outside micrometer : (0-25 mm)	2 nos.
	(0-50 mm)	1 no.
	(50-200 mm)	1 no.
	(200-300 mm)	1 no.
	(300-400 mm)	1 no.
	(400-500 mm)	1 no.
1.14	Taper gauge upto 20 mm	1 no.
1.15	Taper gauge 0.1-10 mm	1 no.
1.16	Feeler gauge 100 mm, 200mm, 300mm long (from 0.03 mm to 1.0mm thick)	2-set each
1.17	Feeler strip 0.03, 0.04, 0.05 & 0.10mm thick x 300 mm long	10-each
1.18	Thread gauge M4 to M56	2 sets
1.19	Depth micrometer 0-25mm	1 no.
1.20	Surface plate 300mm x 300mm	2- nos.
1.21	Combination set	1 no.
1.22	Ball pen gauge for 3 to 10 mm bore	1 set
1.23	Measuring steel tape 3m, 15m	2 each

CUTTING TOOL		
2.01	Tap set M5 to M42 (including M27, M33 & M33X3.5)	1 set each
2.02	Die set M14 to M65	1 set each
2.03	Pistol drill 6mm	2 nos.
	15mm	1 no.
	19mm (with magnetic stand)	1 no.
2.04	Straight grinder GQ4	3 nos.
2.05	Angle grinder AG7 & AG5	2 nos. each
2.06	Pistol grinder	2 nos.
2.07	Flexible grinder (with necessary accessories)	2 nos.
2.08	Bench grinder 150 mm	1 no.
2.09	Hole punch upto 32 mm	1 set
2.10	Easy out upto M24	1 set
2.11	Taper reamer upto 18 mm	1 set
2.12	Hand ratchet	2 nos.
LIFTING TOOL		
3.01	Sling 8mm, 2.5 metre long tip to tip along with 150mm eye at both end	1 pair
3.02	Sling 12 mm; 1.5 metre long : eye at both	2 pairs each
	2.5 metre long : end of 300 mm	
	3.5 metre long :	
3.03	Sling 19 mm; 2.0 metre long : eye 450 mm	1 pair each
	3.0 metre long :	
3.04	Sling 25 mm; 3.0 metre long: eye 450 mm	1 pair each
	6.0 metre long :	
3.05	Eye bolt 10, 12, 14 & 16	4 nos. each
3.06	Eye bolt 20, 24, 27, 36 & 42	4 nos. each
3.07	D-shackles pin dia. 10mm , 12mm	5 pair each
	20 mm, 25mm, 36mm & 44 mm	
3.08	Ratchet host 0.5 T	1 no.
3.09	Chain block 2 T, 5T	2 nos. each
3.10	Manila rope 25mm; 30 metre long	1 pair
3.11	Cotton rope 25mm; 10 metre long	1 no.
OTHER T&P		
4.01	Gas welding machine	2 sets
4.02	Hand lamp (with cover glass with 30 metre cable (24-Volt)	6 nos.
4.03	Switch board with cord (50 metre)	6 nos.
4.04	Scissors (300 mm)	2 sets
4.05	Shim cutter (350mm)	2 sets
4.06	Magnifying glass (75mm dia).	1 no.
4.07	Mirror with handle	1 no.
4.08	Industrial Vacuum cleaner	1 no.
4.09	Carpenter's chisel	3 nos.
4.10	Open "D" D.E. spanner 36x41, 41x46	2 nos. each
4.11	S.E. span "D" spanner 46,50,55,65,70,75,80,85,90 & 100, 105	1 no. each
4.12	Slogging spanners 36, 41, 55, 65	2 nos. each
4.13	Slogging spanners 46 mm	4 nos.

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4.14	Slogging spanners 50, 60, 70, 75, 80, 85, 90, 95, 100 & 105	1 each
4.15	Box spanner set with straight handle, tahet handle, universal, extension piece – AA heavy duty upto 46 mm	1 set
4.16	Tubular spanner 20 to 46	1 set
4.17	Allen key set 4 to 27	2 sets
4.18	Pipe wrench 150, 350 & 450mm	1 no. each
4.19	Slide wrench 200 mm, 300 mm	2 nos. each
4.20	Spray gun for generator varnishing with necessary high pressure hose	1 no.
4.21	High pressure air hose at least 30 metre length	2 nos.
HAND TOOLS		
5.01	Chisels (chrome-vanadium) 1mm	6 nos.
5.02	Center punch (chrome-vanadium) small & big	1 each
5.03	Letter punch – 4mm size	1 set
5.04	Number punch – 6mm size	1 set
5.05	Bearing scrappers-half round - triangular	2 nos.
5.06	Flat scrapper (made out of 1.5 inch power saw blades and pipes)	8 nos.
5.07	Hammer 250 gms., 500 gms.	1 no. each
5.08	Hammer 1 kg, 2 kg	3 nos. each
5.09	Hammer 5 kg	2 nos.
5.10	Hammer 8 kg	1 no.
5.11	Copper hammer 2 kg	1 no.
5.12	Lead hammer 2 kg	1 no.
5.13	Nylon mallet	3 nos.
5.14	Needle file	2 sets
5.15	Assorted file	4 dozens
5.16	Screw driver 150 mm, 300mm, 450mm (Taparia)	2 nos. each
5.17	Tommy Bar 32mm x 1 metre	1 no.
5.18	Crow Bar big and small	2 nos. each
5.19	Hole Bar (Assorted size)	4 nos.
5.20	Hacksaw frame (Good quality) with blades	2 nos.
5.21	Pliers cutting nose, grip, o/s circlip T/S circlip	2 nos. each
5.22	Magnetic needle for cleaning dust in small holes	1 no.
5.23	Oil stone (Rough & smooth)	6 nos. each
5.24	H.S.S. 12 mm sq. section x 100 mm parallel bits (accurate with 0.01 mm in section)	2 nos.
5.25	Copper rod 12mm dia, 25mm dia, 50 mm dia. 300 mm lenth	2 pc. Each
5.26	Bench vice 150 mm	2 nos.
5.27	Channel lock 150 mm	2 nos.
5.28	Vice grip 150 mm	1 no.
5.29	Cutogen gas cutting set with hose, jubilee clamps and regulators	1 set
5.30	Hydraulic jacks (50 tons capacity)	2-nos.
5.31	Welding generators (with lead holder)	2 nos.
5.32	Welding transformer (with lead holder)	2 nos.
5.33	Digital weighing machine (10-Kg capacity)	1-No.
5.34	Portable magnetic drill machine	1-No.
5.35	Emery Grinder	2-Nos.

Annexure - III

LIST OF CONSUMABLE TO BE ARRANGED BY THE CONTRACTOR

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S.N.	Description	Qty.
1	Dye penetration test kit	As per requirement
2	Emery paper (fine and coarse)	-Do-
3	Emery cloth sheets	-Do-
4	Prussian blue	-Do-
5	Grinding paste (Coarse/ Fine)	-Do-
6	Petrol	-Do-
7	Rustolene	-Do-
8	WD 40	-Do-
9	CTC/Acetone	-Do-
10	Lead wire	-Do-
11	Wire brush	-Do-
12	Oil stone	-Do-
13	Diamond Grinding paste	-Do-
14	Dendrite	-Do-
15	Locktite	-Do-
16	Ana bond	-Do-
17	Hand gloves	-Do-
18	Asbestos cloth/ powder	-Do-
19	Buffing wheels	-Do-
20	Halogen Lamps/ Bulbs/ heaters	-Do-
21	25 mm thick wooden cover on LP top casing, cover must be supported property.	Approx. 20 sq. metres.
22	Boxes or packets, to keep the dismantled components.	30-Nos.
23	Sand blasting nozzles, equipments sieves (for Oil/ water line filters) , dry sand, hose pipes, jubilee clamps for hose, plastic tubes, buckets, tarpaulin etc.	As may be required

Note: This is tentative list. However any additional item required to complete the job as per scope to be procured by the agency.

RENOVATION AND MODERNISATION(FB)						
DETAILS OF HP ERECTION WELDS						
SI No.	PG NO	-DESCRIPTION-	MATERIAL	OD(mm)	T(mm)	NO OF WELDS
1	6	PANEL ARRGT.	SA210 Gr.A1	63.5	5.2	2200
2	7	REAR ARCH, HANGER, SCREEN & EXTN WALL TUBES.	SA210 Gr.C	63.5 / 76.1	5.2 / 7.1	330
3	11	PLATEN SH +NIPPLE	SA213 T11	38	6	24
4	11	PLATEN SH +NIPPLE	SA213 T22	38	6	24
5	11	PLATEN SH +NIPPLE	SA213 T11	51	7.1	45
6	11	PLATEN SH +NIPPLE	SA213 T22	51	7.1	45
7	11	PLATEN SH +NIPPLE	SA213 T11	54	7.1	45
8	11	PLATEN SH +NIPPLE	SA213 T22	54	7.1	45
9	11	LTSH COILS + LOW LOOSE TUBE+HDR	SA210 Gr.C	44.5	5	546
10	12	SH.PANELS (BACK PASS)	SA210 Gr.A1	44.5	5	1084
11	12	LTSH COILS LOWER + UPPER	SA213 T11	44.5	5	312
12	12	STEAM COOL SPACER TUBE	SA213 T11	44.5	5	26
13	12	LTSH COILS UPPER TERM TUBE	SA213 T22	44.5	5	312
14	12	LTSH COILS TERM TUBES+ HEADER	SA213 T22	44.5	5	312
15	11	SH.RADIANT ROOF	SA213 T11	51	5	266
16	15to17	RH. FRONT +NIPPLE	SA213 T11 / SA 213 T11	54	3.6	172
17	15to17	RH. FRONT + RH REAR	SA213 T11 / SA 213 T22	54	3.6	172
18	15to17	RH. REAR +NIPPLE	SA213 T22 / SA 213 T11	47.63	3.4	172
19	19	R.G PLUG + PIPE	SA105 / SA106 Gr.C			4
20	19	ECO.LINKS + NOZZLE	SA106 Gr.B / SA 105	219.1	22.23	2
21	19	ECO.FEED PIPE	SA106 Gr.C	273	25	3
22	19	H.H PIPE + END COVER	SA106 Gr.C / SA234 WPC	127	20	4
23	19	ECO.COILS	SA210 Gr.A1	38.1	4	726
24	19	ECO.LINKS TO DRUM	SA210 Gr.B	219.1	22.23	8
25	21	TEE + SV FLANGE	SA105 + SA105	D60.3	8.3	1
26	21	PIPE + PIPE (OR) FLOW SWITCH (OR) BW CON RED	SA106 Gr.B + SA106 Gr.B (OR) SA105 (OR) SA234 WPB	D88.9(3")	5.49 (SCH 160)	4
27	21	PIPE + PIPE (OR) BEND (MADE AT SITE) (OR) BW CON BED (OR) TEE PIECE (FOR SV)	SA106 Gr.B + SA106 Gr.B (OR) SA234	D60.3(2")	3.91 (SCH 40)	510

			WPB			
28	21	PIPE + PRV	SA106 Gr.B + SA217 WC6	D60.3 (2")	3.91 (SCH 40)	1
29	21	PIPE + PIPE (OR) BW CON RED (OR) ORIFICE PLATE ASSEMBLY	SA106 Gr.B + SA234 WPB (OR) SA106 Gr.B	D33.9 (1")	3.38 (SCH 40)	20
30	21	VALVE + PIPE (OR) BW CON RED	SA182 F22CL3 + SA335 P22 (OR) SA234 WP22 CL1	D33.4 (1")	6.35 (SCH 160)	4
31	21	BW CON RED + CONDENSING LOOP ASSY. (OR) PIPE	SA234 OPB + SA106 Gr.B	D21.3 (1/2")	2.77 (SCH 40)	10
32	21	BW CON RED + CONDENSING LOOP ASSY.	SA234 WP 22 CL1 + SA335 P22	D21.3 (1/2")	4.78 (SCH 160)	2
33	21	SW ELL. + PIPE (OR) VSLVE (OR) THERMO COUPLE ASSY. (OR) THERMOWELL ASSY. (OR) LRSB INLET (OR) WB INLET (OR) BLANK FLANGE (OR) SW EQ. TEE (OR) SW UE TEE	SA234 WPB + SA106 Gr.B (OR) SA105 (OR) BM-C16	D60.3 (2")	3.91 (SCH 40)	450
34	21	AHB INLET + BW CON RED (OR) BLANK FLANGE	SA234 WPB + SA234 WPB (OR) IS2062FE410A	D48.3 (1 1/2")	3.68 (SCH 40)	2
35	21	TEE + PIPE (OR) VALVE (OR) BW CON RED	SA234 WPB+SA106 Gr.B SA105 (OR) SA234 WPB	D33.4 (1")	3.38 (SCH 40)	40
36	21	PIPE + TEE (OR) TEE + REDUCER	SA335 P22 + SA182 F 22 CL3 (OR) SA182 F22CL3 + SA234 WP22 CL1	D60.3 (2")	8.74 (SCH 160)	3
37	21	PIPE + PRV	SA335 P22 + SA217 WC6	D60.3(2")	8.74 (SCH 160)	1
38	21	PIPE + BW CON RED	SA335 P22 + SA234 WP 22 CL1	D33.4 (1/2")	6.35 (SCH 160)	2
39	21	PIPE + PIPE	SA335 P22 + SA335 P22	D60.3 (2")	8.74 (SCH 160)	2
40	24	PIPE + VALVE	SA 106 Gr.B + SA 216 WC6	D108.0	16	1
41	24	PIPE + VALVE (OR) EXPANDER	SA 106 Gr.B + SA216 WCC (OR) + SA 234	D108.0	16	6

