Vijayakumar Prabhakaran

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Sent: 28 December 2017 03:12 PM
To: 'Muralidharan Jayapal'; 'shekarreddy@uttamenergy.com'
Cc: 'Satyajit Shukre'
Subject: Standard Tech data sheet for Turbine and BOP area
Attachments: Standard Data sheet - Turbine + BOP.DOCX

As discussed, please find enclosed standardised Technical data for Turbine & BOP area.

Regards,

P.VijayaKumar
UEL Pune

STEAM TURBINE GENERATOR

S.No	Description	Data
1.	**Type of Steam Turbine**	
a.	Type	Horizontal, impulse, multi-stage multi-valve, axial flow, condensing, extraction, geared.
b.	No. of units	1 (One) nos.
2.	**Output**	
a.	Rated output (at generator terminal)	____ kW
3.	**Operating Conditions**	
a.	Inlet steam pressure	____ ata
b.	Inlet steam temperature	____ °C
c.	Exhaust steam pressure	____ ata
d.	Max. 1st Extraction pressure (Controlled Extraction) at turbine nozzle	____ ata
e.	Max. 2nd Extraction pressure (Un-Controlled Extraction) at turbine nozzle	____ ata
f.	Exhaust pressure	____ ata
g.	Inlet flow	____ TPH
h.	1st Extraction flow	____ TPH
i.	2nd Extraction flow	____ TPH
j.	Exhaust steam flow	____ TPH
4.	**Steam quality at Turbine inlet**	
a.	Conductivity at 25°C for CO2-free waters	≦ 0.2 µS/cm
b.	Silica (SiO2)	< 0.02 ppm
c.	Total-iron (Fe)	< 0.02 ppm
d.	Copper (Cu)	< 0.003 ppm

Commented [Vp1]: Extraction or Bleed to be ensured

S.No	Description	Data
e.	Sodium + Potassium	< 0.01 ppm
5.	**Reduction Gear**	
a.	Type	Horizontal, Single reduction. Double helical gear type
b.	Service factor	AGMA 1.3
c.	Applied standards	AGMA/ Manufacturer standard
d.	Quantity	One (1) set / One unit
6.	**Emergency Stop Valve**	
a.	Type	Oil pressure operated type with steam strainer and limit switch for indication of closed position
b.	Quantity	One (1) set / One unit
7.	**Speed Governor**	
a.	Type	Electro-Hydraulic Governor
b.	Model No.	505E WOOD WARD
c.	Adjustable speed range	105-95% of rated speed(105% Max speed limit）
d.	Speed regulation	4% as droop
e.	NEMA CLASS	D
8.	**Overspeed Governor**	
a.	Type	Mechanical eccentric trip weight& Electric signal from governor
b.	Tripping speed	109 % of rated speed (Electric) 110±1% of rated speed (Mechanical)
c.	Quantity	One (1) set / One unit
9.	**Governing valve**	
a.	Type	Bar lift and Multi valve

Commented [Vp2]: 505E for Extraction machine, 505 for Bleed machine

S.No	Description	Data
10.	**Insulation and Jacketing**	Turbine casing and emergency stop valve are insulated and jacketed to maintain jacket temperature below 60 deg C.
11.	**Coupling**	
a.	Coupling between turbine and R/gear	Flexible type
b.	Coupling between R/gear and generator	Flexible type (Oil contained gear type)
12.	**Base Plate or Sole plate**	
a.	Type for Steam turbine	Baseplate
b.	Type for Reduction gear	Soleplate
c.	Type for Generator	Soleplate
13.	**Turning Device**	
a.	Type	Electric (AC) motor driven, automatic engage and automatic disengagement.
b.	Quantity	One (1) set / One unit
14.	**Oil Reservoir**	
a.	Type	Steel plate fabricated type
b.	Full capacity	3 minutes of normal required flow at least
c.	Quantity	One (1) set / One unit
d.	Accessories	Reservoir is furnished with oil level indicator, drain valve, oil charging nozzle, gas vent fan. Equipment such as oil pumps, oil filters and etc., will be mounted on top of oil reservoir.
15.	**Main Lube Oil Pump**	
a.	Type	Gear type
b.	Capacity	As required for the system
c.	Quantity	One (1) set / One unit

S.No	Description	Data
16.	**Auxiliary Lube Oil Pump**	
a.	Type	Gear type
b.	Capacity	As required for the system
c.	Quantity	One (1) set / One unit
17.	**Main Control Oil Pump**	
a.	Type	Gear or Screw type
b.	Capacity	As required for the system
c.	Quantity	1 set / One unit
18.	**Auxiliary Control Oil Pump**	
a.	Type	Gear or Screw type
b.	Capacity	As required for the system
c.	Quantity	1 set / One unit
19.	**Emergency Oil Pump**	
a.	Type	Gear type mounted on oil reservoir and driven by DC electric motor
b.	Quantity	One (1) set / One unit
20.	**Oil Cooler**	
a.	Cleanliness factor	90%
b.	Plugging margin	5%
c.	Type	Shell & tube type or Plate type Heat exchanger
d.	Cooling Surface	100% of required area
e.	Quantity	2 set(s)/one unit
21.	**Lube Oil Filter**	
a.	Type	Duplex with change-over cock

