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THE FOLLOWING UNUSED BOILER IS AVAILABLE FOR SALE WITH US WITH IMMEDIATE DELIVERY

1 No. 110 TPH UNUSED, Partially Erected, CETHAR VESSELS LTD. (2009/10) make, Bagasse and Coal fired CFBC type Steam Boiler, having the Following Technical Specifications:

TECHNICAL SPECIFICATIONS

BOILER	1 No.	
Make		Cethar Vessels (P) Ltd.
Year		2010
Capacity		110 TPH
Type		CFBC
SH Steam Pressure at MSSV		109 ATA
SH Steam Temperature at MSSV		510°C (545 ±5°C without refractory in Wingwall SH)
Feed Water Temperature at Economiser Inlet		210°C
Fuel Used		30 % Distillery Effluent +40% Bagasse +30% Imported Coal
Fuel Quantity		Effluent 20,000 kg/hr Bagasse 17,075 kg/hr Imported Coal 4005 kg/hr

BOILER FEED WATER PUMP	3 Nos.	
Type		HGC 3/16
Make		KSB
Sr. No.		061 8374, 8375, 8376 -752- 2007
Quantity		87.9 m3 /hr
Head		1560 M

Speed		2980 RPM
Motor Rating		499.90 kW
ARC VALVE		
Size		3"
Rating		PN1500 lbs
Material		A105
Order		K06-1141.1-3 0618376
		K06-1141.1-2 0618375
		K06-1141.1-1 0618374
Type		TDM 108 UVW-CS
Year		2007

LP DOSING PUMP	2 Nos.	
Make		Welore Controlled Volume Pump, Ahmadabad
Model		WH 1125/12
Stroke		100 Stroke / min
Flow		10 LPH
Pressure		6 kg/cm ²
Version		V4

HP DOSING PUMP	2 Nos.	
Make		Welore Controlled Volume Pump, Ahmadabad
Model		WH 1750/14
Stroke		200 Stroke / min
Flow		40 LPH
Pressure		136 kg/cm ²
Version		V4

SA FAN	2 Nos.	
Flow		11.03 m ³ /sec
Pressure		877 mm OF WC
Motor Rating		160 kW
Motor Speed		1480 RPM
Operating Temperature		50°C
Casing Orientation		CW -2
Lubrication		Grease
Motor Frame Size		315 L

PA FAN	2 Nos.	
Flow		

Head Developed		1570 mm of WC
Operating Temperature		50°C
Motor Rating		250 kW
Motor Speed		1480 RPM
Casing Orientation		ACW -10
Lubrication		Oil
Motor Frame Size		1 LAB 315

ID FAN	2 Nos.	
Flow		43.90 m ³ /sec
Pressure		460 MM of WC
Model		CS-01 22B
Motor Rating		275 kW
Speed		980 RPM
Frame Size		1A 8355

DEAEARTOR	1 No.	
Make		Cethar Vessels Ltd, Trichy.
Design Pressure		3 kg/cm ² & Full Vacuum
Capacity		140 m ³ /hr
Storage Capacity		44 m ³
Operating Pressure		2.75 ATA
Type		Spray Cum Tray

FEED STORAGE TANK	1 No.	
Make		CETHAR VESSELS LTD, TRICHY.
Design Pressure		1 kg/cm ²
Storage Capacity		60 m ³
Operating Pressure		0.5 kg/cm ²

SAFETY VALVES	3 Nos.	
Make		Tyco Sanmar, Virali Malai.

