SCOPE OF WORK FOR BOILER AUXILIARIES

	WORK OF ERECTION, TESTING, COMMISSIONING, PERFORMANCE GUARANTEE TEST AND POST COMMISSIONING TRIAL RUN & HANDING OVER OF BOILER AUXILIARIES (FD & PA FANS, APH, AIR & FLUE GAS DUCTING, GATES & DAMPERS AND MILLS ETC.) FOR RENOVATION, MODERNIZATION & UPRATING (R, M & U) OF 110 MW UNIT NO. 7 TO 120 MW AT HARDUAGANJ TPS
1.0.0	BROAD SCOPE OF WORK: The **broad scope of work** of **Boiler Auxiliaries** includes, but is not limited to; following only and **any other associated works and any other associated equipments & systems** not specifically included in or excluded from the scope of work but essentially required for successful completion of work and guaranteed performance of the equipments & systems shall form integral part of the scope of work. Dismantling of existing equipments and systems shall be done by BHEL by engaging separate agency. However dismantling of any equipment, if required to be done as per site requirement for successful erection of new equipments and systems shall be in the scope of E&C sub-contractor.
1.0.1	**Tentative List** of **Equipments & Systems** covered in **Boiler Auxiliaries** is as per enclosed **Annexure – A1.**
1.0.2	**Tentative weight of materials** envisaged for erection for **Boiler Auxiliaries** is **2037 Approxi. (TWO THOUSAND THIRTY SEVEN) MT** as per details enclosed in **Annexure A2**.
1.0.3	The Contractor has to **obtain other statutory clearances and permissions from concerned authorities** as required for the work and they must observe and strictly adhere to all labor & industrial laws, and other statutory laws, acts & regulations as **applicable for the contract.**
1.0.4	**All cranes, consumables and T&Ps shall be arranged by sub-contractor as per Annexure- A3.** The Contractor has to provide all required skilled & semi-skilled **labors & technicians**, experienced **engineers & supervisors**, qualified **crane operators**, qualified **personnel for DPT, MPI, UT, Radiography, Heat Treatment, D-Metering, Transformer oil filtration M/C, oil testing kit, HV Megger and other tests** and other Manpower as given in **Annexure A3.**
1.0.5	The Contractor has also to provide **Ex OEM Personnel for supervision of work during erection, assembly, dismantling, testing & commissioning of:** Fans, APH, Mills, Ducts, Gates & Dampers, Commissioning and any other area as required. **Tentative** requirement is as per **Annexure – A3**. **If Ex OEM Personnel not provided by sub-contractor then BHEL will arrange the same at risk and cost of sub-contractor. The cost incurred by BHEL shall be deducted from sub-contrctor's RA bills including BHEL overheads.**
1.0.6	The Contractor has to provide all required **Tools & Plants** in sufficient quantities (T&Ps) including Trucks, Tractors, Trailers, Mobile Cranes , Hydras , Multi Sheave Pulley Blocks, Chain Pulley Blocks, Pulls & Lifts, Manual Winches, Slings, Eye Bolts, D-Shackles, Turn Buckles, Hoists, Hydraulic Jacks, Manual Jacks, Torque Wrenches (up to 750 KG – M), Alignment Clamps, Pipe Clamps, Welding Machines. Gas Cutting Sets, Arc Welding Sets, Spanners (up to 90 mm), Files, Grinders, Drill Machines, Taps & Dies, Sheet Cutting/Bending Machine, Heat Treatment Equipments, **Transformer oil filtration M/C, oil testing kits, HV Megger, Multimeter, Tong tester (AC & DC),** Water Washing Hose Pipes and Attachments and all other types of Tools & Plants. **Tentative** requirement is as per **Annexure – A3**.