S.No	Description	Data
b.	Filtration	200 mesh
c.	Quantity	One (1) set / One unit
22.	**Control Oil Filter**	
a.	Type	Duplex with change-over cock
b.	Filtration	20 micron
c.	Quantity	One (1) set / One unit
23.	**Gland Steam Condenser**	
a.	Cleanliness factor	90%
b.	Plugging margin	5%
c.	Type	Shell and tube, fixed tube sheet type with AC motor driven exhaust fan
d.	Cooling water - Kind	Condensate water
e.	Cooling Surface	100% of required area
f.	Quantity - exhaust fan	2 set(s)/one unit
g.	Quantity - condenser	1 set(s)/one unit
24.	**Surface Condenser and Accessories**	
a.	Quantity	One (1) set / One (1) unit
b.	Type	Horizontal, shell & tube, fixed tube sheet type
c.	Water Box Type	Divided
d.	Operating Conditions :	
i.	Condenser top vacuum	_____ ata
ii.	Condenser steam flow	_____ TPH
iii.	Condensate water temperature	_____ °C
iv.	Kind of cooling water	Cooling Tower Water

S.No	Description	Data
v.	Cooling water quantity	_____ m^3/hr
vi.	Cooling water inlet temperature	_____ °C
vii.	Cooling water outlet temperature	_____ °C
viii.	Cleanliness factor	90 %
ix.	Hotwell retention time (Between Low level and bottom of hotwell)	Min. 1 minutes
e.	Material	
i.	Shell	Carbon steel plate
ii.	Tube sheet	Carbon Steel
iii.	Tube	304 Stainless steel
iv.	Water chamber	Carbon steel plate
f.	Standard Accessories	(for One (1) Unit)
i.	Feed water valve	1 set
ii.	Air vent valve for water chamber	1 lot
iii.	Drain valve for water chamber and hot well	1 lot
iv.	Level indicator controller	1 set
v.	Hotwell level control valve (air operating type)	1 set
vi.	Rupture disc	1 set
vii.	Minimum flow control valve for Condensate Water Pump (air operating type)	1 set
25.	**Air Ejector and Accessories**	
a.	Quantity	One (1) set / One (1) unit
b.	Type	2 stage, twin element, steam jet ejector

S.No	Description	Data
c.	Condenser	Common type (one shell) for inter and after condenser
d.	Cleanliness factor	90%
e.	Material	
i.	Nozzle	Stainless steel
ii.	Diffuser	Carbon steel
iii.	Mixing chamber	Cast steel
iv.	Shell	Carbon steel pipe
v.	Tube sheet	Carbon steel
vi.	Tube	Stainless steel
vii.	Water chamber	Carbon steel plate
f.	Accessories	(For One (1) unit)
i.	Steam inlet valve for ejector	1 lot
ii.	Steam strainer	1 set
iii.	Air vent valve for water chamber	1 lot
iv.	Drain valve for water chamber	1 lot
v.	Suction valve for 1st stage ejector	1 lot
vi.	Startup ejector with silencer	1 lot
26.	**Alternator**	
a.	Rated voltage	11kV ±10%
b.	Rated power factor	0.8
c.	Rated frequency	50±5%
d.	Speed	1500 rpm
e.	Number of phase terminals	Three
f.	Number of neutral terminals	Three

Commented [Vp3]: Verify for project requirement

Commented [Vp4]: Verify for project requirement

Commented [Vp5]: 1800 rpm for 60Hz

S.No	Description	Data
g.	Design ambient temperature	45 Deg C

AIR COOLED CONDENSER

S.No	Description	Data
1.	Process flow medium	Turbine exhaust steam
2.	Condenser type	Air Cooled – A Frame type
3.	Construction type	RCC upto Fan deck level
4.	TG exhaust steam quantity	___ TPH
5.	Turbine exhaust enthalpy	___ kJ/kg
6.	Condensate enthalpy	___ kJ/kg
7.	Turbine exhaust steam pressure	___ ata
8.	Turbine Exhaust nozzle orientation	Top
9.	No. of Streets	___ Nos
10.	No. of modules per Street	___ Nos
11.	Total No. of Modules	___ Nos
12.	**Tube bundle**	
a.	Tube type	Circular
b.	Tube material	Carbon steel (SA 214- ERW -Welded)
c.	Header material & Tube sheet	Carbon Steel (IS 2062 Gr.B)
13.	**Fin**	
a.	Type of fin tube	KL – Knurled
b.	Fin material	Aluminum
14.	**Air side data**	
a.	Temperature at inlet	___ ^{o}C

Commented [Vp6]: Exhaust pressure depends on ambient temperature.