DRUM SAFETY (RIGHT)		
Model		2 J2 6 HCI-86W – IBR – SPL
Flow Capacity		55191 kg / Hr
Set. pr		126 kg / cm ² (g)
Back pr.		ATM
CDSP		126 kg / cm ² (g)
Assy. No		57265 – 005 – 0000

DRUM SAFETY (LEFT)		
Model		2 J2 6 HCI-86W – IBR – SPL
Flow Capacity		56928 kg / hr
Set. Pr		130 kg / cm2 (g)
Back Pr.		ATM
CDSP		130 kg / cm2 (g)
Assy. No		57265 – 005 – 0000
Over Pr.		5%

SUPER HEATER SAFETY		
Flow Capacity		27500 kg/Hr

ELECTRO MAGNETIC SAFETY		
Model & Sr. No		2.5 x 4 HPV-ST-79W-IBR
Flow Capacity		24229 kg / hr
Set.Pr		115.5 kg /cm2 (g)
Tag No		PEPSV 1103
Assy. No		57222 – 000 – 0000
CDSP		115.5 kg / cm2 (g)

MGF BLOWER	2 Nos.	
Make		EVEREST BLOWERS,PUNE.
Model		M 5125
Capacity		4.6 m ³ /min
Pressure		4000 MMWC
Speed		1340 RPM
S.No.		EB 08031926 &EB 08031927

MB BLOWER	2 Nos.	
Make		EVEREST BLOWERS,PUNE.
Model		M 5125
Capacity		4.3 m ³ /min
Pressure		4000 MMWC
Speed		1280 RPM

CONVEYORS		
CONVEYOR		CBC – 1

Capacity		125 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Maker		MRF
Gear Box Make		Greaves (Premium)
Make		Greaves (Premium)
Model		H2 160
Ratio		23.21
Hold Back		YES (RHB)
Motor Rating		22 kW
CONVEYOR		CBC – 1A
Capacity		125 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Make		MRF
Make		Greaves (Premium)
Model		H2 140
Ratio		23.11
Hold Back		YES (RHB) , P2/ACW
Motor Rating		5.5 kW
CONVEYOR		CBC – 2
Capacity		75 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Make		MRF
Gear Box Make		Greaves (Premium)
Model		H3 140
Ratio		31.41
Hold Back		YES (RHB)
Motor Rating		5.5 kW
CONVEYOR		CBC – 3
Capacity		75 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Make		MRF
Make		Greaves (Premium)
Model		H3 160
Ratio		31.41
Hold Back		YES (RHB)
Motor Rating		15 kW
S. No		HGF 016831
CONVEYOR		CBC – 4
Capacity		75 TPH
Type Of Belt		N/N , 315/3 , Gr M24

Belt Make		MRF
Gear Box Make		Greaves (Premium)
Model		H3 140
Ratio		31.41
Hold Back		YES (RHB)
Motor Rating		3.7 kW
CONVEYOR		CBC – 5
Capacity		75 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Make		MRF
Gear Box Make		Greaves (Premium)
Model		H3 140
Ratio		31.41
Hold Back		YES (RHB)
Motor Rating		11 kW
CONVEYOR		CBC – 6
CAPACITY		75 TPH
Type Of Belt		N/N , 315/3 , Gr M24
Belt Make		MRF
Gear Box Make		Greaves (Premium)
Model		H3 140
Ratio		31.41
Hold Back		YES (RHB)
Motor Rating		7.5 kW
CONVEYOR		10 (TC – 1)
Capacity		80 TPH
Type		Bushed Roller With As2 Swivel Attachment On Both Chain At Every Fourth Link
Make		T.I.DIMOND
Make		Greaves (Premium)
Model		H3 280
Ratio		47.11
Hold Back		YES (RHB)
Motor Rating		30 kW
CONVEYOR		9 (TC – 2)
Capacity		80 TPH
Type		Bushed Roller With As2 Swivel Attachment On Both Chain At Every Fourth Link
Make		T.I.DIMOND
Make		Greaves (Premium)

Model		H3 250
Ratio		52.1:1
Hold Back		YES (RHB)
Motor Rating		45kW
CONVEYOR		B-1
Capacity		
Type of Belt		N/N , 315/3 , Gr M24
Belt Maker		MRF
Make		Greaves (Premium)
Model		H3 140
Ratio		38.4:1
Hold Back		No
Motor Rating		45kW
CONVEYOR		SC – 2
Capacity		80 TPH
Type		Bushed Roller With As2 Swivel Attachment On Both Chain At Every Fourth Link
Make		T.I.DIMOND
Gear Box Make		Greaves (Premium)
Make		Greaves (Premium)
Model		H3 250
Ratio		52.11
Hold Back		NO
Motor Rating		30 kW