1.0.7	The Contractor has to provide all required **Measuring & Monitoring Devices (MMDs)** in sufficient quantity including Master Level (0.02 mm/m), Spirit Level, Straight Edge, Water Level, Dumpy Level,, MPI Kit, UT Kit, Piano Wire, Plumb Line, Measuring Tape, Micro Meters (up to 500 mm), Scale, Vernier Callipers, D-Meters, Colum Alignment Checking Instruments, Dial Gauge, Tri Square and all other types of Measuring & Monitoring Devices (MMDs). **Tentative** requirement is as per **Annexure – A3.**
1.0.8	The Contractor has to provide all required **Consumables** including Welding Electrodes & Filler Wires (BHEL approved only), D.A., Oxygen, Argon, Nitrogen and other Industrial Gases, DPT & MPI Consumables, Blue Paste, Diesel, Petrol, Kerosene and other oil, Rust Remover Compound, Sealing & Jointing Compounds, Cloths, Emery Paper, Coir Rope, Paint and all other types of Consumables as per site requirement as per **Annexure – A3.**
1.0.9	The Contractor has to provide all **other materials and resources** including sleepers, planks, scaffolding materials, tarpaulin, plastic sheets, wire brushes and all other types of other materials & resources.
1.1.0	Proper Arrangement of House Keeping, strict compliance of Health Safety & Environment norms of BHEL, Day to Day cleaning of the entire working area and final area cleaning on completion of work including arrangement of water washing equipments and accessories is included in the Scope of Work of the Contractor.
1.1.1	All necessary arrangements are to be made by the contractor for transportation of materials including providing of all required Manpower and Cranes, Hydra cranes, Trucks, Trailers, Tractors and other means as per **Annexure- A3 and terms & conditions as per Annexure-B.**
1.1.2	All Necessary arrangements are to be made for handling, lifting, shifting, erection, placement, assembly, matching, alignment, supporting, welding, cutting, grinding, drilling, DPT, UT, MPI, Radiography, Heat Treatment and other associated works etc. for the materials to be erected/dismantled. Including providing of all required Manpower, T&Ps, MMDs, Consumables and Other Materials.
1.1.3	The contractor has to carry out Dismantling, Removal, Shifting of any obstructing structures, pipe lines, cables & cable trays, trench pipes, trenches, equipments, facilities etc. to facilitate the work and **restoration of the same on completion of work**. **Removal of existing power & control cables from entire specified Scope and returning to the UPRVUNL store/thermal premises. Laying/termination of new /old cables including supply of lugs, ferrules, glands, HV testing Kit etc is in scope of contract.**
1.1.4	All Necessary Preparation, Development, Barricading and Marking of the Area has to be made by the contractor for Storage, Fabrication, and Pre Assembly & Erection of the Materials.
1.1.5	The contractor has to carry out Erection of Scaffolding, Platforms, Approaches as required **including supply** of all scaffolding materials and Dismantling of the same on completion of work.
1.1.6	Identification & Receipt of Materials at Stores & their transportation from stores to site including Necessary shifting/removal of other materials stacked on the identified material, un packing of the materials, removal of any obstructions & hindrances etc.
1.1.7	Transportation of dismantled components, scraps & debris generated and other materials removed to disposal yard/stores on day to day basis. After completion of work, cleaning & shifting of all type of scrap from site to scrap yard and Transportation balance/surplus materials to store.

1.1.8	Marking, Dressing, Surface Preparation & Matching and other associated works of foundation and other necessary assistance to civil agency for casting of foundation and grouting of equipments.
1.1.9	Erection of new size tubular Air Heaters, new Air Heater columns & its associated structures, casings, supports etc. and necessary repair, rectification, refractory and other associated works.
1.2.0	Erection, Assembly, Alignment, Matching, Welding, Cutting, Grinding, Drilling, Connection, Testing and other associated works of Materials supplied for **Mills, Fans, APH Air & Flue gas ducting, Gates & dampers** and other various equipments & systems of **Boiler Auxiliaries** by various Units including any **mino**r rectification, modification, adjustment, fabrication, matching, machining etc. of the supplied materials (without any extra cost to BHEL). The list of equipments and systems as per Annexure A-1 is not exhaustive and comprehensive. Any other associated works or any other associated equipments & systems not specifically elaborated in the scope of work but essentially required for successful completion of work and commissioning & operation of the equipments as per site requirement is included in the Scope of work of the Sub-contractor.
1.2.1	Repair /Replacement of Ducting and associated structures between ESP Outlets to ID fan inlet shall be carried out by other agency.
1.2.2	DPT, MPI, UT & Heat Treatment of Critical welds and other components as per BHEL norms.
1.2.3	Any Modification, Dismantling, Assembly, Servicing and associated works in existing equipments, structures, assemblies, piping, supports, etc. as required for retrofitting of new materials.
1.2.4	Laying of Insulation, Refractory & Cladding as per BHEL norms including curing of the refractory.
1.2.5	Painting and Marking/Labeling of the structures, piping, equipments & other components as per BHEL norms. **Supply of paints** is included in the Scope of Work. The codes and standards applicable, preparation of surfaces, primer paint, finish paint, suggested color codes of painting shall be as per enclosed **Annexure – A4.**
1.2.6	Any other associated work and work of any other associated equipments & systems as per site requirement for successful completion of erection & retrofitting activities in all respects.
1.2.6	**Testing & Commissioning:**
1.3.0	Air/Gas Tightness Test of Boiler including installation of testing equipments, tapping points etc. and rectification of defects observed including replacement/re erection/rectification of components as required.
1.3.1	Testing and commissioning of all equipments & systems including installation of testing equipments, tapping points etc. and rectification of defects observed including replacement/re erection/rectification of components as required.
1.3.2	Trial operations of all equipments & systems and rectification of defects observed including replacement/re erection/rectification of components as required.
1.3.3	Necessary assistance for other Tests of Equipments & Systems, Boiler Light Up and other pre commissioning & commissioning activities and rectification of defects observed including replacement/re erection/rectification of components as required.