S.No	Description	Data
15.	**Fan data**	
b.	No. of fans	___ Nos.
c.	Fan type	Axial flow
d.	Blade material	FRP
e.	No. of motors	___ Nos.
f.	Motor speed	1500 rpm
g.	Motor enclosure	IP 55
h.	Gear box type	Parallel shaft
i.	Gear box service factor	2
j.	Fan sound level @ 1 m	85 db(A)
16.	**System - Evacuation**	
a.	No of hogging ejector	1 x 100%
b.	No of holding ejector	2 x 100%
c.	Inter-After Condenser	Provided
d.	Evacuation time	20 minutes
17.	**Condensate Extraction pumps**	
a.	No. of pumps	2 x 100% (1W+1S)
b.	Pump type	Horizontal single stage foot mounted centrifugal Pump with end suction
c.	Pump flow and head	As per system requirement
18.	**Hot well pumps**	
a.	No. of pumps	2 x 100% (1W+1S)
b.	Pump type	Horizontal single stage foot mounted centrifugal Pump with end suction
c.	Pump flow and head	As per system requirement
19.	**Condensate Storage tank**	

S.No	Description	Data
a.	Condensate storage tank capacity	10 minutes storage (hold up volume between NWL to LWL)
b.	Tank type or orientation	Horizontal
c.	Tank material	Carbon Steel (IS 2062 Gr.B)
20.	**Expansion Bellow**	
a.	Shape	Circular
b.	Material of construction	SS304
c.	End connection	Welded
21.	**Steam duct**	
a.	Material	IS2062 Gr.B
b.	Steam duct IBR / Non IBR	Non IBR
c.	Effective capacity of hot well	3 minutes storage
d.	System relief valve on steam side	Rupture disc
22.	**Fin Cleaning system**	
a.	Type	Semi-automatic

COOLING TOWER

S.No	Description	Data
1.	Type of Cooling tower	Induced Draft/ Counter flow
2.	Construction type – Structure	RCC
3.	Construction type – Basin	RCC
4.	Arrangement of cells	Inline
5.	No. of cooling tower	1 No.
6.	No. of cells	___ Nos. (__ W+__ S)
7.	Flow rate of each cell	___ m3/hr

Commented [Vp7]: RCC or Pultruded FRP

S.No	Description	Data
8.	Wet bulb temperature for Cooling tower design	28 °C
9.	Approach	4 °C
10.	Temperature of Cooling water inlet to cooling tower	40 °C
11.	Temperature of Cooling water outlet from cooling tower	32 °C
12.	Cooling range	8 °C
13.	**Material of construction**	
a.	Cooling tower structure	RCC with brick cladding
b.	Fan Stack	RCC
c.	Fan Deck	RCC
d.	Fan blade	FRP
e.	Fan hub	MS HDG
f.	Gear Box and Motor base frame	MS HDG
g.	Basin	RCC
h.	Fill & Drift eliminators	PVC
i.	Fasteners for wetted parts	Stainless Steel (SS) – Grade 304
j.	Fasteners for non -wetted parts	MSHDG
14.	**Types**	
a.	Fill type	Film
b.	Drift Eliminator type	Sinusoidal wave, blade
c.	Distribution Piping Type	Gravity fed
15.	**Fans**	
a.	Fan Type	Axial flow
b.	Number per cell	One (1) No.

Commented [Vp8]: To be ensure with project ambient data

Commented [Vp9]: To be ensure with project ambient data

Commented [Vp10]: To be ensure with project ambient data

Commented [Vp11]: Aluminium blade for FRP cooling tower

S.No	Description	Data
c.	Type of gears	Spiral bevel cum helical
d.	Shaft Balancing	Dynamic
e.	Shaft material	Carbon steel tube, flange and couplings
f.	Motor type	Squirrel cage, three phase, induction
g.	Class of insulation of motor	F
h.	Degree of protection of motor	IP55
i.	Type of motor mounting	Foot
j.	Motor Supports	MSHDG Frame
k.	Vibration cut-off switch for fan	Provided
l.	Oil level switch for gear box	Provided
16.	Biocide , anti-scalant and corrosion inhibitor dosing	Provided

SUBMERSIBLE ASH HANDLING SYSTEM

S.No	Description	Data
1.	Conveyor No.	SBC - 1
2.	Conveyor Type / Duty	3 Roll 30^{o} Troughed Type Belt Conveyor
3.	Profile /Orientation	Horizontal - Inclined
4.	Material handled	Grate Ash
5.	Bulk density	___ kg/m^3
6.	Particle size	___ mm
7.	Lump Size (Max)	___ mm
8.	Actual Capacity	___ kg/hr
9.	Design Capacity	___ kg/hr

DENSE PHASE FLY ASH HANDLING SYSTEM

S.No	Description	Data
1.	Fuel used	
2.	Fuel Fired	_____ kg/hr
3.	Ash in Fuel	___ %
4.	Total Ash Generation	___ kg/hr
5.	**% Ash Collection**	
a.	Bank Assembly	___ %
b.	Economizer Assembly	___ %
c.	Air Heater Assembly	___ %
d.	ESP	___ %
6.	**Qty of ash generation in actual**	
a.	At Bank Zone	___ kg/hr
b.	At Economizer Zone	___ kg/hr
c.	At Air Heater Zone	___ kg/hr
d.	At ESP Zone	___ kg/hr
e.	Total Ash Generation Actual	___ kg/hr
7.	**Ash Generation for Design Condition**	
a.	At Bank Zone	___ kg/hr
b.	At Economizer Zone	___ kg/hr
c.	At Air Heater Zone	___ kg/hr
d.	At ESP Zone	___ kg/hr
e.	Total Ash Generation Design	___ kg/hr
8.	**Temperature**	
a.	At Bank Zone	___ ° C