			WPB			
42	24	DRUM SV + STUB	SA105 + SA105	D158.8	41.3	2
43	24	CRH LINE SV + STUB	SA105 + SA105	D203.2	25.4	1
44	24	PIPE + VALVE	SA106 Gr.B + SA 105	D33.4 (1")	3.38 (SCH 40)	2
45	24	PIPE + VALVE (OR) SW EQ TEE (OR) SW EQ TEE (OR) HEADER NIPPLE (OR) REDUCER	SA106 Gr.B + SA 105	D60.3 (2")	8.74 (SCH 160)	30
46	24	MANIFOLD + RED. (OR) VALVE (OR) MANIFOLD	SA106 Gr.B + SA 105 (OR) SA 216 WCC	D108.0	12.5	2
47	24	PIPE + VALVE(OR) TEE (OR) CONDENSING LOOP ASSY.	SA106 Gr.B + SA 105 (OR) SA 106 Gr.B	D21.3 (1/2")	3.73 (SCH 80)	40
48	24	PIPE + VALVE (OR) BW CON RED (OR) SW EQ TEE (OR) HDR NIPPLE	SA106 Gr.B + SA 105 (OR) SA 234 WPB	D33.4 (1")	6.35 (SCH 160)	130
49	24	PIPE + VALVE (OR) HEADER NIPPLE (OR) SW EQ TEE (OR) BW CON RED (OR) DWLG	SA106 Gr.B + SA 105 (OR) SA 234 WPB	D48.3 (1 1/2")	7.14 (SCH 160)	125
50	24	PIPE + PIPE (OR) BEND (OR) REDUCER (OR) DRUM NIPPLE	SA106 Gr.B + SA 106 Gr.B (OR) SA 105	D60.3 (2")	8.74(SCH 160)	140
51	24	PIPE + PIPE (OR) BEND (OR) MANIFOLD (OR) FLOW TRANSMITTER	SA106 Gr.B + SA 106 Gr.B (OR) SA 106 Gr.B	D108.0	16	55
52	24	PIPE + PIPE (OR) BEND (OR) BW EQ TEE (OR) BW ON RED. (OR) HEADER / DRUM NIPPLE	SA106 Gr.B + SA 106 Gr.B (OR) SA 234 WPB	D73.0 (2 1/2")	9.52 (SCH 160)	125
53	24	PIPE + VALVE	SA106 Gr.B + SA 216 WCB	D73.0 (2 1/2")	9.52 (SCH 160)	26
54	24	PIPE + PIPE	SA106 Gr.B + SA106 Gr.B	D33.4 (1")	3.38 (SCH 40)	5
55	24	PIPE + PIPE (OR) CONDENSING LOOP ASSY. (OR) BW CON RED	SA106 Gr.B + SA106 Gr.B (OR) SA234 WPB	D21.3 (1/2")	3.73(SCH 80)	100
56	24	PIPE + PIPE (OR) BW CON RED (OR) PIPE WITH STUB (OR) DRUM NIPPLE (OR) ECO INLET PL NIPPLE (OR) HDR NIPPLE	SA106 Gr.B + SA106 Gr.B (OR) SA234 WPB	D33.4 (1")	6.35 (SCH 160)	125

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57	24	PIPE + PIPE (OR) BW CON RED (OR) STUB IN MANIFOLD (OR) DRUM NIPPLE (OR) HDR. NIPPLE (OR) DWLG	SA106 Gr.B + SA106 Gr.B (OR) SA234 WPB (OR) SA105	D48.3 (1 1/2")	7.14(SCH 160)	200
58	24	PIPE + VALVE (E1 INLET & OUTLET) (OR) VALVE (E2 INLET)	SA106 GrC + SA 216 WCC (OR) SA 106 GrC	D273.0	36	3
59	24	MSL. SV + STUB	SA182 F22CL3 + SA182 F22 CL3	D138	37.25	1
60	24	HRH LINE SV + STUB	SA182 F22CL3 + SA182 F22 CL3	D209.6	28.6	2
61	24	CONNECTOR + TUBE	SA182 Gr.F12CL2 + SA 213 TP304H	D14	2.9	1
62	24	CONNECTOR + PIPE	SA182 Gr.F12CL3 + SA 106 Gr.B	D33.4 (1")	6.35 (SCH 160)	1
63	24	TUBE + SOCKET 9SAMPLING CONN. (OR) BEND (OR) VALVE	SA213 TP304H + SA 182 F316	D14	2.9	750
64	24	DRUM NIPPLE + CONNECTOR	SA213 TP304H + SA 182 Gr.F 12 CL2	D31.8	4	1
65	24	VALVE + VALVE	SA216 WCB + SA 216 WCB	D108.0	12.5	3
66	24	VALVE + EXPANDER	SA216 WCC + SA 234 WPB	D73.0	9.53	4
67	24	VALVE + PIPE	SA217 WC9 + SA 335 P22	D159.0	30	4
68	24	ERV. ISOL. VALVE + STUB (1358VX)	SA217 WC9 + SA182 F22 CL3	D139.7	39.7	2
69	24	BW EQ. TEE CONNECTOR	SA234 WPC + SA 182 F12CL2	D73.0 (21/2")	9.52 (SCH 160)	1
70	24	PIPE + PIPE (OR) CONDENSING LOOP (OR) CONNECTING PIECE / CONDENSING LOOP FOR SH ERV (OR) PIPE WITH STUB	SA335 P 22 + SA 335 P22 (OR) SA 182F22CL3	D33.4(1")	6.35 (SCH 160)	50
71	24	PIPE + VALVE	SA335 P22 + SA 182 F22	D33.4 (1")	3.38 (SCH 40)	10
72	24	PIPE + VALVE	SA335 P22 + SA 182F22CL3	D21.3(1/2")	4.78 (SCH 160)	4
73	24	PIPE + VALVE	SA335 P22 + SA 182F22CL3	D60.3 (2")	8.74 (SCH 160)	4
74	24	PIPE + VALVE	SA335 P22 + SA 216 WC6	D108.0	16	1

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75	24	PIPE + PIPE (OR) BEND (OR) DESH NIPPLE	SA335 P22 + SA 335 P 22	D108.0	16	16
76	24	PIPE + PIPE (OR) BEND (OR) HDR. NIPPLE (OR) REDUCING STAGES	SA335 P22 + SA 335 P 22	D159.0	30	18
77	24	PIPE + PIPE (OR) BEND	SA335 P22 + SA 335 P 22	D60.3(2")	8.74 (SCH 160)	12
78	24	PIPE + PIPE (OR) CONDENSING LOOP ASSY. (OR) BW CON RED	SA335 P22 + SA 335 P22 (OR) SA 234 WP 22CL1	D21.3 (1/2")	4.78 (SCH 160)	5
79	24	PIPE + PIPE (OR) HDR NIPPLE	SA335 P22 + SA 335P22 (OR) SA 182 F22CL3	D33.4 (1")	3.38 (SCH 40)	8
80	24	PIPE + VALVE (OR) SW EQ TEE (OR) CONDENSING LOOP (OR) ERV IMPLULSE STUB	SA335 P22 SA 182F22CL3 (OR) SA 234WP22CL1	D33.4(1")	6.35 (SCH 160)	35
TOTAL						9982

--SPECIAL CONDITIONS OF CONTRACT --

1. SERVICES TO BE RENDERED BY THE BIDDER

Services for construction, fabrication, equipment erection, testing as well as trial run & commissioning of various equipment and accessories under the contract shall include but not be limited to the following:

- 1.1 Issuing materials from store/open yard from time to time for erection as per the construction programme. The Contractor shall be the custodian of all the materials issued till the plant/equipment is officially taken over by the owner / BHEL after complete erection and successful trial run & commissioning.
- 1.2 Transport of material to their respective places of erection and erection of the complete plant & equipment as supplied under this specification.
- 1.3 Trial run and commissioning of individual equipment / sub-systems to the satisfaction of Owner/BHEL.
- 1.4 Deployment of all skilled and unskilled manpower required for erection, supervision of erection, watch & ward, commissioning and other services to be rendered under this specification. To obtain form –V from Labour commissioner as may be required.
- 1.5 Deployment of all erection tools & tackle, construction machinery, transportation vehicles and all other implements in adequate number and size, appropriate for the erection work to be handled under scope of this specification except otherwise specified.
- 1.6 Supply of all consumables, e.g. welding electrodes, cleaning agents, diesel oil, lubricant etc as well as materials required for temporary supports, scaffolding etc as necessary for such erection work, unless specified otherwise.

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- 1.7 Providing support services for the contractor's erection staff e.g. construction of site offices, temporary stores, residential accommodation and transport to work site for erection personnel, watch and ward for security and safety of the materials under the Contractor's custody etc. as required.
- 1.8 Maintaining proper documentation of all the site activities undertaken by the Contractor as per the proforma mutually agreed with BHEL, Submitting monthly progress reports as also any such document as and when desired by BHEL/owner, taking approval of all statutory authorities Factory Inspector, Provident fund authority etc , as applicable for respective portions of work under the jurisdiction of such statutes of laws.
- 1.9 All the material issued to the bidder by BHEL shall be reconciled by the bidder and the unused material have to be returned back to Customer stores/yard or any other place as specified by BHEL/ Customer.
- 1.10 Arranging Quality checks as per approved FQP/Drawings, filling log sheets and making required no. of sets as per BHEL instructions.
- 1.11 Any other service, although not specifically called for but required for a contract of the size and nature indicated in the specification.
- 2.0** Facilities being provided to the Subcontractor by BHEL/ customer for this work at site :
- | | | | |
|--|-------------------|-----------------|---|
| a) Water | : PFOC | POCB | CNBP |
| b) Power | : PFOC | POCB | CNBP |
| c) Storage space | : PFOC | POCB | CNBP |
| d) Covered space | : PFOC | POCB | CNBP |
| e) Uncovered space | : PFOC | POCB | CNBP |
| f) E.O.T Crane | : PFOC | POCB | CNBP |
| g) Operators for the above | : PFOC | POCB | CNBP |
| h) Residential accommodation for subcontractor's personnel
(Please state the extent of accommodation that can be subcontractor's personnel) | : PFOC | POCB | CNBP
(may be provided on chargeable basis if and as available) |
| i) Compressed air | : PFOC | POCB | CNBP |
| j) Workshop facilities | : PFOC | POCB | CNBP |
| k) Crane/Hydra for heavy materials if available: | PFOC | POCB | CNBP |
| l) Operator for above (k) | : PFOC | POCB | CNBP |
| m) Fuel for above (k) | : PFOC | POCB | CNBP |
| n) Other material handling equipment | : PFOC | POCB | CNBP |

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o) Trailor	: PFOC _____ PO CB	CNBP
p) Wooden/concrete sleepers	: PFOC _____ PO CB	CNBP
q) Tarpaulins	: PFOC _____ PO CB	CNBP
r) Scaffolding materials	: PFOC _____ PO CB	CNBP

NOTE:-

- 1) PFOC :Provided free of charges.
- 2) PO CB: Provided on chargeable basis.
- 3) CNBP: Can not be provided & to be arranged by successful bidder wherever Necessary.

3.0 Time limit for the application of “no idle charges clause” is not applicable for this tender.

4.0 DEVIATIONS

The bidder is required to submit with his offer in the relevant schedule/format list of any and all deviation taken by him without any ambiguity. Any assumptions, presumptions, deviations etc indicated or implied anywhere by the bidder except those indicated in the deviation schedule/format will not be recognized and will not form a part of consideration/offer. In the absence of such filled-up schedule/format it will be understood and agreed that the bidder's offer is based on strict conformance to the specification and no negotiation would be allowed in this regard. BHEL reserves the right not to recognize any/all deviations submitted after opening of the bid.