	Performance Guarantee Test, Post Commissioning Trial Run and Handing Over:
1.3.4	Necessary assistance for Performance Guarantee Test including installation of testing equipments, tapping points etc. and necessary adjustments/rectification as required.
1.3.5	Necessary assistance for Post commissioning Trial operations of 14 (Fourteen) days, on full load and rectification of defects observed including replacement/re erection/rectification of components as required.
1.3.6	Handing Over of the Unit to the customer after successful completion of period of Post Commissioning Trial Operations.
1.3.7	All works are to be carried out as per drawings and as per instruction of BHEL Engineer and all necessary adjustments, setting, alignment, testing and other associated works shall be carried out as per drawings and as per instruction of BHEL Engineer.
1.3.8	**EXTRA WORKS**
1.3.8.1	All rectifications/ modifications, revamping, and reworks required for any reasons not due to the fault of the contractor, or needed due to any change in deviation from drawings and design of equipments, operation/ maintenance requirements, mismatching, or due to damages in transit, storage and erection/ commissioning, and other allied works which are not very specifically indicated in the drawings, but are found essential for satisfactory completion of the work, will be considered as extra works.
1.3.8.2	Extra works arising on account of the contractor's fault, irrespective of time consumed in rectification of the damage/loss, will have to be carried out by the contractor free of cost. Under such circumstances, any material and consumable required for this purpose will also have to be arranged by the contractor at his cost.
1.3.8.3	All the extra work should be carried out by a separately identifiable gang, without affecting routine activities. Daily log sheets in the pro-forma prescribed by BHEL should be maintained and shall be signed by the contractor's representative and BHEL engineer. No claim for extra work will be considered/ entertained in the absence of the said supporting documents i.e. daily log sheets. Signing of log sheets by BHEL engineer does not necessarily mean the acceptance of such works as extra works.
1.3.8.4	BHEL retains the right to award or not to award any of the major repair/ rework /modification/rectification/fabrication works to the contractor, at their discretion without assigning any reason for the same. The decision of BHEL site engineer w.r.t. extra work shall be final and binding upon the sub-contractor.
13.8.5	After eligibility of extra works is established and finally accepted by BHEL engineer/designer, payment will be released on competent authority's approval at the following rate: **MAN-HOUR RATE FOR ELIGIBLE EXTRA WORKS**: Single composite average labour man-hour rate, including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, consumables for carrying out any major rework/ repairs/ rectification/ modification/ fabrication as certified by site as may arise during the course of erection, testing, commissioning or extra works arising out of transit, storage and erection damages, payment, if found due will be at **Rs. 60/- per man hour.**
1.3.8.6	The above composite labour man hour rate towards extra works shall remain firm and not subject to any variation during execution of the work Rate revision, Over Run Charges/compensation etc will not be applicable due to extra works.
1.3.9	Laying of instrument air, service air and cooling water piping etc for different equipments wherever required in entire Boiler, fuel system, APH, Ducts, Fans, and Mills areas.

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1.4.9	Laying of instrument air, service air and cooling water piping etc for different equipments wherever required in entire Boiler, fuel system, APH, Ducts, Fans, and Mills areas.
1.5.0	All temp, pressure, flow sensing devices and tapping points(Up to root valve) for air /steam /oil /water required for the boiler shall be covered under the scope of work.
1.5.1	The erection of platforms wherever required for approaching to the different types of instruments, pneumatic actuator and electrical actuator etc shall be covered under the scope of work.
2.0.0	**SPECIAL TERMS & CONDITIONS :-**
2.0.1	**Liquidated Damages:**
a)	**For Delay:** **Completion Period** shall be **150 Days** from the date of commencement of work to Commissioning of the Unit. **Penalty/ LD for Delay attributable to sub-contractor** shall be as per **0.5% of the contract value per week** or part thereof subject to **maximum of 10%** of the contract value.
2.0.2	**OVERRUN COMPENSATION**
2.0.2.1	Over Run Compensation (ORC) is payable by way of rate revisions for periods beyond original contract period due to reasons not attributable to sub-contractor, subject to the following terms and conditions:
2.0.2.2	Rates shall be increased by 10% for the first twelve months of one or more extensions beyond original contract period. For the next twelve months of further extensions if any, rates shall be increased as above by 10% over the previous twelve months, and similarly for each subsequent twelve months extension.
2.0.2.3	The amount of increase payable per month due to rate revisions is subject to a minimum of Rs.1,00,000/- per month and a maximum of Rs 10,00,000/- per month.
2.0.2.4	Should there be any 'Time extension' for reasons attributable only to the contractor, then the work shall be executed by the contractor at the rates applicable for the period the work was planned.
2.0.2.5	Payment of ORC shall be regulated as follows: i) Contractor is entitled to Over Run Compensation (ORC) only for the portion of backlog attributable to BHEL. ii) 50% of the compensation as per clause 2.0.2.3 is allocated for deployments of resources agreed as per the joint programme drawn vide 2.0.2.4. Payment shall however be based on the actual deployment of resources for the month as certified by BHEL, as per weightages assigned therein iii) 50% of the compensation as per clause 2.0.2.3 is allocated for achieving of planned progress agreed as per the joint programme drawn vide 2.0.2.4. Payment shall be on pro rata basis for actual achieved quantities iv) Total Over Run Compensation shall be limited to 10% of the executed contract value as certified in Final Bill. For this purpose executed contract value excludes PVC, ORC, Supplementary/Additional Items and Extra Works done on Manday rate basis.
2.0.2.6	Contractor shall not be entitled for any Over Run Compensation (ORC) for the portion of backlog attributable to the contractor. Such works shall be executed at the rates applicable for the period the work was planned.