S.No	Description	Data
b.	At Economiser Zone	___ ° C
c.	At Air Heater Zone	___ ° C
d.	At ESP Zone	___ ° C
9.	**Collection Point**	
a.	At Bank Zone	___ nos.
b.	At Economiser Zone	___ nos.
c.	At Air Heater Zone	___ nos.
d.	At ESP Zone	___ nos.
10.	**Elevation for Collection Point**	
a.	At Bank Zone	___ mtrs
b.	At Economiser Zone	___ mtrs
c.	At Air Heater Zone	___ mtrs
d.	At ESP Zone	___ mtrs
11.	**Density**	
a.	Bed Ash	___ kg/m^3
b.	Fly Ash	___ kg/m^3
12.	Type of inlet valve	Dome valve Swing disc valve/Knife gate valve.
13.	Type of isolation valve	Manual knife gate valve.
14.	Surge hopper	Will be provided, if required
15.	Fluidization of ESP Hopper	Provided (Conveying air used for fluidizing air)
16.	Vent valve	Provided
17.	Expansion joints	SS Bellow type
18.	**Fly ash silo**	
a.	No of fly ash silo	One

S.No	Description	Data
b.	Effective capacity of each silo	__ cum
c.	Construction	RCC /MS
d.	Access stair / platforms	Required
e.	Discharge outlets on each silo	One dry unloading, One wet unloading and one for emergency discharge
f.	Accessories for dry unloading	Rotary feeder & telescopic spout
g.	Vent filter and man hole	Provided
19.	**Knife Gate Valves**	
a.	Method Of Valve Operation	Manual
b.	Body	CI
c.	Slide Plate	SS304
20.	**SS expansion joint**	
a.	Type	Bellow type
b.	Materials Of Construction	
i.	Body	SS
ii.	Bellow	SS
iii.	Inner Sleeve	SS
21.	**Ash Inlet Valve**	
a.	Type	Dome valve
b.	Method Of Valve Operation	Pneumatic
c.	Type And Connections	Pneumatic tubing
d.	Valve Working Pressure	4 -5 bar
e.	Construction Materials	
i.	Body	CI
ii.	Flap Plate	CI/SS

S.No	Description	Data
22.	**Transporters**	
a.	Material Of Construction	CS
b.	Design	ASME SECTION VIII
c.	Vessel operating pressure	4 -5 bar
d.	Vessel design pressure	6 bar
23.	**Pipes**	
a.	Material Of Construction	MS ERW Heavy Duty 'C' Class as per IS 1239
b.	End connection	Flanged
24.	**Bends**	
a.	Material Of Construction	Cast basalt lined bends
25.	**Terminal Box**	
a.	Material of Target Plate	MS
26.	**Air Receiver Tank**	
a.	Material of Construction	MS IS2062
b.	Nozzle flanges	BS 10, Table-E
c.	Mounting accessories	Pressure gauge, pressure switch, safety relief valve & automatic drain trap with manual isolation are provided.
27.	**Filter Bags & Cages**	
a.	Filter Bags	Polyester Needle Felt Type
b.	Cages	MS Galvanized
28.	**Vent Filter**	
a.	Type	Reverse pulse jet type
b.	Bag material	Antistatic polyester
c.	Outlet dust emission	50 mg/Nm^3

S.No	Description	Data
29.	**RAV**	
a.	Material of Construction	
i.	Body	C.I
ii.	Rotor	C.I
iii.	Side Plates	C.I
iv.	Shaft	MS
v.	Seal	Labyrinth Seal(Sealing Washer)
30.	**Ash Conditioner**	
a.	Type	Twin paddle screw type
b.	Material of construction	
i.	Body	MS
ii.	Shaft	EN8
iii.	Screw Paddles	MS
iv.	Nozzle	SS/Brass

EOT Crane

Commented [Vp12]: EOT or HOT Crane

S.No	Description	Data
1.	Capacity in Tons	
a.	Main Hoist	___ Ton
b.	Aux. Hoist	___ Ton
2.	Quantity	One (1) no.
3.	Location of crane	Indoor (Power House)
4.	Purpose of crane	Maintenance purpose
5.	Type	Double Girder Box Type EOT Crane (With Single Trolley)
6.	Span	Length of TG hall

Commented [Vp13]: Not applicable for HOT crane

S.No	Description	Data
7.	Height of Lift	Above level of Turbine Generator
8.	Class of Duty	Class-II; Medium Duty
9.	IS Standard Applicable	As per IS 807 & 3177
10.	Operation	Push button Pendent operated from floor duly independent movement
11.	Speeds in Meters/Min (±10%)	
a.	Main Hoist	1 m/min
b.	Aux. Hoist	2 m/min
c.	Long travel	20 m/min
d.	Cross travel	10 m/min
12.	Motor	
a.	Start /Hr	150
b.	Type	Totally enclosed fan cooled (TEFC)
c.	Duty	S4, foot mounted
d.	Insulation	F/B
e.	Protection	IP55
13.	Type of Brakes	
a.	Main hoist	Electro Hydraulic Thruster X 1 No
b.	Aux. hoist	Electro Hydraulic Thruster X 1 No
c.	Long travel	Electro Hydraulic Thruster X 2 Nos.
d.	Cross travel	Electro Hydraulic Thruster X 1 No
14.	Gear Boxes	
a.	Main hoist	Totally Closed with Horizontal Type
b.	Aux. hoist	Totally Closed with Horizontal Type
c.	Long travel	Totally Closed with Horizontal Type