VIBRATING FEEDER	VF1	
Make		Electro Magnetic Industries, Gujarat.
Capacity		125TPH
Size		750 x 1500 MM LONG
Type		Liner Motion Electro-Mechanical Vibro Feeder Fitted With Unbalanced Motor
Type Of Drive		TROUGH UNBALNCED MOTOR
Mounting		Suspended
Frequency Of Vibration		1460RPM
Stroke / Amplitude		4MM / 2MM (Normal)
Motor Rating		2 x 1.1 kW
VIBRATING FEEDER	VF2	
Make		Electro Magnetic Industries, Gujarat.
Capacity		75 TPH
Size		750 x 1500 MM LO

Type		Liner Motion Electro-Mechanical Vibro Feeder Fitted With Unbalanced Motor
Type of Drive		Trough Unbalanced Motor
Mounting		Suspended
Frequency of Vibration		1460RPM
Stroke / Amplitude		4MM / 2MM (Normal)
Motor Rating		2 x 1.1 kW
VIBRATING FEEDER	VFU - 1215	
Make		TECHPRO SYSTEMS, In Technical Collaboration With PEY TEC , WEYER , AUSTRIA.
Size		1200 x 1500 MM LONG
Capacity		125 TPH
Type		Liner Motion Electro-Mechanical Vibro Feeder Fitted With Unbalanced Motor
Duty		Continuous
Frequency Of Vibration		980RPM
Stroke / Amplitude		6MM / 3MM (Normal)
Motor Rating		2 x 1.0 kW

COAL CRUSHER	CR-1	
Make		Techpro Systems , Under License From Fam, Germany.
Capacity		60TPH
Crusher Rpm		720 (NOM)
Drive System		V-Belt & Pulley
Motor Power		90 kW / 1500RPM
No Of Rows Of Hammer		4
No Of Hammers Per Row		9
No Of V Belts		5
COAL CRUSHER	CR-2	
Make		Tech pro Systems , Under License From Fam, Germany.
Capacity		80TPH
Crusher Rpm		720 (NOM)
Drive System		V-Belt & Pulley
Motor Power		55 kW / 1500RPM
No Of Rows Of Hammer		4
No Of Hammers Per Row		7
No Of V Belts		5

VIBRATING SCREEN – VSC – 1540	(SCR-1)	
Make		Tech pro Systems, In Technical Collaboration With Pey Tec , Weyer , Austria.
Size		1500 x 4000 LG
Capacity		60TPH Max.
Motor Rating		15 kW /1500RPM
VIBRATING SCREEN – VSC – 1530	(SCR-2)	
Make		Tech pro Systems, In Technical Collaboration With Pey Tec , Weyer , Austria.
Type		Single Deck
Size		1500 x 3000 LG
Rated Capacity		80 TPH
Design Capacity		90 TPH
Motor Rating		11 kW /1500RPM
VIBRATING SCREEN – VSC – 1840	(SCR-3)	
Make		Tech pro Systems, In Technical Collaboration With Pey Tec , Weyer , Austria.
Type		Double Deck
Size		1800 x 4000 LG
Rated Capacity		125 TPH
Design Capacity		140 TPH
Motor Rating		22 kW /1500RPM

WATER TREATMENT PLANT	1 No.	
Make		DOSHION LIMITED
Capacity		39 M3/hr
Solid contact clarifier flow rate		220 cu.m/hr.
Multigrade Filter flow rate		65 cu.m
Weak Acid cation exchanger flow rate		65 cu.m.
UF permeate flow rate		65 cu.m/hr.
RO plant flow rate		39 cu.m./hr.
Permeate output		780 cu.m./day in 20 hrs.
Cation and Anion exchanger flow rate		39 cu.m./hr with an OBR of 780 cu.m in 20-4 cycle of operation.
Mixed bed system flow rate		39 cu.m./hr. with an OBR of 5460 cu.m