2.0.4	Space for Office, Dark Room and Stores shall be provided to the sub-contractor and the Sub-contractor has to build and furnish office, dark room & stores at their own cost. The sub-contractor shall arrange for sufficient nos. of flood lights and other arrangement for ensuring round the clock work. Necessary co ordination with stores and other agencies shall be in the scope of the sub-contractor.
2.0.5	The sub-contractor shall submit daily progress report and attend review meeting with BHEL on day to day basis.
2.0.6	The warranty for the equipment is for a period of **12 (Twelve) Months** from Handing Over of the Unit of Performance Guarantee Test which ever is later and all defects observed during this period shall be attended by the Sub-contractor free of cost.
2.0.7	The sub-contractor shall arrange accommodation, transport, medical, sanitary, safety and other arrangements for all Manpower at their own cost.
2.0.8	The sub-contractor must maintain proper system of documentation for Quality, Safety, HSE and other aspects so as to fulfill the requirement of ISO, OHSAS, 5S, SA 8000 and other National/International Standards.
2.1.0	**TERMS OF PAYMENT:**
a)	**85 (Eighty Five) %** of the contract value along with corresponding service tax as **Monthly Progressive Payments** on **pro rata basis (Rate per MT)** for **actual completed work**.
b)	**15 (Fifteen) %** of the contract value along with corresponding service tax as **Mile Stone Payments** on **pro rata basis (Rate per MT)** for **actual completed work** , namely, i. **10 (Ten) %** on completion of Mile Stone ii) **2** % on PG test and iii) **3 %** on handing over the unit to customer. **Above payments shall be released after adjustment of CV based on the actual work carried out.**
c)	**Rate per MT** shall be further subdivided as follows for purpose of measurement: a. **Monthly Progressive Payments** on **pro rata basis:** i. **5 % for transportation of materials to site for erection,** ii. **35 % for erection of materials in position,** iii. **45 % for matching, alignment, welding, supporting, connection, final assembly of materials erected.** **b. Mile Stone Payments** on **pro rata basis:** **i. 2% On completion of Trial runs of Fans, Mills & APH.** **ii. 1% On completion of Boiler Light-Up** **iii. 1% On completion of Air Tightness Test.** **iv. 1% On Providing facilities (Clause no. 2.4) to BHEL** **v. 5% for providing Ex-BHEL as per annexure A3** **vi. 2% for completion of PG test.** **vii. 3% for Handing Over of Unit.**
d)	**Security Deposit** shall be released only on completion of warranty period of 12 Months and fulfillment of all contractual obligations.
e)	All payments shall be subject to statutory deduction as per rule.
f)	Necessary documents as specified in GSCC shall be submitted with bill.
g)	All payment shall be made by Electronic Fund Transfer and necessary Bank Details shall be furnished by the sub-contractor.