Commented [Vp14]: Not applicable for HOT crane

Commented [Vp15]: Not applicable for HOT crane

S.No	Description	Data
d.	Cross travel	Totally Closed with Horizontal Type
15.	Wheels details	
a.	LT Wheel	Double flanged
b.	CT Wheel	Double flanged
16.	Rope Drum detail	
a.	Main hoist	M.S Seamless Pipe, duly stress relieved
b.	Aux. hoist	M.S Seamless Pipe, duly stress relieved
17.	Wire Rope Details	
a.	Type	Un galvanized fiber core
18.	Hook Details	
a.	Main Hoist	Forged Steel, "C" Type with safety latchet
b.	Aux. Hoist	Forged Steel, Standard Single Swivelling hook with safety latchet
19.	Bearings Type	
a.	Long travel	Rollers Type
b.	Cross travel	Rollers Type
20.	Couplings Type	
a.	Long travel	Flexible Gear Coupling
b.	Cross travel	Flexible Gear Coupling
21.	Limit Switch	
a.	Main hoist	Geared Rotary + Gravity
b.	Aux. hoist	Geared Rotary + Gravity
c.	Long travel	Two Way Lever
d.	Cross travel	Two Way Lever

S.No	Description	Data
22.	Bridge Girders	Double girder with single trolley. The total vertical deflection of the girder for the live load shall not exceed 1/750 of the span.
23.	Wire rope	Steel wire rope conforming to IS:2266
24.	Rail	
a.	Long travel	Square bar
b.	Cross travel	Square bar
25.	Platform in Crane	One side full length & other side Two Short platforms
26.	Siren / Hooter	1 No will be provided
27.	Lighting	Lighting fixtures with lamps will be provided under the bridge for illumination.
28.	End Stoppers	Rubber buffers at both ends on LT Girders
29.	DSL Systems	PVC Shrouded GI conductor DSL system
30.	Control Voltage	110V AC, 1Ph, 60Hz

COMPRESSED AIR SYSTEM

S.No	Description	Data
	Compressor	
1.	Type	Oil injected screw compressor
2.	Quantity	___ Nos.
3.	Location	Indoor dusty area
4.	Rated flow of Air Compressor	Suitable for system requirement
5.	Delivery Pressure at 100% Capacity	
a.	Normal Pressure	7 Kg/cm2
b.	Maximum Pressure	7.5 Kg/cm2
6.	No. of Stages	Single Stage

S.No	Description	Data
7.	Cooling Type	Air Cooled
8.	Type of coupling	Direct
9.	Suction filter	Suction Filter Efficiency- 99.99%
10.	Sound level	85dbA at a distance of 1m
11.	**Electrical**	
a.	Design ambient temperature for Electrical Equipment	50 °C
b.	Motor Type	Sq.Cage Induction motor
c.	Motor Winding temperature	Insulation Class F. Temperature rise limited to B.
d.	Motor design temperature	50 °C
e.	Efficiency class	EEF1 / IE2
f.	Type of cooling	TEFC
g.	No. of Hot start & Cold start of motor	Suitable for 3 cold/2 hot starts per hour.
h.	Motor Space heater	Will be provided for above 30kW motor
i.	Degree of Protection	IP 55
12.	**Instrumentation**	
a.	Control panel	Microprocessor based control panel with potential free contact for remote control & monitoring.
	Air Dryer	
1.	Type	Refrigerant type
2.	Capacity	Suitable for system requirement
3.	Quantity	____ No.
4.	Dew point at line pressure	+3 °C
5.	Operating Pressure	7 kg/cm2
6.	Allowable pressure drop	0.3 kg/cm2

Commented [Vp16]: Refrigerant or Desiccant type

Commented [Vp17]: -20DegC for desiccant type

S.No	Description	Data
7.	Max. Inlet Temperature	Compressor outlet temp + 10°C
8.	Sound Level of Air drying unit	< 85 dBA
	Instrument air receiver	
1.	No. of air receivers	1 No.
2.	Capacity of receiver	Suitable for system requirement
3.	Manufacturing Code	IS 2825
4.	Design Pressure	10 kg/cm2
5.	Corrosion allowance	As per Manufacturing standard
6.	Air receiver mounting accessories	Safety valves, Pressure gauge, Electrical Auto Drain Valve in drain line
	Service air receiver	
1.	No. of air receivers	1 No.
2.	Capacity of receiver	Suitable for system requirement
3.	Manufacturing Code	IS 2825
4.	Design Pressure	10 kg/cm2
5.	Corrosion allowance	As per Manufacturing standard
6.	Air receiver mounting accessories	Safety valves, Pressure gauge, Electrical Auto Drain Valve in drain line