DENSE PHASE ASH HANDLING SYSTEM	1 No.	
Make		Macawber Beekay Pvt Ltd - New Delhi
Designed for		1 x 110 TPH CFBC
Pneumatic handling system for		Bed ash cooler, Economiser, Air Pre-Heaters and ESP hoppers

FUEL & ASH HANDLING SYSTEM		
Make		TECPRO SYSTEMS LIMITED
		BELT CONVEYOR B-1
		COAL BELT CONVEYOR CBC-1
		COAL BELT CONVEYOR CBC-2
		COAL BELT CONVEYOR CBC-3
		COAL BELT CONVEYOR CBC-4
		COAL BELT CONVEYOR CBC-5
		COAL BELT CONVEYOR CBC-6
		SLAT CHAIN CONVEYOR SC-2
		SLAT CHAIN ELEVATOR (TC-1)
		SLAT CHAIN ELEVATOR (TC-2)

BOILER OVERVIEW: (Boiler Annexure – II B)

General

The arrangement of the equipment furnished by CVPL will be as shown in the GA drawing and generally as described in this specification.

Air-Ambient Air Conditions (For performance Guarantee)

Temperature of air : 30 °C
 Relative humidity : 80 %
 Moisture in air : 0.0219 kg/kg of dry air
 Plant elevation : 183 m (Above mean sea level)

Feed Water

Specification of boiler feed water shall not be less favorable than the following:

pH at 25 Deg. C (copper alloy pre -boiler system)	-	8.8 to 9.2
pH at 25 Deg. C (copper free pre -boiler system)	-	9 to 9.4
Dissolved Oxygen (max.)	ppm	0.007

Total iron as Fe (max.)	ppm	0.01
Total copper as Cu (max.)	ppm	0.01
Total Silica SiO ₂ (max.)	ppm	0.02
Specific electrical Conductivity at 25 Deg.C measured	Micro	0.3
After cation exchanger in the H form and after CO ₂ removal (max.)	mhos/cm	
Hydrazine residual (max)	ppm	0.01-0.02
Total CO ₂	ppm	NIL
Permanganate consumption	ppm	NIL
Oil		Not allowed

Note:

1. All the above measurement shall be made at HP heater outlet or economizer inlet
2. The recommended pH in feed water can be obtained by dosing Ammonia. The concentration of Ammonia in the condensate should not exceed 0.5ppm (as NH₃) for Copper alloy pre-boiler system and 1.0ppm (as NH₃) for copper free pre-boiler system.

Boiler Water

The recommended boiler water concentration for steady state operation to be maintained at the following figures:

pH at 25 Deg.C	-	9.4 – 9.7
Silica as SiO ₂ (max.)	Ppm	1.0
Phosphate residue as PO ₄	ppm	5 - 10
Specific electrical conductivity at 25 Deg.C (max)	Micro mhos/cm	100
Total dissolved solids (max)	ppm	50

Steam Purity:

When the boiler water concentration in steam drum and the feed water quality are maintained by purchaser as specified above, the purity of steam leaving the drum will be as follows:

Silica as SiO₂ (max) ppm : 0.02
Total Dissolved Solids (max.) ppm : 0.1

Performance Fuel : 70% BAGASSE + 30% IMPORTED COAL

Ultimate Analysis:

ULTIMATE ANALYSIS	BAGASSE	IMPORTED COAL
Carbon	23.50	66.22
Hydrogen	03.25	4.39
Nitrogen	00.00	1.24
Sulphur	00.00	0.39
Moisture	50.00	13.27
Ash	01.50	6.21
Oxygen	21.75	8.28
GCV (Kcal/kg)	2272	6000

Fuel Size:

S.NO.	DESCRIPTION	BAGASSE	IMPORTED COAL
1	Top size of fuel	As received from sugar mill	12 mm
2	Fines (-1 mm)		Less than 30%

Operating Parameters

The operating conditions / boiler parameters at MCR will be as detailed under design basis of this specification.