2.2.0	TAXES, DUTIES AND OCTROI CHARGES
2.2.1	**TDS under Income Tax, Sales Tax, Vat etc,** if any, shall be deducted at prevailing rates on gross invoice value from the running bills unless Exemption Certificate from appropriate Authority / Authorities is furnished.
2.2.2	**Price quoted shall be inclusive of all taxes, duties except service tax.** The service tax, as legally leviable & payable by the sub-contractor under the provisions of applicable law/act, shall be paid by BHEL as per sub-contractor's bill. However, sub-contractor shall have to submit proof of service tax deposited by them immediately after the deposit but not later than the next bill submitted after the due date of deposit. The sub-contractor shall furnish proof of Service Tax registration with Central Excise Division covering the services covered under this contract. Registration should also bear endorsement for the premises from where the billing shall be done by sub-contractor on BHEL for this project.
2.2.3	Sub-contractor shall get his organization registered with concerned sales tax/VAT authorities within 15 days of award of this contract, if applicable. The delay on this account and delay in bringing the material shall be to sub-contractor's account and no extension of time shall be allowed on this account. The sales tax/VAT registration for this sub-contractor shall be forwarded to BHEL within 30 days from the date of LOI. In case the sub-contractor is already registered for sales tax/VAT with Govt. Authorities he must quote his registration no, while submitting their tender.
2.2.4	Sub-contractor has to make his own arrangement at his cost for completing the formalities, if required, with Sales Tax Authorities, for bringing his materials, plants and equipment at site for the execution of the work under this contract. **No road permit shall be issued by BHEL for sub-contractor's materials/equipments.**
2.2.5	OCTROI, if any, payable on BHEL's consignments will have to be initially paid by the sub-contractor and necessary reimbursement claimed from BHEL duly supported by documentary proof. Whenever the amount payable in one particular case is more than Rs. 5000/-, the sub-contractor may request BHEL well in time to issue cheque / draft in favor of authorities.
2.3	Other Terms & conditions shall be as per GSCC. In case of any conflict between the special terms and conditions specified in the scope of work and GSCC attached, the conditions of scope of work shall prevail.
2.4	**Facilities to be provided by Sub-contractor to BHEL**
	The Sub-contractor shall provide 1 Laptop and 1 Desk Top Computer of latest configuration along with 3-in-1 printer (PSC printer), UPS, Data card for accessing internet (Modem), other peripherals, accessories, Stationary & cartridges and one mobile phone with rental & call charges **Exclusively for BHEL use** from start till completion of work. The Sub-contractor shall also provide one qualified computer operator, one office assistant and 1 attendant for BHEL Site Office/colony on round the clock basis from start till completion of work.

ANNEXURE – A1

TENTATIVE LIST OF EQUIPMENTS & SYSTEMS COVERED IN BOILER AUXILIARIES

Equipments & Systems covered in **Boiler Auxilliaries** includes erection/retrofitting and other associated works of, but not limited to, following:

1.0	**FD FANS**
1.1	2 Nos of FD fans with blade pitch control and anti friction bearings with forced oil lubrication system
1.2	Fan with blade pitch control.
1.3	Rigi-flex coupling.
1.4	Inlet silencer with acoustic insulation.
1.5	Anti-friction bearing.
1.6	Forced oil lubrication system.
1.7	Foundation fasteners for fans.
1.8	Field instruments (RTD's) for temperature detection.
1.9	Platform along with stairs, monorail with motorized trolley fitted with suitable chain pulley to facilitate proper & fast maintenance on the fan side & motor side.
2.0	**PA FANS**
2.1	2 Nos of PA fans with inlet damper control and sleeve bearings with forced oil lubrication system
2.2	Fans with inlet damper control.
2.3	Pin type-flexible coupling
2.4	Inlet silencer with acoustic insulation.
2.5	Sleeve bearings
2.6	Forced oil lubrication system.
2.7	Foundation fasteners for fans
2.8	Field instruments (RTD's) for temperature detection.
2.9	Platform along with stairs, monorail with over head motorized geared trolley easy maintenance of PA fans.
3.0	**SEAL AIR FANS**
3.1	2 Nos of seal air fans with manually operated damper and anti friction bearings with sump oil lubrication system
3.2	Pin type-flexible coupling
3.3	Antifriction bearings with sump oil lubrication
3.4	Foundation fasteners for fans
3.5	Field instruments (RTD's) for temperature detection.
4.0	**AIR PRE-HEATERS**
4.1	Tubular Air Pre Heaters for Secondary Air Pre Heater (SAPH) and Primary Air Pre Heater (PAPH).
4.2	Structures for III Pass.
4.3	Foundation Materials.
4.4	Steam Coil Air Pre Heater (SCAPH).
4.5	Expansion Bellows.
4.6	Insulation Materials.
4.7	Inspection and Necessary Rectification/Repair of existing Flue Gas Air Pre Heater and its associated structures, supports, insulation etc.
5.0	**AIR & FLUE GAS DUCTING, GATES & DAMPERS**
5.1	Air Ducting from FD Fan to SCAPH and AH along with expansion joints and supports.
5.2	Air Ducting from AH to wind box along with supports, expansion joints.