5.0 GENERAL TECHNICAL REQUIREMENTS (CODES AND STANDARDS)

- 5.1 Except where otherwise specified, the plant/equipment shall comply with the appropriate Indian Standard or an agreed internationally accepted Standard Specification as mentioned elsewhere in contract specifications, each incorporating the latest revisions at the time of tendering. Where no internationally accepted standard is applicable, the Bidder shall give all particulars and details as necessary; to enable BHEL to identify all of the plant/equipment in the same detail as would be possible had there been a Standard Specification.
- 5.2 Where the Bidder proposes alternative codes or standards he shall include in his tender one copy (in English) of each Standard Specification to which materials offered shall comply. In such case, the adopted alternative standard shall be equivalent or superior to the standards mentioned in the specification.
- 5.2.1 In the event of any conflict between the codes and standards referred above, and the requirements of this specification, the requirements which are more stringent shall govern.
- 5.2.2 Tools used during erection and commissioning shall not be accepted except with the specific approval of the Engineer.

6.0 ERECTION SCHEDULE

- 6.1 In order to achieve the overall completion schedule, the contractor shall provide BHEL all the information covering erection sequence, testing and commissioning activities. These schedules may be

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based on the recommended erection procedures and will subject to discussions/agreements with the owner/BHEL subsequent to the award of contract.

- 6.2 The successful bidder shall have to provide all the above schedules in a tabular form in addition to that in the form of network and these shall necessarily include information not limited to the earliest and latest dates for various activities and related constraints. **The schedule is to be submitted to BHEL within 15 days of issue of LOI.**

7.0 CONTRACT MANAGEMENT

The Contractor should also submit Network programs for the erection and commissioning of various items. These networks shall show the Owner/BHEL hold points (CHP) which have to be cleared by Owner/BHEL or their authorised representative(s) before further erection/commissioning can take place. These programs for the erection and commissioning would clearly identify responsibilities of the Contractor and Owner/ BHEL. Networks shall be submitted within 2 weeks of the date of finalization of award of work / placement of LOI.

8.0 CONSTRUCTION MANAGEMENT

- 8.1 Based on the PERT Network program, within one (1) month of the award of the Contract, the Contractor shall submit a program of construction / erection / commissioning, for the implementation. These programs would be amplified showing start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring, The three monthly rolling program with the first month's program being tentative based on the site conditions would be prepared based on these programs. The Contractor shall also be involved along with the Owner/BHEL to tie up detailed resource mobilisation plan over the period of time of the contract matching with the performance targets.

The program would be jointly finalized by the site in-charge of the contractor with BHEL/owner's project coordinator as well as the site planning representative. The erection program will also identify the sequential erectable tonnages.

The successful Bidder is liable to furnish all the documentary evidences towards payment of Works Contract Tax as and when required by BHEL.

9.0 PROJECT PROGRESS REVIEW MEETINGS

Periodic progress reviews on the entire activities of execution in respect of supply & works in scope of bidder will be held once in a month at Calcutta/site. These meetings will be attended by reasonably higher officials of the Contractor and will be used as a forum for discussing all areas where progress needs to be speeded up. Actions will be placed on the concerned agencies and decisions will be taken to expedite/speed up the progress. Minutes of such meetings will be issued reflecting the major discussions and decisions taken and circulated to all concerned for reference and action. The contractor shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings.

In addition to the above and to streamline the construction and erection at site a suitable frequency and forum of periodic meetings between the contractor and the Owner/BHEL will be decided upon as part of erection coordination procedure.

10.0 SITE ORGANISATION

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10.1 The contractor shall maintain a site organization of adequate strength in respect of manpower, construction machinery and other implements at all times for smooth execution of the contract. The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the vendor shall ensure providing one qualified supervisor against deployment of 15 workmen. This organization shall be reinforced from time to time, as required to make up for slippage from the schedule without any commercial implication to BHEL.

The site organization shall be headed by a competent Construction Manager having sufficient authority to take decisions at site.

On award of contract, the contractor shall submit to BHEL site organization chart indicating the various levels of experts to be deployed on the job. BHEL reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by BHEL, will have to be posted at site and deviations in this regard will not generally be permitted.

The Contractor should also submit to BHEL for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackles shall not be removed from site without written permission of BHEL.

The organization chart for site should indicate the various levels of experts to be posted for supervision in the various fields in erection, commissioning etc as applicable. For proper supervision of the work, the vendor shall ensure providing one qualified supervisor against deployment of 15 workmen.

11.0 GENERAL GUIDELINES FOR FIELD ACTIVITIES

11.1 The contractor shall execute the works in a professional manner so as to achieve the target schedule without any sacrifice on quality and maintaining highest standards of safety and cleanliness.

11.2 The contractor shall co-operate with the Owner/BHEL and other Contractors working at site and arrange to perform his work in a manner so as to minimize interference with other contractor's works. BHEL's engineer shall be notified promptly of any defect in other contractor's works that could affect the contractors work. If rescheduling of contractors work is requested by the Owner's/ BHEL's engineer in the interest of overall site activities, the same shall be complied with by the contractor. In all cases of controversy, the decision of BHEL shall be final and binding on the contractor without any commercial implication.

11.3 The Engineer shall hold weekly meeting of all the contractors working at Site at a time and a place to be designated by the Engineer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Engineer and shall strictly adhere to those decisions in performing this work. In addition to the above weekly meeting, Engineer may call for other meetings either with individual contractors or with selected number of contractors and in such a case the contractor, if called will also attend such meetings.

11.4 Time is the essence of the contract and the contractor shall be responsible for performance of his work in accordance with the specified construction schedule. If at any time the contractor is falling behind the schedule, he shall take necessary action to make good of such delays by increasing his work to

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comply with the schedule and shall communicate such action in writing to the Engineer, satisfying that his action will compensate for the delay. The contractor shall not be allowed any extra compensation for such action.

- 11.5 The Engineer shall however not be responsible for provision of additional labour and or materials or supply of any other services to the contractor except for the co-ordination work between various contractors as set out earlier.
- 11.6 The works under execution shall be open to inspection & supervision by BHEL's / Owner's engineer at all times. The contractor shall give reasonable notice to BHEL before covering up or otherwise placing beyond the reach of inspection any work in order that same may be verified, if so desired by the Owner / BHEL. Locations where easy accessibility is not there for inspection, contractor will provide suitable approach platforms etc. for safe movement of BHEL/ Owner/Inspector within normal scope of work.
- 11.7 Every effort shall be made to maintain the highest quality of workmanship by stringent supervision and inspection at every stage of execution. Manufacturer's instruction manual and guidelines on sequence of erection and precautions shall be strictly followed. Should any error or ambiguity be discovered in such documents the same shall be brought to the notice of BHEL's Engineer. Manufacturer's interpretation in such cases shall be binding on the contractor.
- 11.8 The contractor shall comply with all the rules and regulations of the local authorities, all statutory laws including Minimum wages, workmen compensation etc. All statutory fees arising out of **special Govt. notification or locally agreed norms** with the existing union shall have to be borne by the vendor within his quoted rate. No compensation / reimbursement to this effect arising out of some freshly imposed regulation / norms during contract tenure will be entertained by BHEL.
- 11.9 All the works such as cleaning, checking, leveling, blue matching, aligning, assembling, temporary erection for alignment, opening, dismantling of certain equipment for checking and cleaning, surface preparation, edge preparation, fabrication of tubes and pipes as per general engineering practice at site, cutting grinding, straightening, chamfering, filling, chipping, drilling, reaming, scrapping, shaping, fitting-up, bolting/welding, stainless steel welding, minor contingency works to meet commissioning schedules etc. as may be applicable in such erection and necessary to complete the work satisfactorily, are to be treated as incidental and the same shall be carried out by the contractor as part of the work.
- 11.10 It is the responsibility of the contractor to do the alignment etc., if necessary, repeatedly to satisfy Engineer, with all the necessary tools & tackles, manpower etc. The alignment will be complete only when jointly certified so, by the contractor's Engineer and BHEL. The contractor should also ensure that the alignment is not disturbed afterwards.
- 11.11 Equipment and material which wrongly installed shall be removed and reinstalled to comply with the design requirement at the contractor expense, to the satisfaction of BHEL/Owner/Consultant.
- 11.12 After identification of erection materials by BHEL at BHEL's store/storage yard, it shall be the responsibility of the contractor to take delivery of materials from BHEL's store/storage yard by contractor's own T&P/manpower and re-stack the leftover materials as per erection sequence at

BHEL store at their own cost. The entire activities are to be carried out under supervision of BHEL's Material Management engineer.

12.0 WORK & SAFETY REGULATIONS

The contractor shall ensure the safety of all workmen, materials and equipment either belonging to him or to others working at site. He shall observe Health, Safety & Environment rules and codes applied by the owner/BHEL at site without exception. Contractor will follow all applicable OCP (Operational Control Procedures) as prepared by BHEL, within quoted rate.

- 12.1 Safety nets with hand railings must be provided on all both inside & outside hanging platform of slip-form equipment & hanging platform from brickwork.
- 12.2 Emergency vehicle must be provided & kept separately as stand-by.
- 12.3 Non-conformity of safety rules and safety appliances will be viewed seriously and BHEL has right to impose fines on the contractor on each incident/each non-
- 12.4 conformity as per details given below:

SI No	Safety measure	Fine (Rs)
1	Not wearing safety helmet.	10 /workmen
2	Not wearing safety belt.	20 /workmen
3	Grinding without goggles.	25 /workmen
4	Not using 24V supply for internal work.	500 /case
5	Electrical plugs not used for hand machines.	100 /case
6	Welding cables, electrical wires using insulated with proper/standard.	50 /joint
7	Not removing scrap from platform.	Actual cost for removal plus 30 %
8	Gas cutting without taking proper precaution/not using sheet below per Incidence.	100 /case
9	Electrical winches having no guards earthed properly etc.	500 /case
10	Improper earthing of electrical T&P.	200 / equipment
11	Not protecting/locating the gas cylinder to avoid catching of fire.	100 /cylinder
12	Not providing earth leakage circuit breaker as per direction of BHEL.	1000 /point

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- 12.5 Any other nonconformity noticed not listed above will also be fined. The decision of BHEL engineer is final on the above. The amount will be deducted from running bills of the contractor. The amount collected on the above will be utilised for giving award to the employee who could avoid accidents by following safety rules. Also, the amount will be spent for improving the safety at site.
- 12.6 The contractor shall also be responsible for provision of all safety notices and safety equipment required both by the relevant legislation and BHEL/owner, as he may deem necessary.
- 12.7 The contractor will notify well in advance to BHEL/owner of his intention to bring to the site any container filled with liquid or gaseous fuel or explosive or petroleum substance or such chemicals, which may involve hazards. BHEL/owner shall have the right to prescribe the conditions, under which such container is to be stored, handled and used during the performance of the works and the contractor shall strictly adhere to and comply with such instructions. BHEL/owner shall have the right at his sole discretion to inspect any such container or such construction plant/equipment for which material in the container is required to be used and if in his opinion, its use is not safe, he may forbid its use. BHEL/owner shall entertain no claim due to such prohibition and BHEL/owner shall not entertain any claim of the contractor towards additional safety provisions/conditions to be provided for/constructed as per the BHEL/owner's instructions.
- 12.8 Further, any such decision of the BHEL/owner shall not, in any way, absolve the contractor of his responsibilities and in case, use of such a container or entry thereof into the Site area is forbidden by the BHEL/owner, the contractor shall use alternative methods with the approval of the BHEL/owner without any cost implication to owner or extension of work schedule.
- 12.9 Where it is necessary to provide and/or store petroleum products or petroleum mixtures and explosives, the Contractor shall be responsible for carrying-out such provision and/or storage in accordance with the rules and regulations laid down in Petroleum Act 1934, Explosives Act, 1948, and Petroleum and Carbide of Calcium Manual published by the Chief Inspector of Explosives of India. All such storage shall have prior approval of the BHEL/owner. In case, any approvals are necessary from the Chief Inspector (Explosives) or any statutory authorities, the Contractor shall be responsible for obtaining the same.
- 12.10 All equipment used in construction and erection by Contractor shall meet Indian/ International Standards and where such standards do not exist, the Contractor shall ensure these to be absolutely safe. All equipments shall be strictly operated and maintained by the Contractor in accordance with manufacturer's operation Manual and safety instructions and as per Guidelines/Rules of owner in this regard.
- 12.11 Periodical examinations and all tests for all lifting/ hoisting equipment & tackles shall be carried-out in accordance with the relevant provisions of Factories Act 1948, Indian Electricity Act 1910 and associated Laws/Rules in force from time to time. A register of such examinations and tests shall be properly maintained by the Contractor and will be promptly produced as and when desired by BHEL/owner or by the person authorized by him.
- 12.12 The Contractor shall provide suitable safety equipment of prescribed standard to all employees and workmen according to the need, as may be directed by BHEL/owner who will also have right to examine these safety equipments to determine their suitability, reliability, acceptability and adaptability.
- 12.13 Where explosives are to be used, the same shall be used under the direct control and supervision of an expert, experienced, qualified and competent person strictly in accordance with the Code of Practices/Rules framed under Indian Explosives Act pertaining to handling, storage and use of explosives.