Description	units	At 100 % BMCR
No. of boilers	No.	One
Superheated steam flow at main steam stop valve outlet	TPH	110
Superheated steam pressure at main steam stop valve outlet	Kg/cm ² (g)	108
Superheated steam temperature at main steam stop valve outlet	°C	510 ±5
Feed water temperature at economizer inlet	°C	210

TERMINAL POINTS AND EXCLUSIONS – (Boiler Supply Annexure II)

General

This specification covers One (1) No. 110 TPH CFBC steam generator. The steam generator is designed to generate 100% MCR capacity under the following fuel firing combinations, and the percentages given are on the heat value basis:

70 % Bagasse with 50% moisture+30% imported coal 100% Imported coal

80 % Imported coal + 20 % Bagasse pith

80% Imported coal + 20 % Julia flora (Prosopis)

30 % Distillery Effluent + 40 % Bagasse + 30 % Imported Coal

The boiler is designed to operate with any of the above fuels individually or any combination of the fuels within the limits specified and with the feed water inlet temperature of 210 Deg.C. The boiler steam outlet parameters shall be 108 ata and 510 + 5 Deg.C at the main steam stop valve outlet.

Design and Construction - General

The Type of Steam Generator and Auxiliaries is broadly as indicated below:

- The boiler is of CFBC type.
- The boiler is suitable for outdoor installation.
- The draft system of the boiler is balanced, at the cyclone inlet.
- The boiler is designed with natural circulation and with Single Drum.
- The boiler combustor is Water cooled membrane walls.
- Two / three stage superheaters with inter stage attemperator.
- Economizer & air heater as the heat recovery systems.
- Deaerator and Deaerated water storage tank.
 - 3 x 60 % Motor driven Boiler feed pumps
 - 2 x 100 % Feed water transfer pumps.
- Deaerator and Deaerated water storage tank and Feed water storage tank.

The Boiler Parameters shall be as under:

Net Steam Output at the Boiler Main Steam Stop Valve (Kg/Hr)	:	110,000
Superheated Steam Pressure at Main Steam Stop Valve Outlet (ata)	:	109.0

Superheated Steam Temperature at Main Steam : 510 + 0
Stop Valve Outlet (Deg.C)
Feed Water Temperature at Economizer Inlet (C) : 2101

The Net capacity of the boiler excludes, soot blowing and any other auxiliary steam requirements.

The flue gas temperature leaving the boiler to stack shall be chosen such that maximum economically possible efficiency is achieved but the temperature shall be sufficiently higher than the dew point considering the fuel characteristics.

Scope of Supply

Mechanical

One (1) No. CFBC Steam generator unit comprising of,

- Boiler drum with all internals and attachments.
- Complete water-cooled combustor system with membrane wall construction and with all required piping, headers etc. Solid separation system, including refractor lined cyclone, loop seal etc.
- Circulating system components with downcomers, raisers and with piping and headers.
- Complete superheater system with two or three stage superheater with all required piping, headers etc.
- Desuperheater system comprising of the spray control station (if required), variable orifice type desuperheater.
- Complete economizer system including all piping, headers, coil supports, casing, etc.
- Tubular Air preheater with casing and supports.
- Steam and Water Analysis System comprising of analyzers, Sample coolers with complete SS coils, analyzers, sampling piping and cooling water piping.
- Steam soot blowing system complete with necessary piping, PRS, valves and other specialties for superheater and economiser with instruments and controls as required.
- Boiler refractory, insulation and inner and outer casing with all fixing material for the boiler, piping, ducting, equipment.
- Insulation with all the fixing materials and outer casing for piping, valves, fittings and equipment, etc.

- Bagasse feeding system consisting of bag assesilo, motorised rack & pinion gates at the inlet of the silos, feeders, screw conveyors etc. Bagasse silo support structures. The minimum number of feeders shall be two (2). Coal bunkers with SS lining (in conical portion), rod pin gates, drag chain feeders, and chutes for coal. Diverter chutes for the emergency emptying of bunker and steam / nitrogen inserting system for the bunkers. The motors for all the feeders shall be suitable for Variable frequency drives.
- LDO based Start up oil system, inclusive of the storage tank, strainers, pumps, trip valves, return oil lines, air atomized burners etc.
- Effluent firing system shall be provided as per Supplier P& ID No. Enq -CF-3-339 Rev Nil
- Ash drains system from the combustor with ash coolers.