5.3	Wind box ducting
5.4	PA Ducting from PAH to mills including tempering air ducting
5.5	Hot Air Inter connection ducting after AH
5.6	Flue Gas Inter connecting Ducting
5.7	Flue Gas ducting from Economizer to AH with supports, expansion pieces.
5.8	Flue Gas Duct from AH to ESP Inlet with supports, expansion pieces
5.9	Ducting between ESP outlet to ID fan inlet.
5.10	Ducting between ID fans and chimney.
5.11	All expansion of metallic type.
5.12	Gates & Dampers with actuators located in various ducts as per requirement.
5.13	Damper with actuator in Hot Air Interconnection Ducting
5.14	Materials for repair of ducting between ESP outlets to ID fan Inlet.
5.16	New and Old ESP Inlet Gate with actuator
5.17	Old ESP Outlet Gate with actuator.
5.18	Foundation Materials for above Ducting.
5.19	Insulation & Outer Casing for above Ducting.
5.20	Hangers & Supports for above ducting.
5.21	Platforms and Approaches for Ducting.
6.0	**MILLS**
	The existing 03 nos of drum mills will be replaced with 04 nos of XRP 803 bowl mills. Three mills will be working and 4th mill be as standby. The existing three bunkers will be connected to three new mills. One more bunker is to be added in the available space for 4th mill.
	The Mills consists of following sub-assemblies:
6.1	Withdrawal type mill drive assembly with external lube oil system
6.2	Bowl hub, bowl and vane wheel assembly
6.3	Mill side and liner assembly
6.4	Separator body & tall top classifier assembly.
6.5	Roller journal assembly.
6.6	Mill discharge valve & multiple port outlet assembly
6.7	Tramp iron & spout valve assembly.
6.8	Pyrite hopper & isolation gate valve assembly.
6.9	Mill handling arrangement as part of tools & tackles.
6.10	MDV (Flap Type) Assy.
6.11	Mill motor coupling.
6.12	Seal Air Header assy.
6.13	Foundation Fastener Assy.
6.14	4 Nos. HALF HP 803 BOWL MILLS & MOTORS with Foundation materials.
6.15	4 Nos. FEEDERS ASSEMBLIES with Foundation materials and associated supporting structures.
6.16	Mill Plant Auxiliaries
6.17	Mill Maintenance Floor
6.18	Mill Handling Structures & Equipments.
6.19	Providing assistance during clean air flow test of bowl mills.
7.0	**ANY OTHER ASSOCIATED EQUIPMENTS & SYSTEM OF BOILER AUXILIARIES**

ANNEXURE – A2

TENTATIVE WEIGHT OF MATERIALS TO BE ERECTED FOR BOILER AUXILIARIES

APH, FANS and GATES & DAMPERS

S.No.	PG MA	TOTAL DU	Description	Design Wt (Kg)
1	50221	74	VERTICAL TURN TYPE AH,	260373.236
2	50421	50	VERTICAL PRY AH	77004.226
3	50620	1	SCAPH	2400
4	55011	16	FD FAN FOUNDATION MATL	964.324
5	55017	4	FD FAN C&I ITEMS	37
6	55213	60	1 REACT FD FAN	13185.134
7	55810	0	AXIAL FDFAN COUPLING	700
8	55910	0	AXL FDFAN ACCESSORY	4400
9	55911	33	AXIAL FDFAN SILENCER	18546.396
10	56000	0	TOOLS & FIXTURE/CONT	150
11	56021	0	ID FAN FOUNDATION MATL	1900
12	56031	15	PA FAN FOUNDATION MATL	890.28
13	56037	4	PA FAN C&I ITEMS	37
14	56077	2	SEAL AIR FAN C&I ITEMS	9
15	56135	68	PA FAN BC1S2000-2500	13451.458
16	56171	56	SEALAIRFAN BCSS<1000	6010.728
17	56226	19	IDFAN BCDS2500-3150	36924.456
18	56670	0	IGNITR FAN MOTOR	800
19	56830	0	RADL PAFAN COUPLING	150
20	56870	0	SEAL AIR FAN COUPLING(	50
21	56930	0	RAD PAFAN ACCESSORY	2300
22	56931	39	PA FAN SILENCER	20449.952
23	57013	3	DAMPERS BET FD FAN & A	4719.626
24	57033	2	SA SCAPH INLET DAMPER	2222.688
25	57063	2	SA SCAPH OUTLET DAMPER	2218.038
26	57110	1	GUILLOTENE GATE PA FAN	4706.008
27	57143	1	DAMPER COLD AIR BUS(TE	924.352
28	57160	1	COLD AIRGATE, AIRBUS TO MILL	4000
29	57209	4	MTG BKT FOR CL DAMPER	2718.5
30	57270	6	GUILLOTENE GATE DUCT T	7110.184
31	57273	1	DAMPER BOILER OUTLET	1925.688
32	57403	1	DAMPER PRIMARY GAS OUT	2886.796
33	57423	1	DAMPER CASCADE EVOP GA	1636.123
34	57466	0	PLATFORMS AND LADDERS	18000
35	57470	1	EP OUTLET GATE	7062.024
36	57480	1	ID FAN INLET GATE	7062.024
37	57491	0	BLOWER WITH MOTOR	600

38	57577	0	ELECT ACTUATOR FOR GAT	3600
39	57988	0	DUCTS COMMISSIONING SP	20
40	77608	12	GAS DIST. ASSY	4214.541
41	77650	35	INLET-OUTLET FUNNEL	33274.5
42	77664	0	MISCELLANEOUS ITEMS	7000
			Total Weight	**576634.282**

MILLS

S. No.	PGMA No.	Description	Qty per Mill	Wt. per Unit (Kgs)	Qty for 4 Mills	Total Wt. (Kg)
1	61080	Journal Journal Assy	3	3637	12	43644
2	61180	Mill Drive & Bowl Assy (Withdrawal type) with External Lube oil system	1	23760	4	95040
3	61280	Mill side & liner assy	1	13350	4	53400
4	61380	Classifier (Seperator) Assy	1	16740	4	66960
5	61480	MDV (Flap Type) Assy	1	3050	4	12200
6	61580	Tramp iron Spout Assy	1	110	4	440
7	61680	Pyrite Hopper Assy.	1	610	4	2440
8	61780	Mill motor coupling	1	220	4	880
9	67400	Seal Air Header assy	1 Set	2120	1 Set	2120
10	61880	Tools & Accessories with Mill Handling System (Per unit)	1 Set	15950	1 Set	15950
11	61980	Foundation Fastener Assy	1 Set	5980	4 Set	23920
12	61988	Commissioning Spares (per unit)	1 Set	100	1 Set	100
13	61880	Lube Oil (First Fill/Unit)	1 Unit	7776	1 Unit	7776
		Total				**324870**

AIR & FLUE GAS DUCTING

S.No	PG	Description	Qty.	Total weight (Kg)
1.	48	Complete replacement of all the air & gas ducting, expansion joints and supports with new one.		485700
2.	48	ID system ducting, structure (Blr to ESP and ID fan to chimney)		650000
		Total		**1135700**

Total Weight (Boiler Auxiliaries):- 576634.282 + 324870 + 1135700 = 2037204.282 kgs = 2037 MT (Approxi)

ANNEXURE – A3

TENTATIVE REQUIRMENT OF MANPOWER & OTHER RESOURCES

1.0	**GENERAL MANPOWER**	**Nos.**
1.1	Site In charge	1
1.2	Engineer	5
1.3	Supervisor	10
1.4	Store Keeper	3
1.5	HP Welder	2
1.6	Structural Welder/LP Welder	12
1.7	Gas Cutter	6
1.8	Grinder Man	10
1.9	Mill Wright Fitter	12
1.10	Pipe Fitter	2
1.11	Structural Fitter	10
1.12	Junior Fitter	10
1.13	Electrician	5
1.14	Junior Electrician	5
1.15	Sarang	5
1.16	Rigger	50
1.17	Mason	2
1.18	Sheet Fabricator	10
1.19	Lagger	50
1.20	Helper	100
1.21	Painter	20
	Total	**330**
2.0.0	**Ex OEM /NTPC/SEB Experts**	**Man X Month**
2.0.1	Fans	2X5
2.0.2	Mills	1X5
2.0.3	APH	1X5
2.0.4	Ducts, Gates & Dampers	2X5
2.0.5	Commissioning	2X1
		32 Man Months
3.0	**TESTING TEAM**	**Teams**
3.1	Radiography	--
3.2	Heat Treatment/SR	1 Team
3.3	Ultrasonic Testing	1 Team
3.4	DP Test	1 Team
4.0.0	**T&Ps, MMDs, Consumables & Other Materials**	**Boiler Auxiliaries**
4.0.1	Crawler /Mobile Crane (75 T)	1
4.0.2	Mobile Crane (20 T)	2
4.0.3	Hydra Crane (12/14 T)	2
4.0.4	Tractor & Trailer 15/20 T	2
4.0.5	Truck – 9 T	3
4.0.6	Derrick Structure	As required
4.0.7	Electric Winch 15 T/10 T/5 T	1/2/3
4.0.8	Multi Sheave Pulley Block – 60 T/100 T	As required
4.0.9	Passenger Cum Goods Hoists	As required
4.1.0	Hydraulic Jacks 100 T/50 T/25 T	1/1/2
4.1.1	Chain Pulley Block – 10 T/5 T/3 T	2/5/8

4.1.2	Heat Treatment Equipment	As required
4.1.3	UT Kit	1
4.1.4	Welding Generator	10
4.1.5	Welding Transformer	10
4.1.6	Torque Wrench 400 KGM/800 KG M	1/2
4.1.7	Gas Cutting Set	10
4.1.8	TIG Welding Set	1
4.1.9	Arc Welding Set	15
4.2.0	Inside/Outside Micrometer (up to 500 mm)	2
4.2.1	Micrometer 25/50/300	4/4/4
4.2.2	Magnetic Base Dial Gauge	6
4.2.3	Electrode Baking Oven	1
4.2.4	Portable Oven	10
4.2.5	Drum Lifting Arrangement	NA
4.2.6	Sleepers	50
4.2.7	Scaffolding Materials	As required
4.2.8	Water Washing Equipments	1 Set
4.2.9	Master Level – 0.02 mm/m	6
4.3.0	Spirit Level	6
4.3.1	Water Level	4
4.3.2	Dumpy Level	2
4.3.3	Column Alignment Checking Device	2
4.3.4	Piano Wire	As required
4.3.5	Set of Spanners up to 90 mm	As required
4.3.6	Welding Electrodes & Filler Wires	As required
4.3.7	DA, Oxygen, Argon Gas	As required
4.3.8	DPT Kits	As required
4.3.9	Drilling Machines	As required
4.4.0	D-shackles, wooden planks, Slings, Huck-chuks etc.	As required
4.4.1	Other T&Ps, MMDs , Consumables & Materials	As required

Note: The above list is only tentative and does not list out each and every item or grade of manpower or the quantity thereof. The Sub-contractor has to deploy all Manpower, T&Ps, MMDs, Consumables and other materials as required to complete the entire scope of work. The deployment of cranes shall be as per site requirement.

ANNEXURE – A4

SPECIFICATION OF PAINTING WORK

1.0	The following Indian Standards may be referred to for carrying out the painting job: IS - 1303, 2379, 1477, 2524, 2395, 2338, 6278, 3140, 158, 2074, 104, and 2932.
2.0	All surfaces to be painted shall be thoroughly cleaned of all grease, oil, loose mill scale, dust, rust and any other foreign matter by mechanical cleaning with power tool, scrapping with steel wire brushes, and sand scrapping with wire brush/emery paper as per requirement. Cleaning with solvents shall be adopted only after approval of the customer.
3.0	After the surface is prepared, one coat of Zinc Phosphate primer conforming to IS: 2074 shall be applied. After first coat is dried up completely, second coat of red oxide primer shall be applied by brushing to ensure continuous film. The **dry film thickness** of each coat shall be **minimum 25 microns**.
4.0	Synthetic enamel paint conforming to IS: 2932 shall be used for finish coats. The color/shade shall be as approved by the customer. After cleaning the dust on the dried up primer, first coat of synthetic enamel shall be applied. After this first coat dries up hard, the surface should be wet scrubbed cutting down to smooth finish and ensuring that at no place the first coat is completely removed. After applying second coat, allowing the water to get evaporated completely, third finish coat of painting shall be applied.
5.0	For all electrical equipment, powder coating shall be done as per the relevant standard.
6.0	**Painting** and **Marking/Labeling of the materials erected. Supply of paints is included in the Scope of Work of the Sub-contractor.**

Annexure 'B'

Terms and Conditions for Cranes Provided by Sub contractor

1.0	All T&Ps required for successful execution and completion of work shall be arranged and provided by the sub-contractor. Indicative lists of T&Ps and other inputs be arranged by the sub-contractor are given **as per Annexure-3.** The subcontractor should ensure that these are in good working condition. In the event of the failure of subcontractor to bring necessary and sufficient T&Ps and other inputs, BHEL will be at liberty to arrange the same and hire charges as applicable shall be deducted from subcontractor's bill. Decision of BHEL in this regard shall be final and binding on subcontractor.
2.0	The subcontractor shall arrange, at his own cost fuel and other consumables for the operation of the Cranes. **(Operator for all the cranes, helpers, fuel and other consumable shall be provided by sub-contractor within the final accepted rates).** All lubricants for these cranes such as mobil oil, gear oil, brake oil, hydraulic oil, torque converter oil and grease will be provided by sub-contractor free of cost.
3.0	The day to day maintenance of Cranes should be carried out by subcontractor as per manufacturer's maintenance schedule at his cost. These shall be maintained in good working condition during the entire period of use.
4.0	The subcontractor at his own cost shall arrange all supervision and labour required for maintenance of cranes. For attending breakdowns, the contractor shall arrange for labour. Minimum one mechanic and two helpers shall be exclusively marked for the above work.
5.0	For cranes, replacement of filter and repair of batteries, self, dynamo shall be the responsibility of the subcontractor. ***(The cranes shall be fitted with a set of new batteries initially)***
6.0	Increasing / shortening of the crane boom to suit work requirements shall have to be arranged by the indenting subcontractor at his cost. All necessary manpower tools, support, consumables, illumination etc. will have to be arranged by subcontractor at his cost.