FUEL HANDLING SYSTEM

S.No	Description	Data
	Crusher	
1.	Type	Non Reversible Impactor Crusher
2.	Quantity	1 No.
3.	Location	Below Screen
4.	Material Handled	Coal
5.	Bulk Density	800 – 1000 Kg / Cu.m

S.No	Description	Data
6.	Duty	Continuous
7.	Inlet Particle Size	150 mm
8.	Moisture Content	30 % Max
9.	Maximum Inlet Lump Size	150 mm
10.	Crusher Design Capacity	Suitable for system requirement
11.	Operating Capacity	Suitable for system requirement
12.	Crusher Outlet Product Size	< 6 mm
13.	Motor Speed	1000 rpm
14.	Vibration / Sound Level	As per VDI-2056
15.	Inspection Door	Front & Rear Side designed suitably with Dust Tight Seals.
16.	Rotor Shaft	Forged Carbon Steel (C45)
17.	Rotor	This Assembly will be Statically and Dynamically balanced.
18.	Body liner	SAILHARD
19.	Blow Bars (If required)	Chrome Molly alloy steel having superior quality against wear and hardened through depth for 400 to 450 BHN.
20.	Bearings	Heavy Duty, Self-Aligning Anti Friction Spherical Roller type, Sealed from Dust and Weather Tight.
21.	Bearing - Make	SKF
22.	Life of Bearing	25000 Hrs. minimum
23.	Breaker	Breaker plates will be made from Wear Resistant Steel Plates mounted at Inner portion of housing, duly machined and stress relieved.
24.	Drive Base Frame	The Frame will be Designed & Fabricated on Heavy Steel Plates / Sections and Ribbed for additional strength.
25.	Vibration Level of Crusher	As per VDI-2056

S.No	Description	Data
26.	Feed Chute	Chutes will be designed for effective Crushing having matching Flange / Hardware's along with Deflector Plates.
	Vibrating Screen	
1.	Type	Circular Motion Vibrating Screen
2.	Location	Below Belt conveyor & Below Recycling Bucket Elevator/ Belt Conveyor
3.	Material to be Screened	Coal
4.	Quantity	1
5.	Operating Capacity	Suitable for system requirement
6.	Design Capacity	Suitable for system requirement
7.	Duty	Continuous Operation of 24 Hrs. per day
8.	Moisture Content	30 % Max
9.	Grindability Index Considered for Selection	45-70
10.	Screen cloth	Spring Steel
11.	Screen Aperture	6 mm Sq. Screen will be designed in such a way that the holes do not get blocked due to moisture.
12.	Screen Opening	(-) 6 mm
13.	Deck Body	IS 2062 Plates with Adequate Stiffeners
14.	Angle of Deck	12 Deg.
15.	No. of Deck	1 No.
16.	Motor Speed	1000
17.	Drive Arrangement	Through V-belt & Pulleys
18.	Deplugging Arrangement	Through Compressed Air
19.	Frame Material	Fabricated from MS Sections suitably stiffened.
20.	Bearings	Heavy Duty Spherical Roller Bearing - Vibrating Type

S.No	Description	Data
21.	Eccentric Shaft	Will be provided with Stroke Adjustment Counter Weight Plates for adjustment.
	Vibrating feeder	
1.	Type	Electro Mechanical
2.	Quantity	1 no.
3.	Capacity and Range	Suitable for system requirement
4.	Maximum Lump Size	150 MM for Coal
5.	Material & Thickness of Feeder Trough	M.S. 6 mm Thk
6.	Material & Thickness of Liner - Bottom & Side	Sail Hard - 6 mm thk
7.	Number of Vibrations per Minute	1500 (Same equal to Motor RPM)
8.	Range of Amplitude	2 to 4 MM
9.	Type of Drive	Un-Balance Motor
10.	Inclination of Feeder	8 deg
11.	Range of Adjustment of Inclination	5 to 10
12.	Type of Support	Spring Mounted suspension type
13.	Type of Dust Cover	Rubber Gasket
	Magnetic Iron Separator	
1.	Type	Permanent Magnet suspended Type
2.	Location	Raw belt conveyor
3.	Type of Cooling (Oil / Air)	Air
4.	Bottom bumping plate material	SS 304
5.	Lifting Capacity	25 kg
6.	Max. Size of Tramp Iron	-25 mm
7.	Min. Size of Tramp iron	1 mm
8.	Operating Height	250 mm

S.No	Description	Data
	Belt Conveyor	
1.	Conveyor Type	Three roll trough type
2.	Profile / Orientation	Inclined
3.	Material Handled	Coal
4.	Bulk Density	800 kg/cum for volume calculation and 1000 kg/cum for structure calculation
5.	Particle Size fibre length	As per client input
6.	Lump Size (Maximum)	As per client input
7.	Capacity	Suitable for system requirement
8.	Belt Speed	Less than 1m/sec
9.	C-C Distance	As per layout
10.	Lift	As per layout
11.	**Belt**	
a.	Width	As per capacity requirement
b.	Material	N/N
12.	**Gear Box**	
a.	Type	Planetary Type
b.	Holdback	Provided
13.	**Coupling**	
a.	Type Input Side	Pin-Bush Type
b.	Type Output Side	Geared Type
14.	**Pulley**	
a.	**Head Drum**	
i.	Bearing Type / Make	Spherical roller type bearing

S.No	Description	Data
ii.	Rubber lagging	Herring bone type
iii.	MOC	Shell M.S. ERW Pipe, Hub - IS:2062, Shaft - En-8
b.	**Tail / Take-up Pulley**	
i.	Bearing Type / Make	Spherical roller type bearing
ii.	Rubber lagging	Plain
iii.	MOC	Shell M.S. ERW Pipe, Hub - IS:2062, Shaft - En-8
c.	**Snub / Bend Drum**	
i.	Bearing Type / Make	Spherical roller type bearing
ii.	Rubber lagging	plain
iii.	Pulley Material	MS
iv.	Shaft Material	EN-8
v.	MOC	Shell M.S. ERW Pipe, Hub - IS:2062, Shaft - En-8
15.	**Idlers**	
a.	**Carrying Idler / Transition Idler**	
i.	Type	3 Roll 45 deg. Troughing
ii.	Spacing	1200mm
iii.	Idler Housing	Pressed
iv.	MOC	Shell M.S. ERW Pipe, Shaft - En-8, Bearing housing - Pressed steel
b.	**Impact Idler**	
i.	Type	3 Roll 45 deg. Troughing
ii.	Spacing	400mm
iii.	Idler Housing	Pressed
iv.	MOC	Shell M.S. ERW Pipe, Shaft - En-8, Bearing housing - Pressed steel
c.	**Return Idler**	

S.No	Description	Data
i.	Type	Flat
ii.	Spacing	3000mm
iii.	Idler Housing	Pressed
iv.	MOC	Shell M.S. ERW Pipe, Shaft - En-8, Bearing housing - Pressed steel
16.	**Take up Type**	Screw/ Vertical gravity
17.	**Bearing Type**	Spherical roller bearing
18.	**Belt Cleaners**	
a.	Internal	V' Plough, Segmented polymer cleaning block
b.	External	Segmented type multi blade scrapping type
19.	**Skirt Board**	
a.	Type / Location	At Feeding
b.	Skirt Length	3 m
20.	**Deck Plate**	
a.	Location	At Feeding
b.	Material Thickness	2 mm
21.	**Discharge Chute**	
a.	Plate	Mother plate with sailhard liner
22.	**Conveyors Frame Type**	
a.	Gallery	Open
b.	Walk-way	500 mm on one side
23.	**Safety Switches**	
a.	Zero Speed	At tail end
b.	Pull Cord	At every 15 meters
c.	Belt Sway	At every 30 meters in pairs

S.No	Description	Data
	Chain Conveyor	
1.	Material to be handled	____
2.	Capacity (Rated / Design)	Suitable for system requirement
3.	Bulk density of material	____ kg/m^3
4.	Material Temperature	Ambient
5.	Particle size of material	_____
6.	Characteristic of material	Non-Abrasive
7.	No. of Inlets / No. of outlets	1/1
8.	Sprocket CRS	As per layout
9.	Total length of Conveyor	As per layout
10.	Chain Speed	Less than 1m/sec
11.	Casing Details	
a.	Material of Construction	IS 2062 Gr. A
b.	MOC for Liners	Sailhard
c.	Gasket	CAF
12.	Chain & Flight details	
a.	MOC & type of Chain Link	20MnCr5 / Forged
b.	MOC of Connecting Pin & Hardness	EN 24 / 42 to 45 HRC
c.	MOC of Circlip	Spring Steel
d.	MOC of Flight	IS 2062 Gr A
13.	Sprocket Details	
a.	MOC of Rim / Hub	EN 353 / MS
b.	Hardness	55 to 60 HRC

S.No	Description	Data
c.	Drive Shaft MOC	EN8
d.	Type of Bearing	Spherical Roller
14.	Trailing Wheel Details	
a.	MOC of Rim / Hub	EN 353 / MS
b.	Hardness	55 to 60 HRC
c.	Tension Shaft MOC	EN8
d.	Type of Bearing	Spherical Roller
15.	Transmission Details	
a.	Type	Through Suitable Chain & Sprocket type
16.	Safety Features	
a.	Mechanical Shear Pin	Provided
b.	Zero Speed Switch	Provided
17.	Tensioning Arrangement	
a.	Screw Take up / Spring Tension	Screw take-up

Firefighting system

S.No	Description	Data
1.	**Types of Systems**	**Locations**
a.	Fire detection & alarm system	For the MCC room, Cable Cellar and Control room of the power plant.
b.	Fire hydrant system	Hydrant points at Coal conveyors, Boiler operating floor & bunker floor, TG hall staircases, Crusher house staircase, Screen house staircase, Boiler, ESP areas
c.	High Velocity Water Spray system (HVWS)	For lube oil tank and Generator transformer
d.	Medium velocity spray water system (MVWS)	For coal conveyor closed gallery & TG Building cable cellar
e.	Portable fire extinguishers	At strategic locations.

S.No	Description	Data
i.	CO2 Extinguisher (4.5 kg)	- At MCC Room - At TG hall operating floor level - At TG Building Cable gallery - At WTP Building - At WTP MCC Room
ii.	Dry chemical power (6kg / 9kg)	- At TG Building ground floor level - At TG Building First floor level - At TG Building Operating floor - At TG Building Control room - At TG Building MCC room - At TG Building Cable gallery - At WTP Building 0.00M floor - At WTP Building MCC room
iii.	Foam Fire Extinguisher	At TG Building near Lube oil tank area
2.	**Hydrant valves**	
a.	Type	Single headed female oblique type
b.	Code / Standard	IS: 5290,Type A
c.	End Connection	Flanged and drilled to ANSI B16.5
d.	**Material of Construction**	
i.	Body	SS / IS: 3444 Gr.1
ii.	Stop valve	SS / IS: 3444 Gr.1
iii.	Spindle	SS / IS: 6603 Gr. 04 Cr18Ni10
iv.	Hand Wheel	Cast Iron IS: 210 FG 200
v.	Washer, gasket	Rubber IS: 937 Type – A / Neoprene rubber
vi.	Bonnet	SS / IS: 3444 Gr.1
vii.	Gland nut	SS / IS: 3444 Gr.1
viii.	Quick coupling connection	SS: 3444 Gr-1
ix.	Spring	SS: 304 / IS: 6528 Gr
x.	Testing	As per IS: 5290
3.	**Deluge Valve**	

S.No	Description	Data
a.	Type	Diaphragm Style, Vertical or Horizontal Installation
b.	Type of actuation	HVWS-Hydraulic (By fusing of QBD) MVWS-Electric (By detector signal)
c.	End connection	Flanged & Drilled to ANSI B16.1
d.	**Material of Construction**	
i.	Body	Rilsan coated ductile iron
ii.	Diaphragms, Clapper	Nylon fabric reinforced natural rubber
e.	**Accessories**	
i.	Basic vertical trimmings	Provided
ii.	Wet pilot actuator trimmings	Provided (HVWS)
iii.	Wet pilot actuator	Provided (HVWS)
iv.	Electric Trim	Provided (HVWS & MVWS)
v.	Vertical alarm & test trimmings	Provided
vi.	**Water motor gong**	
	Type	Hydraulically driven
	Mounting	Pre-assembled
4.	**Water Monitor**	
a.	Type	Fixed type
b.	Code / Standard	IS: 8442
c.	Coverage	Horizontal 360 & vertical +80 & -45 rotation
d.	End Connection	Flanged & drilled to ANSI B 16.5
e.	**Material of Construction**	
i.	Base flange	M.S. IS 2062.drilled to ANSI B 16.5
ii.	Reducer	M.S. conforming to IS: 1239 Part-II
iii.	Swivel Joint	Bronze IS: 318, LTB-II

S.No	Description	Data
iv.	Locking lever	M.S
v.	Water barrel	Seamless IS: 1239 -PART-I
vi.	Water Nozzle	SS / IS: 3444 Gr.1
5.	**Quarzoid Bulb Detector**	
a.	Type	Pendent type
b.	**Material of Construction**	
i.	Frame	ASTM C 37700 B124
ii.	Bulb	Glass with Gylcerine solution
iii.	Deflector	ASTM C22000 B36
iv.	Button	Brass / Copper
v.	Seal	Belleville Washer coated on both side with Teflon Tape
vi.	Cap	Copper
6.	**4.5kg CO2 type fire extinguisher**	
a.	Standard	IS: 15683
b.	Material Construction	
c.	Body	Seamless Pipe Conforming to IS: 7285
d.	Safety Release	Provided with Discharge Valve
e.	Discharge Valve	Conforming to IS: 3224, wheel Type
f.	Discharge Horn	Non-Conductor of electricity like Polythene Fiber Glass
g.	Syphon Tube	Aluminium conforming to IS: 738
h.	Hose Details	High pressure with stand Hose 1M Length
i.	Filling Ratio	0.667
j.	Accessories Provided	Hose, Safety Pin, Carrying Handle, Wall Bracket & others as per requirement
7.	**9 Ltr Foam Type Fire Extinguisher**	

S.No	Description	Data
a.	Standard	IS: 15683
b.	**Material Construction**	
vii.	Body	Mild Steel (IS: 513)
viii.	Cap	Gun Metal IS 318 Gr. LTB 2
ix.	Neck Ring	Mild steel made out of seamless pipe
x.	Plunger	Brass
xi.	Washer	Rubber
xii.	Piercer	Stainless steel
xiii.	Cartridge Holder & Sealing device	Leaded tin bronze
xiv.	Spring	Steel
xv.	Snifter valve	Brass (IS: 319)
xvi.	Nozzle	PVC
xvii.	Syphon tube	Brass tube (IS: 410)
c.	Water	8.46 Ltr
d.	AFFF Foam	540ml - 6% AFFF
e.	Gas Cartridge	60GMS (IS: 4947)

Air Conditioning and Ventilation system

S.No	Description	Data
1.	Packaged/Split air conditioning unit	For control room at TG building.
2.	Exhaust type ventilation with wall mounted exhaust fans	For TG Hall.
3.	Dry pressurized ventilation with supply air fans & exhaust fans	For MCC room, Cable cellar at TG building
4.	Wall mounted supply fans and Exhaust fans	For the other local MCC rooms