Furnace draft system comprising of,

- 2 x 50% Primary Air (PA) fans (however each fan will be designed to handle 60 % MCR load ie to handle 66 tons/hr) with motor suitable for variable frequency drive (VFD) and cylinder operated inlet guide vanes complete, with necessary base frames, base plate, foundation bolts, supports, covers, couplings, accelerometer type vibration probes on the bearing at drive end and at non -drive end, lubrication system etc.
 - 2 x 50% Induced Draft (ID) fans (however each fan will be designed to handle 60 % MCR load ie to handle 66 tons/hr) with motor suitable for variable frequency drive (VFD) and cylinder operated inlet guide vanes complete, with necessary base frames, base plate, foundation bolts, supports, covers, couplings, accelerometer type vibration probes on the bearing at drive end and at non -drive end, lubrication system etc.
 - 2 x 50% Secondary Air (SA) fans (however each fan will be designed to handle 60 % MCR load ie to handle 66 tons/hr) with motor suitable for variable frequency drive (VFD) and cylinder operated inlet guide vanes complete, with necessary base frames, base plate, foundation bolts, supports, covers, couplings, accelerometer type vibration probes on the bearing at drive end and at non-drive end, lubrication system etc.
- All air and flue gas ducting with required stiffeners, expansion joints, guide vanes for bends, dampers, insulation, cladding, supports, etc.
 - HP and LP Chemical dosing system, with complete piping as per specification.
 - Blow down tanks both CBD & IBD, steam piping from CBD tank to Deaerator, drain headers, drain and vent piping, etc.
 - Deaerator and deaerated water tank, with required piping, valves fittings, pressure and level control stations, overflow, vents and drains, supports and operating platform with ladders.

- Feed water tank with required piping valves fittings, over flow, vents and drains, supports and operating platforms with ladders.

Boiler Feed Pumps / Feed water transfer pumps

- 3 x 60% Boiler water feed pumps along with LT motors suitable for Variable Frequency Drives (VFDs) with necessary base frames, foundation bolts, couplings, lubrication system, accelerometer type vibration probes on the bearing at drive end and at non-drive end, etc.
- 2 x 100% boiler feed water transfer pumps along with LT motors suitable for Variable Frequency Drives (VFDs) with necessary base frames, foundation bolts, couplings, lubrication system, etc.
- Complete boiler integral piping consisting of all the interconnecting piping between the economizer inlet stop valve and the superheater outlet header, valves, fittings, drains, vents and safety valve exhaust piping, startup vent with motorized isolation valve and pneumatic operated pressure reducing valve with silencer, super heater safety valve with silencer and exhaust piping, superheater electrometric relief valve with silencer and exhaust piping, blow down systems etc., all as required.

Boiler external piping with valves, fittings, hangers, supports, on -line instrument, insulation, cladding, etc. as required.

- Sixty (60) meters and eight (8) elbows of Main steam piping from super heater outlet header to and including the common steam distribution header (located at 14 m elevation in the TG building). All required branches and motorized isolating valves (as given in P&ID) in the common steam distribution header. The common steam distribution header shall be fabricated with forged tee s for the branches. No external reinforcements for the branches are acceptable. The main steam pipe sizing shall be done considering a maximum permissible pressure drop of 2.0 kg / Sq.Cm up to the outlet of the steam header.
- Steam piping from super heater first stage outlet header to soot blowing system.
- A 9/3 ata Deaerator steam & process steam pressure reducing station with upstream piping and downstream piping up to the battery limit, including control valves and safety valves.
- A 108/3 ata process steam Pressure reducing station with upstream piping and downstream piping up to the battery limit, including control valves and safety valves.
- A 108/9 ata process steam Pressure reducing station with upstream piping and downstream piping up to the battery limit, including control valves and safety valves.
- A 108/20 ata process steam Pressure reducing station with upstream piping and downstream piping upto the battery limit, including control valves and safety valves.