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12.14 The Contractor shall provide safe working conditions to all workmen and employees at the Site including safe means of access, railings, stairs, ladders, scaffoldings etc. The scaffoldings shall be erected under the control and supervision of an experienced and competent person. For erection, the Contractor only shall use good and standard quality of material.

12.15 The Contractor shall not interfere or disturb electric fuses, wiring and other electrical equipment belonging to the BHEL/owner or other Contractors under any circumstances, whatsoever, unless expressly permitted in writing by owner to handle such fuses, wiring or electrical equipment.

12.16 Before the Contractor connects any electrical appliances to any plug or socket belonging to the other Contactor or BHEL/owner, he shall:

- a) Satisfy the BHEL/owner that the appliance is in good working condition:
- b) Inform the BHEL/owner of the maximum current rating, voltage and phases of the appliances;
- c) Obtain permission of the BHEL/owner detailing the sockets to which the appliances may be connected.

The BHEL/owner will not grant permission to connect until he is satisfied that:

- a) The appliance is in good condition and is fitted with suitable plug;
- b) The appliance is fitted with a suitable cable having two earth conductors, one of which shall be an earthed metal sheath surrounding the cores.

12.17 No electric cable in use by the contractor/BHEL/owner will be disturbed without prior permission. No weight of any description will be imposed on any cable and no ladder or similar equipment will rest against or attached to it.

12.18 No repair work shall be carried out on any live equipment. BHEL/owner must declare the equipment safe and a permit to work shall be issued by the BHEL/owner before the Contractor carries out any repair work. While working on electric lines/equipments whether live or dead, suitable type and sufficient quantity of tools will have to be provided by Contractor to electricians/workmen/officers.

12.19 The Contractors shall employ necessary number of qualified, full time Electricians/ Electrical Supervisors to maintain his temporary electrical installations.

12.20 The Contractor shall **employ a qualified Safety Officer under approval of BHEL site-in-charge at site before submission of first RA bill** to supervise day to day safety aspects of the equipments and workmen, who will co- ordinate with the BHEL/owner Safety Officer. In case of work being carried out through sub-Contractors, the Sub- Contractor's workmen/employees will also be considered as the Contractor's employees/workmen for the above purpose.

12.21 3% of each RA bill shall be deducted towards non-fulfillment of HSE requirement on the part of the contractor but the same may be released subject to certification by the concerned BHEL Site engineer that the HSE requirements have been fulfilled by the contractor to the satisfaction of BHEL.

12.22 The name and address of such Safety Officer of Contractor will be promptly informed in writing to BHEL/owner with a copy to Safety Officer-In charge before he starts work or immediately after any change of the incumbent is made during currency of the Contract.

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12.23 In case any accident occurs during the construction/ erection or other associated activities undertaken by the Contractor thereby causing any minor or major or fatal injury to his employees due to any reason, whatsoever, it shall be the responsibility of the Contractor to promptly inform the same to the BHEL/owner in prescribed form and also to all the authorities envisaged under the applicable laws.

12.24 The BHEL/owner shall have the right at his sole discretion to stop the work, if in his opinion the work is being carried out in such a way that it may cause accidents and endanger the safety of the persons and/or property, and/or equipments. In such cases, the Contractor shall be informed in writing about the nature of hazards and possible injury/accident and he shall comply to remove shortcomings promptly.

12.25 The Contractor shall not be entitled for any damages/ compensation for stoppage of work due to safety reasons above and the period of such stoppage of work will not be taken as an extension of time for completion of the facilities and will not be the ground for waiver of levy of penalty.

12.26 The Contractor shall follow and comply with all Safety Rules of the BHEL/owner, relevant provisions of applicable laws pertaining to the safety of workmen, employees plant and equipment as may be prescribed from time to time without any demur, protest or contest or reservation. In case of any inconformity between statutory requirement and owner's Safety Rules of the BHEL/owner referred above, the later shall be binding on the Contractor unless the statutory provisions are more stringent.

12.27 If the Contractor does not take all safety precautions and/or fails to comply with the Safety Rules as prescribed by owner or under the applicable law for the safety of the equipment and plant and for the safety of personnel and the Contractor does not prevent hazardous conditions which cause injury to his own employees or employees of other Contractors, or the owner employees or any other person who are at Site or adjacent thereto, the Contractor shall be responsible for payment of compensation to owner as per the following schedule or as decided by statutory concerned authority:

a) Fatal injury or accident causing death - Rs 100000.00/person.

b) Major injuries or accident causing 25% or more - Rs 20000.00/person.

Permanent disablement to workmen or employees.

12.28 Permanent disablement shall have same meaning as indicated in Workmen's Compensation Act. The compensation mentioned above shall be in addition to the compensation payable to the workmen/employees under the relevant provisions of the Workmen's Compensation Act and rules framed there under or any other applicable laws as applicable from time to time. In case the BHEL/owner is made to pay such Compensation then the Contractor is liable to reimburse the BHEL/owner such amount in addition to the compensation indicated above.

12.29 These insurance covers have to be taken prior to start of his work at the subject project and he shall make available the Policy to BHEL Site in-charge for necessary verification before commencement of work. However, irrespective of such verification/acceptance, the sole responsibility to maintain adequate insurance cover for his workmen, T&P, assets etc. at all times during the period of contract shall lie with the contractor. Regarding the aforesaid insurance cover, the contractor shall directly deal with the Insurance Company for all matters regarding the insurance in his scope.

13.0 **ERECTION SERVICES**

13.1 As part of the overall project management activity, the contractor shall be responsible for proper coordination of erection activities during various phases of execution of the contract. The contractor shall

identify a person designated as construction manager, with whom BHEL shall interact on matters related to execution of the contract. The construction manager shall be the single point contract person on behalf of the contractor. BHEL shall interact with the construction manager only on all matters on co-ordination between BHEL and the contractor. For timely completion of work the contractor may have to work in one or more shifts. He will not be eligible for any extra charge on this account.

- 13.2** The contractor shall confine all his field operations to those works which can be reformed without subjecting the equipment and materials to adverse effects, during inclement weather conditions, like monsoon, storms etc. and during other unfavorable construction conditions. No field activities shall be performed by the contractor under conditions which might adversely affect the quality and efficiency thereof, unless special precautions or measures are taken by the contractor in proper and satisfactory manner in the performance of such works and with the concurrence of the engineer. Such unfavorable construction conditions in no way relieve the contractor of his responsibility to perform the works as per the schedule.
- 13.3** The contractor shall supply all the skilled workmen like welders, gas cutters, electricians, riggers, sarangs, erectors, carpenters, fitters, masons, ladders, tin-smiths, instrument machines etc, in addition to other skilled, semi-skilled and unskilled workmen required for all the works of handling and transportation from site store to erection site, erection, testing and commissioning contemplated under this specification. Only fully trained and competent men with previous experience on the job shall be employed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and the other personnel who will be employed by the contractor. BHEL reserves the right to insist on removal of any employee of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.
- 13.4** The supervisory staff employed by the contractor shall be technically qualified and experienced in the area of work. They shall ensure proper out turn of work and discipline on the part of 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 employed directly by BHEL or other contractors of BHEL and BHEL's client/consultant.
- 13.5** The successful bidder has to arrange and deploy the EX-BHEL experts one no. Each in following areas on mandays basis as per discretion of BHEL site engineers:

Sl.no.	Description of area	No. of experts	No. of Mandays At site	Remarks
01.	Burner	01	45	in 02 spell
02.	APH	01	60	in 02 spell
03.	Dampers , Gates	01	30	in 02 spell
04.	Valves & Actuators	01	30	in 02 spell
05.	Coal Mills	01	45	in 02 spell
06.	Fans	01	45	in 02 spell
07.	Piping and H&S	01	30	in 02 spell
08.	ESP	01	45	in 02 spell

The total cost of Ex-BHEL deputation including journey, their accommodation etc. are to be borne by the contractor within the quoted price. The no. of spells is tentative and mandays are minimum mandays to

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be deployed. Any further requirement is also to be arranged within the quoted price as per discretion of BHEL Site Incharge/Engineers. The Ex-BHEL experts to be deployed will be with the consent of BHEL engineers. If any Ex-BHEL experts are not found suitable for the area of work, the successful bidder will arrange a substitute EX-BHEL experts accordingly.

In case of failure of the successful bidder in deployment of EX-BHEL experts a deduction of Rs.4000.00 per man days will be done by BHEL site engineers from the outstanding bill of successful bidder.

- 13.6 The contractor shall also furnish daily labour report showing by classification the number of employees engaged in various categories of work a progress report of work as required by BHEL Engineer.
- 13.7 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 co-operate with other personnel, and other contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 13.8 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 tolerance given in the drawing / instruction given by BHEL Engineer from time to time.
- 13.9 It is the responsibility of the contractor to engage his workman in shifts or on overtime basis for achieving the target set by BHEL during erection, commissioning and testing period. Contractor's quoted rate shall include all these contingencies.
- 13.10 For rendering commissioning assistance during running of the unit till handing over of the set, a dedicated gang of 6/8 (Six to eight) persons along with an exclusive supervisor need to be deployed by the vendor to attend the incidental works of commissioning as per the instruction of BHEL commissioning engineer. The gang need to be provided during night shift also whenever required by BHEL commissioning engineer. They shall be equipped with all necessary hand-tools to attend all the incidental works during commissioning.
- 13.11 Wherever DP test or other tests (NDT) are required to be done on non-pressure parts the same shall be done by the contractor as instructed by BHEL Engineer without any financial implication to BHEL.
- 13.12 Wherever temporary supports /wire ropes are to be removed, the contractor shall remove the same as instructed by BHEL engineer, immediately on completion of NDT and other tests.

14.0 QUALITY ASSURANCE PROGRAMME

The contractor shall adopt suitable quality assurance programme to control activities as necessary. Such programme shall be outlined by the contractor and shall be finally accepted by the BHEL/Owner / authorised representative. A quality assurance programme of the contractor shall generally cover the following:-

- 14.1 The organization structure and qualification data of key personnel for the management and implementation of the proposed quality assurance programme.
- 14.2 System for site erection control including process controls and fabrication and assembly controls.
- 14.3 Control of non-conforming items and system for corrective actions.
- 14.4 Inspection and test procedure for all site related works.

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14.5 Control of calibration and testing of measuring and testing equipment.

14.6 System for quality audit.

14.7 System for indication and appraisal of inspection status.

14.8 System for maintenance of records.

15.0 GENERAL REQUIREMENTS - QUALITY ASSURANCE

15.1 All materials, components and equipment covered under this specification shall be erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme.

15.2 Field Quality plans will detail out for all the equipment, the quality practices and procedures etc to be followed by the contractor site quality control organization during various stages of site activities from receipt of materials/equipment at site. Filling up of different quality log sheets as desired and directed by BHEL/owner at different stages of inspection of erection & commissioning activities after due checking by BHEL/owner and get the same signed by concerned engineers.

15.3 Quality audit/approval of the results of tests and inspection will not prejudice the right of BHEL to reject equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.

15.4 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the approval of BHEL/ Owner.

15.5 The Contractor shall employ a qualified Quality Engineer under approval of BHEL site-in-charge at site to supervise day to day quality checks as per approved FQP of the equipments in co-ordination with the BHEL/Customer Engineer.

16 INSPECTION, TESTING AND INSPECTION CERTIFICATES

16.1 The Engineer, his duly authorised representative and/or an outside inspection agency acting on behalf of the BHEL/Owner shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.

16.2 To facilitate advance planning of inspection in addition to giving inspection notice the contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at customer hold point and final inspection stages.

17.0 QUALITY CONTROL & QUALITY ASSURANCE

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Contractor's Engineers and supervisors shall be adequately qualified and also inclined to do a quality job. The quality assurance Engineer shall co-ordinate all aspects of quality control, inspection, implementation of quality assurance procedures laid down in Quality Plan and technical specification by BHEL. He shall fill up quality assurance log sheets / formats and submit to BHEL for joint inspection and acceptance.

18.0 CERTIFICATE TOWARDS COMPLETION

The work under the scope of the contractor will be deemed to be completed in all respects only when so certified by BHEL . The decision of BHEL shall be final and binding on the contractor.

19.0 TAXES AND DUTIES

19.1 All taxes (except Service Tax), WCT under VAT act, duties, charges etc for execution of the contract shall be borne by the bidder and shall not be payable extra. Any increase of the same at any stage during execution of the contract shall have to be borne by the bidder. Quoted price of the bidder shall be inclusive of all such requirements.

19.2 Service Tax (including Educational Cess) as legally leviable & payable by you under the provisions of applicable law/ act shall be paid by BHEL as per your bill. You 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 you on BHEL for this project.

19.3 Any changes in Service Tax rules (by Govt) shall be complied with.

19.4 You should be registered under state VAT Act as applicable. You should produce your Registration No and copy of Registration Certificate as proof of registration and you shall produce proof of payment of VAT so that BHEL as main contractor can get the benefit of deduction of input credit from the contractual transfer price under State VAT Act. You should produce your Tax Invoice, copy of tax paid challan, copy of returns showing BHEL portion of job value separately and other necessary documents to BHEL as required under VAT Act/ Rules so that BHEL can avail input credit under VAT Act.

19.5 New tax & duties, if imposed subsequent to latest due date of offer submission, by statutory authority during contract period (including extension, if the same is not attributable to you), shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties. No reimbursement shall be made on account of increase in rates of existing taxes, duties etc (as on latest date of offer submission).

19.6 However, the bidder shall obtain prior approval from BHEL before depositing new taxes and duties.

20.0 DEWATERING

Contractor shall ensure at all times that his work areas & approach/access roads are free from accumulation of water, so that the materials are safe and the erection/progress schedule are not affected. No separate claim in this regards shall be admitted by BHEL. No separate payments for dewatering of subsoil or surface water if required at any time during execution of the work including monsoon period shall be considered by BHEL.

21.0 CONSUMABLE

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- 21.1 All consumables, like gas, electrodes , TIG filler wire, chemicals, lubricants of contractor's T&Ps, gaskets/o-rings/gland packing for temporary work, dye penetrants, other erection consumables such as tapes, jointing compound, grease, mobile, M-seal, Araldite, Emery papers, Rustolene, Holdtite/Hylomer, Molykote, Cotton waste, preservative paints, primers, Heating elements, thermo-couples, Engineer's Blue, Galvanized steel wire, lead wires, tarpaulin, bulbs, 24 Volt lamps, wires/ropes, Number punch and center punch, gas cutting torch, DP testing kit, Parmali wood, Petrol, other cleaning agents, wooden sleepers, steel required for temporary works, H&S shims etc required for the job (Except those which are specifically supplied by manufacturing units, which will be issued free) shall be arranged by the contractor at his cost. . First filling and topping-up/subsequent fillings (till handing over) of lubricants of the equipments shall be done by the contractor within the quoted rate. Lubricants required for first filling and topping up of the equipment/subsequent fillings shall have to be supplied by successful bidder.
- 21.2 All consumables to be used for the job shall have to be approved by BHEL prior to use.
- 21.3 In the event of failure of contractor to bring necessary and sufficient consumables, BHEL shall arrange for the same at the risk and cost of the contractor. The entire cost towards this alongwith BHEL overhead shall be paid by the contractor or deducted from the contractor's bills.

22.0 ELECTRODES AND GASES

- 22.1 All electrodes required for MS, carbon steel, stainless steel, alloy and other metals required for the job shall be supplied by the contractor after due approval of BHEL and as per design requirement within this quoted rate. It shall be the responsibility of the contractor to obtain prior approval of BHEL, before procurement regarding suppliers, type of electrodes etc. on receipt of the electrodes at site, it shall be subject to inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes, batch number and date of expiry etc.
- 22.2 In case of improper arrangement for procurement of above electrodes, 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 communicated from time to time. Postponement of such recovery is not permitted.
- 22.3 BHEL reserves the right to reject the use of any electrodes at any stage, if found defective because of bad quality, improper storage, quality date expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.
- 22.4 Contractor shall submit weekly / fortnightly / monthly statement /report regarding consumption and the stock available of all types of electrodes of for cost analysis & preventive measure.
- 22.5 All the required gases like oxygen, acetylene, LPG, required for work shall be supplied by the contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. The contractor shall submit weekly/fortnightly/monthly statement report regarding consumption of the above gases for cost analysis purposes. Safe keeping of inflammable cylinders, distribution using gas manifolds shall be contractor's responsibility.

23.0 PROJECT MANAGEMENT

The successful bidder will have to establish computerized project management system and the following are the essence of the system:

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- 23.1 Still colour photography (matt paper, post card size, max 10 nos. per month of the contract execution period) depicting progress of the work, damage to the machine parts (if any) as directed by BHEL site Engineer is to be arranged by the successful bidder.
- 23.2 Successful bidder has to provide for electronic/computerized storing & reproduction/printing/plotting of various data, log sheet, protocol, measurement, etc. These may be stored in a virus-free external hard disc 01 no. 80 GB and pendrive 02 nos. 8 GB handed over to BHEL as per requirement.
- 19.1 The bidder will have to install atleast 1 no. PC (multimedia PC Work Station i3 processor or above, 250 GB HDD & minimum 2 GB RAM of HP/HCL/COMPAQ/ZENITH or equivalent make with Window 7 professional or above, 17 inch monitor, UPS having a back up of min 1 hour running of printer, monitor & CPU and required software like Latest MS Office Professional, AutoCAD 2000, PageMaker 7.0, Primavera etc., MS Project, internet data card with monthly recharge, latest registered anti virus software with total security with DVD writer, and laser jet printers (printer, copier, fax, scan) compatible for A4 size printing with power backup at places, as per instruction of BHEL. All data thus stored during the execution of job shall be transferred to detachable Pen drive (4X16-GB capacity) and handed over to Resident Manager at site after the completion of dismantling job unit wise for submission to Customer. Further detailed spec (if necessary) of the PC & software will have to be obtained from BHEL site and to be complied as per instruction of BHEL site. However, the deployed computer will remain the property of the contractor and will be taken out after completion of the job.
- 19.2 The Bidder will engage atleast 1 no. of computer operator for computerized store keeping in line with BHEL's SOMS (Site Operation Management System) software system requirements and having necessary knowledge for operation of MS Office Professional, AutoCAD 2000, PageMaker 7.0, Primavera etc. The operator(s) may have to undertake training in one of BHEL premises and the contractor shall bear all expenses towards their TA, boarding, lodging at the designated place where the training shall be arranged.
- 19.3 The successful bidder has to arrange for printing & binding of the Protocol and / or Report and / or Data, pertaining to the scope of the bidder. Contents, Layout Design, Quality of paper/cover, No. of copies etc of such printing and/or binding will be decided by BHEL.
- 19.4 The successful bidder shall provide BHEL with all erection / work schedule and or progress report, protocol, test report in floppies (compatible to BHEL software) and also in requisite number of hard copies. The input & output data for all such schedule shall be furnished to BHEL in a manner compatible with BHEL software available at site. A copy of the progress report must be submitted to Project Manager / Kolkata latest by 7th of every month covering the detailed progress achieved in the previous month.
- 19.5 If contractor fails to provide computer/ printer or personnel as per requirement, for a continuous period of fifteen days or more, BHEL shall have the right to deduct the amount as per following rates on prorate basis, from contractor's RA bill or any other dues.
- @ Rs 12,000/- (twelve thousand)/ month for each computer operator.
 - @ Rs 8,000/- (eight thousand)/ month for each computer with printer.
 - @ Rs 6,000/- (eight thousand) / month for each service staff.
- 20.0 **MMD**
The contractor shall ensure deployment of reliable and calibrated Measuring and Monitoring Device (MMD). The MMD shall have test/calibration certificate from authorised / Govt approved agencies. The

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contractor shall also keep provision of alternate arrangement for such MMD so that the work does not suffer when a particular MMD is sent for calibration. Re-testing/re-calibration shall also be arranged by the contractor at their own cost at regular interval during the period of use as advised by BHEL.

21.0 TEST CERTIFICATE FOR T&P

Contractor shall ensure deployment of serviced and healthy T&Ps including cranes, lifting tackles, wire ropes, manila ropes, winches and slings, Welding machines, Gas cutting sets, Grinding machines 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. All T&Ps, lifting tackles, pulling devices, wire rope and slings to be deployed by the contractor must bear valid/latest test certificates for their suitability, and the documents shall be preserved at site.

22.0 ISSUE OF T&P

- 26.1 In the event of BHEL issued T&P, measuring instruments etc the contractor and BHEL shall maintain joint protocol about the condition of all T&P, instruments etc taken from BHEL's custody and return to BHEL after use. The contractor shall not use these equipments for purposes other than the scope of work given in this tender document.
- 26.2 It is the responsibility of contractor to keep these equipment always in working condition and ensure their safe return in working condition to BHEL' s store subject to normal wear & tear.
- 26.3 After use of T&P items issued by BHEL the same shall be returned to BHEL in good working condition subject to normal wear & tear failing which recoveries at the book value of the item or the market rate prevailing at the time of returning the items, whichever is higher shall be made from the payments due to the contractor from BHEL from this contract or from any other contract.

27.0 INSURANCE

The contractor shall make available the original insurance cover(s) taken by him, against his T&P, assets and workmen compensation and any other cover as may be pertinent to his works and obligatory in terms of law, to BHEL for necessary verification in regard to their adequacy, before commencement of work. However, irrespective of such verification/ acceptance, the responsibility to maintain adequate insurance coverage at all times during the period of the contract shall be of the contractor alone. Such insurance covers to be taken shall be in the joint names of the owner and the contractor. The contractor shall however be authorised to deal directly with the Insurance company(s) and shall be responsible in regard to maintenance of such insurance covers. Insurance covers to be taken by BHEL/ Customer shall be as stipulated under relevant clause of this specification. However, third party liability shall also be in BHEL/customer's scope.

28.0 WATER

- a. BHEL/MTPS will provide construction water free of cost at one point.
- b. BHEL/MTPS will provide free of cost one Drinking water point.
- c. Further distribution beyond above mentioned points to be arranged by the contractor at his own cost within the working areas.

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- d. Water will be supplied 1 to 2 times in a day. Contractor will have to arrange for storage of water to meet the day to day requirement. BHEL will however arrange for adequate supply of construction water to meet the requirement .
- e. Contractor shall ensure that no water is wasted. In this regard the contractor shall take all necessary measure towards preservation of water.
- f. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of water supply and no compensation for delay in work for such interruption shall be claimed by the contractor.
- g. Contractor should arrange Drinking water in their labour colony on their own.

29 ELECTRICITY

- a. BHEL will provide construction power on **Free of charges** at 415 V at single point within project premises. Further distribution (including maintenance of the distribution lines) beyond this point to be arranged by the contractor at his own cost. Any other voltage if required shall be arranged by the contractor from power supply as above. Supply of electricity shall be governed by Indian Electricity Act and Installation Rules and other Rules and Regulation as applicable.
- b. BHEL shall not be responsible for any inconvenience or delay caused due to any interruption of power supply and no compensation for delay in work can be claimed by the contractor due to such non-supply on the grounds of idle labour, machinery or any other grounds.
- c. The Contractor should ensure that the work in critical areas is not held up in the event of power break-down and for the same he should have suitable standby arrangement at his cost. In the event of breakdown in the electric supply, if the progress of work is hampered, it will be the responsibility of the Contractor to step up the progress of work after restoration of electric supply so that overall progress of work is not affected.
- d. The contractor shall have to make arrangements at their own cost for area illumination that will be required in the working areas for execution of the work.

30 CONSTRUCTION OF TEMPORARY OFFICE ETC

The contractor shall arrange at his own cost the construction of his temporary office, stores, etc and also the watch and ward of all the above.

31 TOOLS AND PLANTS

- a. The contractor is required to provide all necessary tools and plants, (other than those specified to be provided by BHEL), measuring (calibrated) instruments and handling equipment for timely completion of the total works as per contract. The quoted rate shall be inclusive of such requirements. However the contractor shall submit deployment plan of all T&Ps along with tender bid.

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- b. In the event of any failure of the part of the contractor, BHEL may at his discretion also terminate the contract on this ground and take out any or whole amount of the contract from the scope of the contractor. Decision of BHEL in this regard will be final and binding on the contractor.
- c. The T & Ps to be arranged by the contractor shall be in proper working condition.
- d. The list of T&P indicated in relevant annexure is the minimum expected to be provided by the contractor.
- e. All other tools and plants required for the work including cranes, electric /hand/ pneumatic winches, tractor-trailors, Air compressors, trucks, welding generators/transformers, jacks, slings, pulley blocks, welding equipment, electrode drying ovens, etc and small tools and plants like chisels, scrappers, spanners, files, screw drivers, electrical tools kits etc required for timely completion of work shall be arranged by the contractor at his own cost. All T&P's required for smooth and timely completion of work shall be arranged by the contractor at his own cost and BHEL project manager's decision regarding the requirement of a particular item shall be binding on the contractor. The equipment once deployed at site shall not be removed from site without the written consent of BHEL, Construction Manager.
- f. Sufficient quantities of Guy ropes shall be arranged by the contractor for erection/alignment of columns.
- g. All tools & plants deployed by the contractor shall be as per the specification approved by BHEL Engineers.
- h. All the T&P, lifting tackles including wire ropes, slings, shackles and electrically operated equipment shall be approved by BHEL Engineer before they are actually put on use.
- i. The list of major T&P required to be deployed in indicated in annexure. The list is minimum and not exhaustive but anything required over and above these to suit the site condition/rate of progress/nature of work shall be arranged by contractor at his own cost.
- j. For the movement of crane, etc, it may become necessary to lay sleeper bed or any other material for obtaining leveled safe approach, for usage of equipment. It shall be contractor's responsibility to arrange for necessary materials for this.
- k. All the T&P arranged by contractor including electrical connections wherein required shall be reliable/proven/tested with necessary test certificate.
- l. Successful bidder has to provide 75 T crane having long boom alongwith jib facility. Bidder must visit site for proper planning of erection of ESP before submitting the Bid.

32 TOOLS AND PLANTS TO BE PROVIDED BY BHEL (Shared Machinery)

- a. All arrangements, including providing & laying of sleeper beds, backfilling of approaches wherever necessary for safe movement of the cranes as directed by BHEL shall be the responsibility of the contractor. Sleepers for this purpose shall be provided by the contractor.
- b. BHEL will provide 1 no. HUCK BOLTING MACHINE with Two (2) sets of Jaws free of cost.
- c. The contractor shall return BHEL equipment / T&Ps issued to him in good condition as and when desired by BHEL. If the return is delayed, hire charges, as applicable shall be levied by BHEL.

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- d. In case of any machinery (given to contractor) remaining idle without any valid reason, BHEL shall withdraw the equipment immediately for allotment to the contractor next in priority.
- e. In case any machinery (given to contractor) is idle and/or in case of exigency of work, BHEL reserves the right to withdraw the same and no compensation shall be entertained on this account by BHEL.
- f. In case the total work under scope is split, the tools and plants to be provided by BHEL shall be shared amongst the contractors as per discretion of BHEL.
- g. All the above equipment issued to contractor will be inspected periodically by BHEL engineer. In case contractor fails to make good the damages caused, BHEL will do the same at the cost of the contractor.
- h. The above T&P shall be available with construction manager/BHEL. The T&P shall be shared by all contractors working for BHEL at the site and distribution of these shall be done at the discretion of Construction manager/BHEL on the requirement/priority of the job and the availability of these items.
- i. In the event of any damage or theft occurring to these items while in use with the contractor due to their negligence, the same shall be repaired/replaced by the contractor at their own cost within the time stipulated by Construction manager, BHEL. Contractor's failure to do so shall entitle BHEL to get the above done through other agency and the cost so incurred by BHEL shall be recovered from the contractor's bill.

33 TIME SCHEDULE

- a. The entire work as per tender shall be completed within a period of 09 months (nine Months) from the date of start of work.
- b. The erection and commissioning will be deemed to be completed in all respects, only when the trial runs of individual equipment and testing including floating of safety valves is over and the unit is handed over to customer after successful trial operation with MCR. The decision of BHEL in this respect shall be final and binding on the contractor.
- c. The contractor should arrange to mobilise and start the erection work within 5 (Five) days from days from the date of written intimation from BHEL.

34 RECTIFICATION / MODIFICATION

- a. All rectification/modifications and reworks required for any reasons not due to fault of the contractor on works already completed, which require less than or upto 50 man-hours shall be considered as minor and shall be carried by the contractor free of cost.
- b. BHEL may consider payment for extra works on man-hour basis for such of those works which require major revamping / rework and is totally unusual to normal erection or commissioning works which are not due to contractor's faulty erection. The decision of BHEL in this regard shall be final and binding on the contractor. The contractor may submit his extra claim bills (specifically agreed by BHEL Engineer) along with the labour sheet duly certified by BHEL Engineer at site. But BHEL has also got the option to get these works done through other agencies, if they so desire.
- c. All the extra work, if any, carried should be done by a separate gang which should be identified prior to start of work for certification of man-hours. Daily labour sheets should be maintained and should be signed by contractor's representative and BHEL engineer. Signing of labour sheet does not necessarily

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mean the acceptance of extra work. Only those works which are identified as not usual to normal erection and certified so by the construction manager only will be considered for payment.

- d. BHEL has got the option of executing work related to this package but added subsequently on technical requirement / detailed engineering / customer's recommendation either adopting clause through quoted tonnage rate (upto the limit of + 20% of the given tonnage) or by adopting either of the following clauses on H.P. joints and man-hour rates at the discretion of BHEL.

35 EXTRA WORK RATE

The following man-hour rates will be applicable for modification/rectification work, excluding pressure part joints.

- a. Average single man-hour rates including overtime if any supervision use of tools & tackles and other site expenses and incidentals including consumables for carrying out rework/revamping as certified by site as may arise during the course of erection testing and commissioning --Rs 40.00 (Forty) per man-hour.
- b. Average single man-hour rates including overtime if any supervision use of tools and tackles and other site expenses and incidentals excluding consumables for carrying out rework/ revamping as certified by site as may arise during the course of erection testing and commissioning --Rs 25.00 (Twenty Five) per man-hour.

NOTE: The above man-hour rates towards extra work shall be firm and **not subject to any variation** during execution of the work.

36 RATES/PRICE

- a. The bidder shall quote their rate as per rate schedule given in this specification.
- b. For PART-A : Quoted/accepted rates shall remain valid for +/- 20 % variation in total weight indicated in relevant annexure of weight schedule. Actual tonnage as detailed in the documents of manufacturing units shall be considered for the purpose of billing and payment at accepted unit rates.

37 REVISION ON ACCEPTED CONTRACT RATE

Not applicable. Accepted rate will remain firm.

38 PRICE VARIATION CLAUSE

NO PRICE VARIATION ON THE QUOTED RATE IS ADMISSIBLE.

39 MOBILISATION ADVANCE

NO MOBILISATION ADVANCE IS ADMISSIBLE FOR THIS CONTRACT.

40 TERMS OF PAYMENT FOR BOILER & AUXILIARIES : (AS PER TOTAL AMOUNT UNDER SL NO 1.0 (PART-A) OF PRICE SCHEDULE/ VOLUME-III)

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- a. The contractor shall submit his RA bill once in a month at the end of each month. The RA bill, complete in all respects accompanied by BHEL engineer's certificate/jointly signed measurement sheet will be paid within 30 days of submission of the bill, subject to its completeness & correctness in all respects. The measurement will be taken by BHEL engineer as per relevant clause of GCC and certify regarding the actual work executed in the measurement book and bills for work.
- b. Out of break-up for progressive payment indicated below, 5% will be retained from each RA bill which will be released on successful commercial operation of the Unit # 2 .
- c. 1.5% will be retained from each RA bill and shall be paid in the following manner on certification by BHEL engineer after compliance of each of the following activity in each month. . In case of non-fulfilment of respective activity by vendor in each month, no payment shall be made by BHEL against corresponding activity and no claim of bidder at a later date, whatsoever, in this regard shall be entertained by BHEL.
 - (i) 0.7 % shall be paid on compliance of house keeping of vendor's working area and store/ office areas.
 - (ii) 0.3 % shall be paid on compliance of general illumination of vendor's working area and stores, office area.
 - (iii) 0.2 % shall be paid on compliance of applicable OHSAS requirement as per guidelines of BHEL/ PSER and as specified in the tender.
 - (iv) 0.3 % shall be paid on compliance of applicable safety requirement as per guidelines of BHEL/ PSER and as specified in the tender.
- d. STAGES OF PROGRESSIVE PRO-RATA PAYMENTS

Subject to the deduction & retention as indicated above, which BHEL may be authorised to make under the contract, the contractor shall, on the certification of the engineer at site, be entitled for payment as explained here under:

The quoted rates per MT for different groups indicated in rate/price schedule shall be distributed in the following manner for releasing payments against RA bills:

SL NO	<i>STAGES OF PAYMENT</i>	PAYMENT BREAK UP OF TOTAL AMOUNT OF PART-A
01.	Dismantling & Transportation of old components/equipment, Transportation of new components, preassembly & Erection in position of components/equipments	35%
02.	Alignment & welding	35%
03.	Completion of non destructive examination & stress relieving / heat treatment	5%
04.	Bolting & completion hangers & supports etc wherever necessary	3%
05.	Completion of Hydraulic test	3%

06.	Completion of air & Gas tightness test for equipment	3%
07.	Boiler light up and ABO	3%
08.	Completion of Acid Cleaning	3%
09	On completion of steam blowing & Safety Valve floating	3%
10	COAL FIRING	3.5%
11	FULL LOADING	1.4%
12	Submission of as-built drawings	----
13	Liquidation of pending points	0.7%
14	Reconciliation of issued materials	0.7%
15	Completion of all contractual Obligation and de mobilization of site office.	0.7%
	TOTAL	100%

- e. For erection, testing & commissioning of Boiler & Aux., as detailed in the tender document, progressive payment shall be made as above on the basis of contract price as per rate schedule. The above break-up is only for the purpose of progressive payment and should not be construed as total scope of work.

41.0 TERMS OF PAYMENT FOR TURBINE,GENERATOR & AUXILIARIES: (AS PER TOTAL AMOUNT UNDER SL NO 2.0 (PART-B) OF PRICE SCHEDULE/ VOLUME-IIIA)

- 1) *89% payments shall be paid progressively against monthly bills on completed percentage of activities.(IN CASE OF PART-B)*
- 2) *Balance 11% payment shall be payable after successful commissioning and PG Test and subject to fulfillment of all statutory requirements. .(IN CASE OF PART-B)*

In case any part of the job is not required to be carried, a deduction will be will be affected as per percentage against those items.

42.0 Compensation for delay (LD):

Time is the essence of the Contract. If the contractor fails to maintain the required progress of work as per contract or to complete the work within the time prescribed as per Clause no. 33, he shall without prejudice to any other right or remedy of BHEL on account of such breach, the contractor agrees to pay compensation (penalty) to BHEL. The above agreed compensation shall be a penalty equivalent to 1/4 % (One fourth percent) of the total contract price including taxes & duties for the delay of every week or part thereof of the delay subject to a maximum of 5% (Five percent) of the total executed price including elements of taxes, duties.

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43.0 OVER RUN COMPENSATION

No over run compensation is applicable for this job.

44.0 VARIATION IN QUANTITIES

For PART-A : The weights & quantities of the various items mentioned in this schedule of items are approximate, based on very preliminary information and may vary to any extent or be deleted altogether. The quoted rates of each item will remain firm throughout the period of execution including extension, for reasons whatsoever, as long as variation in the total value of work executed under any part of this contract including extra, if any but excluding any price variation remains within twenty percent (20%) of the awarded price as per LOI.

45.0 DRAWINGS AND DOCUMENTS

The detailed drawings, specifications, instruction manuals available with BHEL site Engineers will form this tender specification. The documents will be made available to the contractor during execution of work.

46.0 GUARANTEE PERIOD

The guarantee period will be for a period of 12 months from the date of commissioning of the Unit. Any defect found during this period is to be attended by you free of cost.

ANNEXURE-IV

SHIPPING LIST OF BOILER & AUX

Project	R149	MUZAFFARPUR-2-RM	RANIPET
PGMA		DESCRIPTION	DESIGN WT.
52010		LARG AH-ROTOR ASSY	32260
52013		LARG AH-ROTOR SEALS	1900
52030		LARG AH-ROTOR HOUSING	12048
52041		HOE END CONN PLATE	28594
52042		COLD END CONN PLATE	18540
52054		LARGE AH-AXIAL SEAL	150
52055		LARG AH-BY PASS SEAL	634
52100		LARG AH ROTOR DRIVE	3136
52220		LARG AH-GENS DETAILS	1440
52261		LARG AH-GUIDE BEARING	1895
52271		OIL PIPING GUIDE BRG	461
52272		OIL PIPING SUPRT BRG	537
52274		LUB OIL CIRCULATION UNIT	1102
52301		WASH MANIFLD GAS INL	530
52302		WASH MANIFLD GAS OUT	501

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52326	CLEANG EQPT GAS OUT	166
52329	CLE EQPT DRIVE UNIT	1200
52600	LARGE AH E,C&I COMPONENTS	10
56027	ID FAN C&I ITEMS	30
56171	SEAL AIR FAN BCSS<1000	5250
56226	IDFAN BCDS2500-3150	29645
56670	IGNITOR FAN MOTOR	750
56820	RADL IDFAN COUPLING	15000
56870	SEAL AIR FAN COUPLING (RADIAL)	50
57013	DAMPERS BET FD FAN & APH	5400
57033	SA SCAPH INLET DAMPER	2000
57063	SA SCAPH OUTLET DAMPER	2000
57110	GUILLOTENE GATE PA FAN TO APH	7000
57113	DAMPERS BETWEEN PA FAN AND APH	2750
57141	SEAL AIR HAG AND ID FAN OUTGAT	10000
57143	DAMPER COLD AIR BUS(TEMP AIR T	3200
57160	COLD AIRGATE, AIRBUS TO MILLS	10000
57203	DAMP APH TO WINDBOX DUCT	3000
57209	MTG BKT FOR CL DAMPER AIR CYL	4000
57223	DAMP APH PRIMARY SIDE TO HOT A	3000
57270	GUILLOTENE GATE DUCT TO MILL	13500
57273	DAMPER BOILER OUTLET	5500
57383	FLUE GAS SAH INLET DAMPER	4800
57393	FLUE GAS PAH INLET DAMPER	4800
57433	DAMPER APH BOILER OUTLET-GAS	5500
57460	GUILLOTENE GATE EP INLET	20000
57466	PLATFORMS AND LADDERS	25000
57470	EP OUTLET GATE	20000
57480	ID FAN INLET GATE	20000
57490	GUILLOTENE GATE ID FAN OUTLET	20000
57491	BLOWER WITH MOTOR	2000
57577	ELECT ACTUATOR FOR GATE,DAMPER	8000
57988	DUCT COMMISSIONING SPARES	20
		357300

Project		MUZAFFARPUR-2-RM	TRICHY
PG	MA	DESCRIPTION	DESIGN WT. (IN KG)
04	136	DRUM SPARE	122.35
06	400	BURNER PANEL ASSY	16503.884
06	631	UPPER & INTER FRONT PANEL	25159.3

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06	637	LOWER FRONT WW PANEL & CUTOUT OPENING	14385.928
06	641	REAR UPPER WW & TAPPING OPENING LOOSE	12595.58
06	647	LOWER REAR WW PANEL	14217.828
06	651	UPPER /INTERSIDE WW PANEL & PANEL ERECTION ATTACHMENT	33323.72
06	655	SIDE LOWER WALL PANEL	15548.8
06	670	EXT. SIDE WW PANEL	5885.96
07	223	BENT TUBE/FURNACE SCREEN TUBE	7753.4
07	225	WW HANGER TUBE	4340.7
07	226	TUBE RA, REAR ARCH & CORNER TUBE ASSY	12468.736
07	231	LWR COR.TRANS. TUBE ASSY	1876.72
07	232	UPP.COR.TRANSN. TUBE ASSY	572.98
07	500	SHIELD, U CLAMP	289.21
07	501	FURNACE INSERT TUBES	1991.7
07	601	CLIP, ROD & PLATES	673.135
07	992	TIG WIRE	80
07	993	TUBE , VPI PELLETS, TUBE END COVER	461.174
08	101	BUCKSTAY BEAM ASSY	56932.812
08	107	BUCKSTAY BEAM & HANGER ROD ASSY	12067.648
08	900	BUCK STAY SPARES	8546.402
08	901	SEAL BOX COVER	572.768
09	001	PLATE ,NUT HEX SEAL BOX COVER	5543.503
09	002	PESSURE TAPPING ASSEMBLY, SCALLOPED BAR	1235.864
09	003	TUBE ,PLATE,ROD AND M.S. LINK CHAIN	262.305
10	174	SH VERT SPACED INLET HEADER	5522
10	274	SH. VERT SPACED OUTLET HEADER	7007.3
10	278	SH.VERTICAL PLATEN OUTLET HEADER SHH-12	4562.697
11	278	SH.VERTICAL SHAPED ASSY.	31755.885
11	687	SH REAR ROOF PANEL ASSY.	12967.04
11	691	PANEL ASSY.	13615.43
12	803	S.C.S TUBES ,SPACER TUBES	610.83
12	903	MECH SPACER BAR,U ROD	10020.83
12	904	ISMC 200, UROD, TIE ROD WELDED BEAM & BENT PIN	6594.032
12	906	TIE ROD AND OTHER CONSUMABLES	918.2
12	909	TIE ROD ASSY,BENT PIN,TIG WIRE	9568.23
12	992	TIG WIRE D2.4	49.8
12	993	SPARES	525.65
16	275	RH. VERTICAL SPACED FRONT COIL ASSY.	15698.379
16	277	RH. VERTICAL SPACED REAR COIL ASSY(MAIN)	24196.147
17	919	END BAR ASSY	3522.5
17	929	END BAR,CROWN PLATE , SEALING PLATE	4258.05
17	992	TIG WIRE	37.8
18	001	SH	6308.362
18	010	SH ASSY	1785.05

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19	114	ECO.PL.TUBE UP.COIL MOD.WITH SPTS ECMU-1	52604.4
19	124	ECO.PLN TUBE LOWER COIL WITH SPRT ECML-1	50696.24
19	903	SHEET AND ROD ASSY	8238.58
19	904	LIFTING CHANNEL PL	1126
19	905	PLATE ,WASHER & PIN	1514.2
19	992	TIG WIRE D2.4	5
20	201	WALL BLOWER ASSY	6843.44
20	204	SLEEVE ASSY	790.8
20	794	SLEEVE AYL	31.5
20	972	TP, EMERGENCY HAND CRANK AND HANGER SUPPORT	626.48
20	988	AIR VENT,SPRING RETAINER,PACKING STACK	17.04
20	998	CONDENSING LOOP, CONNECTOR, VALVE LAPPING TOOL	7.46
21	600	PIPES , BLANK FLANGE,BW CON RED,GASKET	5940.352
21	601	ERW TUBE,MOUNTING ARRGT. ,SEAL PLATE , SUPPORT PLATE	3563.696
21	700	STUD BOLT , HEX NUT,PIPE GUIDE INSLN	585.492
21	800	SOLENOID VALVE, AIR SET	429.9
21	825	PNEUMATIC SBPRV	250
21	850	SB SV 7 TEST GAG	23
21	987	ADJ RING PIN	0.08
21	988	GLAND PACKING FOR SBPRV	0.2
21	992	ER 70S/90S RODS	31.29
24	200	PIPES, TUBES ,BENDS AND OTHER SPARES	19021.627
24	201	ROUND ,FLAT, SUSPENSION PLTE, EYE HANGER	5189.027
24	240	SAMPLE COOLER ASSY	639.87
24	260	NB3/10/15/25/40/50/65/250	6457.4
24	265	MCD CLAW FROGE& OTHER CONSUMABLES	122.35
24	273	MCD CLOW FORGE ,PUNCHED WASHER & OTHER CONSUMABLES	122.35
24	700	PIPE CLAMP ROD TYPE , U BOLT ,HEX NUT	184.238
24	960	LAP JIG /NB3/3 WAY /FSS	34.4
24	988	GLAND PACKING - SH COMMON BLOCK VALVE	3.6
24	989	PACKING RING , SOFT IRON GASKET	23.597
24	992	ER ROD	18.865
24	993	VPI PELLETS , TUBE END COVER	5.19
24	994	NPL PG ECO INLET LINK ASSY	263.482
28	220	ACCESS DOOR,ELLIPTICAL DOOR,FLANGE	6486.303
30	103	FASTENERS & SEAL PLATE	1477.526
30	105	SHEET,RETAINER,HEX NUT	3167.364
30	211	ANGLE,SHEET,HEX NUT	3653.65
30	212	SUPPORT,SUPPORT PLATE,GUIDE AND BENT PLATE	6153.533
30	215	HOOK,RETAINER,SHEET	2843
30	219	COLUMN ASSEMBLY	39615.286
30	220	ISMC ,SHEET,RIBBED ECK SHEET	15036.495
30	223	BAFFLE PLATE	153.67

31	010	SCALLOPED BAR	2124.583
31	102	CASING SHEET	813.119
31	104	CASING SHEET	4431.458
31	105	CASING SHEET	630.103
31	993	SHEET & PLATE	282.605
32	010	FIXING PIN ,RETAINER,CASING SUPPORT,PUNCHED WASHER	10870.225
32	310	FIXING PIN,STUD,PLAIN ALUMINIUM	36919.126
33	021	LRB ROCK WOOL MATT	52770
33	201	FIRE BRICK	751.605
33	212	CASTABLE REFRACTORY	60000
33	230	POURABLE INSULATION	75000
33	321	LRB ROCK WOOL MATT	46602.5
33	970	WELD MESH, PACKING ROPE	1081.55
33	971	WOVEN WIRE CLOTH	353.404
35	110	PLATE	6798.11
36	811	FLOOR GRILL,GUARD PLATE	80040.95
36	850	ERW TUBE	20127.23
37	010	COVER PLATE,BRACKET PLATE,GUIDE PLATE	14435.109
37	810	CORRUGATED AL.SHEET	10221.711
41	350	OIL GUN ASSY	779.974
41	390	OIL BURNER RACK	814.845
41	500	HEA RETRACTOR ASSY	444.66
41	988	COPPER CLADDED ASBESTOS GASKET, HEAT SPARK TIP	1.8
42	001	COPPER TUBE, UNION TEE	40.98
42	005	TUBE , SWELL , GAUGE CONNECTOR	264.004
42	070	OIL BURNER ASSY	2039.698
42	150	INSTRUMENT HEADER ASSY	2887.499
42	152	TRAY, SW COUPLING ,U CLAMPS	860.329
42	157	PIPE , FLANGE, CAF JOINTINGS	901.697
42	158	PIPE,FLANGE , REDUCER	2509.746
42	200	HFO RETURN TRIP VALVE ,SS HOSE	2889.859
42	300	2-C800-GV-SW-HW-A105	246.8
42	358	3-C300-GV-FL-HW-WCB	235.66
42	700	NUT,BOLT ,PUNCHED WASHER AND OTHER SPARES	33.089
43	004	DAMPER,AUTO DAMPER,BENDS,REDUCER	2281.74
43	005	AUTO DAMPER ,GAUGE CONNECTOR,GASKET	1786.506
43	104	ERW PIPES, ASBESTOS ROPE,STUB,FLEX HOSE	12613.188
43	105	ERW PIPES, NIPPLE,BLANK PLATE,CHANNEL	16483.536
43	200	SCANNER AIR FAN WITH AC & DC MOTOR ,ANTI VIBRATION PAD	3798.367
45	180	T.T . BURNER ASSEMBLY	34443.96
45	181	TIE BEAM, TIE PLATE , LINK, SPLIT COTTER,PIN,CIRCULAR ELBOW	4242.719
48	002	CIRCULAR ELBOW,CIRCULAR DUCT	3052.96
48	005	HANGER ASSY	161.552

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48	012	TRANSITION WALL,DUCT WALL,ELBOW DUCT WALL	34594.162
48	014	SAW TOOTH EXPAN JOINT	1541.872
48	015	SUPPORTS CHANNEL,GUSSET PLATE,TIE ASSEMBLY	3700.092
48	022	DUCT WALL	835
48	112	TRANSITION WALL,ELBOW DUCT WALL,CHANNEL	12056.138
48	114	SAW TOOTH EXPAN JOINT 1840X2449 STY.1	744.26
48	115	STOPPER,HANGER ASSY,GUSSET PLATE,BOLT,WASHER	586.866
48	132	DUCT WALL,ELBOW DUCT WALL,TRANSITION WALL	23077.8
48	141	PIPE,SAW TOOTH,FLANGE	2689.404
48	142	ELBOW DUCT WALL,TRANSITION WALL,DUCT WALL	9607.0601
48	144	SAW TOOTH EXPAN JOINT	1792.464
48	145	CHANNEL HANGER,RESTRAINT,HANGER ASSY	6406.028
48	200	TEMP.TAPPING,PR.TAPPING,AIR TEMP PROBES	2551.32
48	202	BEND DUCT WALL,TRANSITION WALL,DUCT WALL	28694.374
48	204	SAW TOOTH EXPAN JOINT 2626X3362 STY;1	2968.464
48	205	GUSSET PLATE,CHANNEL.HANGER ROD ASSY	1982.319
48	207	AIRFOIL ASSY.	4905.156
48	212	WALL	6075.946
48	222	ELBOW,TRANSITION,DUCT,BENT DUCT	25467.139
48	224	SAW TOOTH EXPANJOINT 1840X2449- STY.01	2951.86
48	225	CHANNEL,TUBE,GUSSET PLATE,HANGER ROD ASSY	4499.373
48	232	ELBOW DUCT WALL,DUCT,TRANSITION,ELBOW	8815.701
48	234	EXP. JOINT,ISMC	2175.548
48	382	DUCT WALL,ISMC,HOPPER	25246.402
48	384	SAW TOOTH EXPN JOINT	6420.676
48	385	MAN HOLE DOOR,LUG PLATE,TAKE OFF TRUSS	9333.856
48	432	TRANSITION,DUCT,HOPPER	13228.4
48	434	SAWTOOTH EXPANSION JOINT	806.8
48	435	SUPPORT BEAM,STOPPER,RESTRAINT,GUSSET PLATE	8762.488
48	462	ELBOW,BENT DUCT,HOPPER	32097.218
48	464	SAW TOOTH EXPN JT 2425X2654 STY-01	2851.94
48	465	SUPPORT BEAM,RESTRAINT WITH BEAM,GUSSET PLATE	3875.422
48	482	ST.DUCT WALL,TRANSITION WALL,Y DUCT WALL	69153.821
48	484	EXPAN JOINT	6687.328
48	485	SUPPORT BEAM ,GUSSET PLATE , SUPPORT CHANNEL BOX	7802.472
48	486	DUCT WALL,ELBOW WALL,STOPPER ,PLATE	12990.39
48	492	DUCT,TRANSITION WALL,BENT DUCT WALL	83130.047
48	494	EXP.JOINT 1537X2642	3710.4
48	495	RESTRAINT,GUSSET PLATE,TIE ASSY,BEAM	9169.021
48	662	DUCT	8528.05
48	664	SAW TOOTH EXP.JT	2083.608
48	665	HANGER ASSY,GUSSET PLATE ,SUPPORT POST	4714.684
48	700	HEX SCREW, HEX NUT,WASHER	1544.9

48	993	PLATE,MAN HOLE DOOR,ISMC	3861.834
80	303	PIPE,IMPULSE PIPE,SOW FLANGE,CAF JOINTING	4507.951
80	340	PIPE,IMPULSE PIPE,PIPE WITH ATTACHMENT	5937.451
80	345	PIPE ,PIPE WITH STUB , PIPE WITH CARRIER PLATE	3119.342
80	346	PIPE,PIPE WITH CARRIER PLATE,PIPE WITH SUPPORT PLATE	699.256
80	348	PIPE ,BOTTOM SUPPORT PLATE,PIPE WITH STUB	1529
80	351	PIPE WITH STUB,PIPE,CARRIER PLATE	2276.661
80	425	PIPE ,PIPE WITH STUB,PIPE WITH CARRIER PLATE	6266.977
80	431	PIPE ,SW EQTEE	240.11
80	450	PIPE ,BW EQT	3418.4
80	451	PIPE ,BW EQT , BW LR 90 DEG	2707
80	452	PIPE ,BW EQT	3747.3
80	453	PIPE ,SW EQT,SW REDUCER	2452.5
80	460	PIPE , BL 90 DEG , WELDED TEE	22582.063
80	477	PIPE ,LR 90 DEG ELBOW	10956.934
80	600	PIPE ,SW EQT	390.3
80	612	PIPE ,UNEQUAL TEE, EQUAL TEE, CONC. REDUCER	2537.17
80	616	PIPE, G& T SOCKET,G&T RED, G&T EQT	6331.5
80	905	GATE, GLOBE, REGGLOBE	19706.1
80	921	BL. HEX NUT , EYE NUT , CLEVIS WITH BOLT, BRG CLAMP ASSY	1751.734
80	922	TUBE CLIP SHORT TYPE , PIPE CLAMP, HEX NUT, HEX BOLT	4006.221
80	923	BL. HEX NUT, CLEVIS WITH BOLT, EYE NUT , TURN BUCKLE	27196.06
80	924	BL. HEX NUT , EYE NUT , BRG. CLAMP ASSY, RIS CLAMP	506.438
80	992	TIG WIRE	109
81	128	DOSING SYSTEM	3000
81	318	BL HEXBOLT ,CERAMIC FIBRE,CLAMP FOR INSL & CLAD,SUPPORT LUG	5764.573
81	341	SEALING COMPOUND	550
81	350	AL.SHEET	14961.96
81	421	FN ASSEMBLY FOR MS LINE,CONDENSING VESELS	1896
80	422	FN ASSEMBLY FOR BFD LINE, COOLING VESSELS	768
95	088	FLAME SCANNER HEAD ASSY.,6-WAY MINIATURE JUNCTION BOX	179.5
95	089	LOCAL OIL GUN. MAINT.BOX	48
95	091	FLAME SCANER SHIELDED CABLE,GLANDWP,GI CABLE TRAY	22140
95	092	SHIELDED CABLE, PIN TYPE CRIMPING LUNG	33655
96	187	COPPER POWER CABEL, CRIMPING LUGS, GLANDWP	51768.6
96	188	FURNACE TEMP. PROB STARTER BOX	75
96	189	3 PUSH BUTTON BOXESFOR SB ISO.VLV	15
96	193	SCANNER AIR FAN DC MOTOR STARTER BOX	75
97	282	STRAINER FOR HEAVY FUEL OIL SUPPLY LINE,SHIELDED SIGNAL CABLE	421
97	284	HAC10CP502, 0 TO 250 KG/CM2	165
97	285	PR. SWITCH, TEMP. SWITCH	177
97	287	ORIFICE PLATE ASSEMBLY ,NIPPLE, ELBOW	
97	297	WELDPAD , WELD CLAMP	25.2

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97	298	MTM ,MTM 24 WAY JUNCTIONBOX	741.36
97	577	SH ERV CONTROLLER WITH PR SWITCH	10.5
97	590	FCS UNION,FCS COUPLING, FCS CROSS, FCS TEE	9336.25
97	591	JB FOR SHEAR PIN FAILURE INDICATION	72
97	592	CONNECTOR , STRAIGHT CONNECTOR, TEE UNION	2587.5
			1961129.162

Project		MUZAFFARPUR-2-RM	INSULATOR PLANT ,JAGDISHPUR
PGMA	DESCRIPTION		DESIGN WT.(in KG)
47144	CERAMIC BEND WITH LINER 15°,Radius-1200		258
47144	CERAMIC BEND WITH LINER 23°,Radius-1200		110
47144	CERAMIC BEND WITH LINER 30°,Radius-1200		1430
47144	CERAMIC BEND WITH LINER 45°,Radius-335		784
47144	CERAMIC BEND WITH LINER 45°,Radius-1200		4025
47144	CERAMIC BEND WITH LINER 45°,Radius-1200		2100
47144	CERAMIC BEND WITH LINER 60°,Radius-1200		1320
47144	CERAMIC BEND WITH LINER 90°,Radius-712		5184
47144	CERAMIC BEND WITH LINER 90°,Radius-1200		618
47144	CERAMIC BEND WITH LINER 90°,Radius-1200		7128
47144	F I E Ceramic Lined , RADIUS - 356		2256
47144	F I E Ceramic Lined , RADIUS - 356		1768
47144	ORIFICES ID-271 MUZAFAR:JP:3.01 3-01345-01		135.366
47144	ORIFICES ID-274 MUZAFAR:JP:3.02 3-01345-02		172.791
47144	ORIFICES ID-278 MUZAFAR:JP:3.03 3-01345-03		57.03
47144	ORIFICES ID-281 MUZAFAR:JP:3.04 3-01345-04		111.996
47144	ORIFICES ID-288 MUZAFAR:JP:3.06 3-01345-06		74.084
47144	ORIFICES ID-300 MUZAFAR:JP:3.08 3-01345-08		
47144	ORIFICES ID-296 MUZAFAR:JP:3.07 3-01345-07		
47144	ORIFICES ID-284 MUZAFAR:JP:3.05 3-01345-05		
			27532.27

HYDRABAD MILLS MATERIALS STOCK REGISTER (UNIT-2, R&M)MTPS,KANTI

Sl.No	Description	Deliverable material	Qty	Net Weight(Kg)
1	MILL DISCHARGE VALVE ASSY, XRP 623			16,668.00
2	MILL DISCHARGE VALVE ASSY, XRP 623			16,668.00
3	GRINDING ROLL-28"			11,520.00

4	GRINDING ROLL-28"			11,520.00
5	BULL RING ASSEMBLY			3,775.80
6	BULL RING ASSEMBLY			3,775.80
7	PIN TYPE R.T.D (U. RAD. BRG SPRG LOADED)			12
8	PYRITE HOPPER ASSLY			2,664.00
9	PYRITE HOPPER ASSLY			2,664.00
10	INNER CONE SPOUT SEGMENT			792
11	INNER CONE SPOUT SEGMENT			792
12	OUTLET VENTURI COLLAR (XRP 623)			1,077.00
13	OUTLET VENTURI COLLAR (XRP 623)			1,077.00
14	INVERTED CONE (XRP 623)			315.33
15	INVERTED CONE (XRP 623)			315.33
16	CENTRE FEED PIPE LOWER (623 XRP)			1,021.56
17	CENTRE FEED PIPE LOWER (623 XRP)			1,021.56
18	CENTER FEED PIPE UPPER-XRP-623			1,200.00
19	CENTER FEED PIPE UPPER-XRP-623			1,200.00
20	INNER CONE CERAMIC LINED			2,220.00
21	INNER CONE CERAMIC LINED			2,220.00
22	MECHANICAL FACE SEAL ASSY			1,788.00
23	MECHANICAL FACE SEAL ASSY			1,788.00
24	BEARING SET (ALL TYPES)			2,100.00
25	BEARING SET (ALL TYPES)			2,100.00
26	VANE WHEEL ASSY			1,290.00
27	VANE WHEEL ASSY			1,290.00
28	VERTICAL SHAFT(STL-02			1,872.00
29	VERTICAL SHAFT(STL-02			1,872.00
30	BOWL			6,996.00
31	BOWL			6,996.00
32	BOWL HUB			5,130.00
33	BOWL HUB			5,130.00
34	GEAR HUB			3,420.00
35	GEAR HUB			3,420.00
36	SCRAPER GUARD ASSY			354
37	SCRAPER GUARD ASSY			354
38	MILL MOTOR COUPLING			744
39	MILL MOTOR COUPLING			744
40	OTHER COMPONENTS OF MDB ASSY			24,000.00
41	OTHER COMPONENTS OF MDB ASSY			24,000.00
42	SHIMS(ALL TYPES)			90
43	SHIMS(ALL TYPES)			90
44	HOSES(ALL TYPES)			120
45	HOSES(ALL TYPES)			120
46	OIL SEALS & O RINGS			120

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47	OIL SEALS & O RINGS		120
48	SEPARATOR TOP		12,276.00
49	SEPARATOR TOP		12,276.00
50	INNER CONE DRUM SECTION		1,488.00
51	INNER CONE DRUM SECTION		1,488.00
52	DEFLECTOR BLADES		1,404.00
53	DEFLECTOR BLADES		1,404.00
54	DEFLECTOR CONTROL ASSY		486
55	DEFLECTOR CONTROL ASSY		486
56	VENTURI VANE SET		120
57	VENTURI VANE SET		120
58	JOURNAL SPRING ASSY(BEARINGLESS)		7,692.00
59	JOURNAL SPRING ASSY(BEARINGLESS)		3,846.00
60	JOURNAL SPRING ASSY(BEARINGLESS)		11,538.00
61	OIL COOLER ASSY		1,260.00
62	FASTENERS SET FOR 623 BM		600
63	FASTENERS SET FOR 623 BM		600
64	OIL LEVEL & TEMP. GAUGE VAR:02(L=180)		21.6
65	WORM GEAR SET 27"(WGR,SFT,NUT&KEYS)623BM		4,200.00
66	WORM GEAR SET 27"(WGR,SFT,NUT&KEYS)623BM		4,200.00
67	TROLLEY WITH HOIST-5 TON (ELEC OPERATED)		2,000.00
68	RAW COAL FEEDER ITEMS FOR 623 BM		10,400.00
69	JOURNAL ASSY WITHOUT GRINDING ROLL		34,092.00
70	SERVOMESH SP320 (FIRST FILL OIL)		11,206.00
TOTAL			301,770.98

FORMAT FOR NO DEVIATION CERTIFICATE
(To be submitted in the bidder's letter head)

BHARAT HEAVY ELECTRICALS LIMITED,
Power Sector - Eastern Region,
Plot no 9/1, DJ Block, Sector – II, Salt Lake City,
Kolkata – 700 091

Sub	No Deviation Certificate.	
Job	Dismantling and R & M of Boiler & Aux, Turbine, TG set & Aux, Miscellaneous Equipment for 1x110 MW unit # 2 at Muzaffarpur TPS,KBUNL, Bihar.	
Ref	01	Tender no PSER:SCT:MUZ-S1351:12.
	02	BHEL's NIT, vide reference no PSER:SCT:MUZ-S1351:2804, dated 30-04-2012.
	03	BHEL's TCN-01, vide reference no PSER:SCT:MUZ-S1351:TCN-01, dated 08-05-2012.
	04	Other references (if any).

Dear Sirs,

With reference to above, this is to confirm that as per tender conditions, we have visited 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/ issued by you and in case of such 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. We hereby confirm our unqualified acceptance to all terms & conditions, unqualified compliance to technical specification, integrity pact (if applicable) and acceptance to reverse auctioning process.

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 in accordance with tender instructions and as per aforesaid references.

Thanking you,

Yours faithfully,

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