- 9 ata process steam header with branches, isolation valves, end covers, supports etc.
- 20 ata process steam header with branches, isolation valves, end covers, supports etc.
- Auxiliary steam piping to deaerator
- Feed water piping from feed water tank outlet to transfer pump, feed water transfer pump to deaerator. Also, a tap off and piping will be provided from the feed water transfer pump suction header up to terminal Point. (During off-season operation the transfer pumps will not be working, the feed water tank will act as a surge tank and the make up water will be added in the condenser hot well by gravity with level control valves (both in main and bypass)). Drain and over flow piping up to terminal point and all trim piping of the feed water storage tank.
- Feed water piping from deaerated water storage tank to feed pump suction and from feed pump discharge to economiser through HP feed water heaters (Two numbers), feed control station.
- Minimum recirculation piping, balance leak off piping shall be individually taken from each pump and connected to the deaerator tank.
- HP / LP dosing system piping from the dosing skid to economizer outlet feed pipe / suction pipe to feed pump.
- Spray water piping for deaerator steam PRDS 9/3 ata, process steam PRDS 108/9 ata, process steam PRDS 108/20 ata and process steam PRDS 108/3 ata with all valves, including control valves and desuperheaters.
- Steam piping to the HP heater from the 9 ata header, Steam piping to the HP heater from the 20 ata header, HP heater(s) feed water inlet and outlet piping, feed water heater(s) Bypass piping and HP heater(s) vent piping to deaerated water storage tank.
- Condensate piping from terminal point to feed water storage tank.
- Cooling water supply and return piping from terminal point near boiler to all equipment's within the boiler island requiring cooling water supply.
- Instrument air piping from terminal point near boiler to all equipment within the boiler island, requiring instrument air.
- Primarily Motorized Isolation valves shall be provided in the boiler transfer pump discharge line, Boiler feed pump discharge lines, Main steam line, Startup Vent line, HP heaters feed water lines including bypass lines to HP heaters, Inlet steam line to HP heaters etc. The motorized valves open / close time shall be suitable for the application. However, motor operated valves used in the HP heaters isolation shall have a closing

time of maximum 12 seconds. Please also refer Annexure – B for additional motorized valves requirements.

- Solenoid operated quick closing non -return valve (QCNRV) in the steam piping to both the HP heater(s). (this valve will operate with the signal from the high level switches in the HP heaters).
- Target plates and temporary piping as required for steam blowing, including the motor operated isolation valve with quick closing and opening time. (the temporary piping and the valve shall be taken back by the SUPPLIER)
- Boiler filling line from feed water transfer pump discharge to the water wall drain header.
- HP & LP dosing system dilution water line from feed water transfer pump discharge line to tank.
- Raw water quenching line for IBD tank.
- Complete boiler mountings and fittings including safety valves, two (2) Nos. gauge glasses of port type etc.
- Special refractories for the combustor, cyclone, loop seal etc.
- Boiler buck stays, tie connectors, corner connectors, stiffeners, channels and guides.
- Boiler rough mountings including access / inspection doors, peepholes with frames and fittings.
- Air pollution control system comprising of one no. Electrostatic Precipitator, ash hoppers and motor operated air lock ash discharge valves, with manually operated gates upstream of the air lock valves.
- Motor operated rotary ash discharge valves for all ash hoppers. Manually operated gates upstream of the rotary valves for the maintenance of rotary valves.
- For all manual and power cylinder operated dampers, suitable operating mechanism complete in all respects with access for manual operation shall be provided.
- Chimney connecting flanges, counter flange, expansion joint near chimney and all fasteners for the connections.
- Chemicals required for alkali boil out.
- First fill of lubricants and chemicals, for all equipment in boiler scope.
- Rain water down pipes.

- Support and suspension steel, access platforms for all equipment, piping, ducting etc.
- Complete foundation materials, structural steels and anchor bolts and channels for columns, bought out items like fans, pumps, etc. and for all other equipment & supports.
- Monorails and hoists shall be provided for all fans and pumps.
- Platform, ladders / galleries / stair cases with fabricated floor gratings / checkered plates, including complete roof, side cladding above the drum operating floor level along with cladding structures for protection against rain and other climatic conditions. Roof over the bagasse storage silos and coal bunker with side cladding extended down to about 3 M from the top of the silos / bunkers. All temporary steel required for boiler erection. Sheet steel motor guard/ canopy shall be provided for all the outdoor motors in the SUPPLIER's scope. Platforms, galleries and staircases shall be provided with handrails. The platform gratings, the stair treads and the handrails shall be galvanized. There shall be one (1) staircase from the finished floor level to the steam drum operating floor. The boiler canopy shall also cover the staircases.

The feed water storage tank will be located as marked in the Layout. The feed water tank operating platform will be located at an approximate elevation of 14 meters. The feed water transfer pumps will be located below the feed water tank at 0.0 m elevation.

- Interconnecting platform between boiler and turbo generator building at two elevations.
- Counter flanges for all inlet and outlet connections from and to the SUPPLIER's battery limit, including gaskets, bolts and nuts.
- Two (2) coats of primer paint prior to dispatch for all items and supply of final paints for two coats of final application.
- Aluminum cladding sheets shall be 20 SWG.
- Six engineer months will be provided for training the operating people.

Electrical

- Drive motors (suitable for variable frequency Drives wherever applicable) of all auxiliaries covered under the scope.
- All control panels of ESP, viz. TR set control panel, rapper controller and rapper distribution / temperature scanners / timers (as applicable). Rapper controller may be part of TR set control panel or can be housed in a separate panel.
- Lightning protection of the boiler house with necessary horizontal roof conductors, vertical down conductors up to Purchaser's underground earth electrodes.

- Complete engineering of the Boiler & ESP systems shall be in the scope of the SUPPLIER, which shall include, but not limited to furnishing of the following details / drawings to enable the PURCHASER to procure the switchgears and other electrical items, as required for the system completion.

Control and Instrumentation

- Supply of all field instruments (transmitters, local temperature gauges, local pressure gauges, thermocouples, flow nozzles / Orifice plates, etc.) that are required for the monitoring / control of the various parameters for the operation of boiler / auxiliaries.
- Supply of all the final control elements (on/off valves, control valves, power cylinders, I/P converters, etc.) taking in to account the precision of control.
- Supply of all the field instruments such as temperature switches, pressure switches, flow switches, level switches, limit switches, etc. for the purpose of safety interlock and start/stop operation.
- Provision of serial communication facility (RS 485 in MODBUS protocol) in the TR set, rapper controllers of the ESP.
- Supply of all the instrument / signal / control cable and accessories like cable trays, conduits, supports etc., from the individual field instrument / control element / any other panel supplied by the SUPPLIER to the I/O rack and laying and termination of the same.
- Supply of a separate control panel for housing the ESP system with all the accessories and local display.
- Submission of all the control schemes & interlock / start/ stop procedure in the form of logic diagram so that the same will be incorporated in the Distributed Control System.
- Submission of input and output list for the various analog and digit al signals.
- Wherever applicable, instrument junction boxes shall be provided by the SUPPLIER. Drawing shall be furnished separately for wiring and tubing for showing all instrument interface details. 20% spare terminals shall be available in the Junction Boxes for future expansion.
- Please also refer the Sketch -1 enclosed to this section of the Specifications, for the scope demarcation with respect to the interconnection of SUPPLIER's Instrumentation & Control Scope to PURCHASER's DCS.

Civil

All foundation bolts within the scope of supply.

Supply of all embedment requiring machining (i.e. tapping, threading etc.) and embedment not conforming to IS: 2062.

Supply of all support structures for mounting the base channels of all Electrical and Instrumentation panels, included in the scope.

PHOTOGRAPHS:









