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THE FOLLOWING POWER PLANT IS AVAILABLE FOR SALE WITH US WITH IMMEDIATE DELIVERY:

1 No. - 469 MW Natural Gas based Combined Cycle Complete Power Plant, having the Following Technical Specifications:

PLANT DETAILS:

No. of Units:	One (1) No. of 469 MW Natural Gas based Combined Cycle Power Plant
Year of manufacturing:	2005
Model:	Alstom 13E2 - Dual Fuel (MXL)
Condition:	Commissioned in the year 2008
New/Used/Refurbished	Good operating condition and currently kept under preservation
Cost price:	
Operating hours:	GT 1 – 36,830 EOH GT 2 – 32,752 EOH ST – 33,728 Hours
Wattage:	GT - 152.4 MW x 2 Nos (at site ambient condition of 29 deg C) ST – 166.6 MW x 1 No
Voltage:	15 KV 3 Phases
Frequency:	50 Hz
RPM:	3000 RPM
Fuel type:	Natural Gas & Diesel

Balance of plant	Available
Pictures	Attached
Scope of Supply	Supply of complete 469 MW Natural Gas based Combined Cycle Power Plant
Spares and Parts	One (1) set of Capital spares for Gas Turbine available

PLANT EQUIPMENT'S TECHNICAL DETAILS

COMBINED CYCLE DATA

Operation Data Of Combined Cycle		
CCPP Load	%	100%
Ambient Temp. (dry bulb)	Deg C	29
Relative Humidity	%	70%
Ambient pressure	Bar	1.009
Inlet air pressure drop	mbar	7
Heat Input to the GT (LHV)	MJ/S	429.3
Gross Output of the GT	MW	152.4
Gross Output of the ST	MW	166.6
Gross Output of the CCPP	MW	469
Gross Heat Rate based on LHV	KJ/KWH	6779
Gross Heat Rate based on HHV	KJ/KWH	7524
Speed	Rpm	3000
Power factor		0.8
Gross Efficiency	%	53.17%
GT Efficiency	%	34.40%
ST Efficiency	%	33.41%

GAS TURBINE MACHINE DATA

Description	Unit	Specification
Make	Company	ALSTOM
Model	Type	GT 13E2-Duel Fuel(MXL)
Fuel	Type	Fuel Gas & Diesel Oil
Ambient Conditions(Temp./Pressure /RH)	Deg C/Bar/%	29.0/1.013/70
Gross electrical output	MW	179.9 (ISO) / 152.42(Gas) / 156.54(Oil)
Speed	rpm	3000
Frequency	HZ	50
Compressor	type	AXIAL
Compressor stages	Nos	21
Compressor pressure ratio	Bar	16.5:1
Air Fuel ratio	Ratio	55:1
Number of turbine stages	Nos	5
Number of cooled rotating blade rows	Nos	3
Number of cooled stationary blade rows	Nos	2
Blow-off stages	Nos	4 Valves (4 th ,8 th ,12 th Stages)
Critical Speeds	Rpm	1350/2450/6610
combustor	Type	Single annular
Number of burners	Nos	72 EV
Burner	Type	Dry Low NOx Cone, with premixing
Ignition torches	Nos	2
Flame monitors	Nos	3
TAT max (average max., part and base load)	Deg C	550 °C / 530.6 °C
TIT SP GAS load (gas dry, valid also for part load)	Deg C	1095 °C
NOx emission corrected to 15% O2, dry)	PPM	25 (Gas) , 75(HSD)
Gross electrical efficiency	%	34.62%(Gas) / 33.20%(Oil)
Gross heat rate	KJ/KWH	9756KJ/kWh
Exhaust gas flow	Kg/Sec	511.884(Gas) / 518.908(Oil)
Generator & Exciter		
Generator		WY 21 Z-092LLT
Exciter		Static
Insulation Class	Type	F

Apparent power	MVA	210
Power factor	Cos Phi	0.8
Terminal voltage	KV	15.75
Current	Amps	7698
Reactive Power	MVAR	126MVAR(0.8 Inductive), 62MVAR(0.93 Capacitive)
Cooling	(coolers integrated into bottom of stator housing) Air-water cooling in closed cooling circuit	

Gas Fuel(Evaporative Cooler ON)(LHV:49542 KJ/Kg)		13.9 °C	29 °C	49 °C
Gross electrical output	KW	--	152420	144992
Gross electrical efficiency	%	--	34.62	34.12
Gross heat rate	KJ/KWH	--	6757.343	6804.552
Exhaust gas flow	Kg/Sec	--	511.84	496.757
Exhaust gas Temp	Deg C	--	528.8	534.6
Gas Flow	Kg/Sec	--	8.89	8.58
Gas Fuel(Evaporative Cooler Off)(LHV:49542 KJ/Kg)		13.9 °C	29 °C	49 °C
Gross electrical output	KW	161868	148803	126954
Gross electrical efficiency	%	35.23	34.41	32.69
Gross heat rate	KJ/KWH	6743.162	6754.831	
Exhaust gas flow	Kg/Sec	520.1	506.456	470.608
Exhaust gas Temp	Deg C	533.35	530.4	543.9
Gas Flow	Kg/Sec	9.27	8.73	7.84
Liquid Fuel(Evaporative Cooler Off)(LHV:42000KJ/Kg)		13.9 °C	29 °C	49 °C
Gross electrical output	KWH	170381	156540	133652
Gross electrical efficiency	%	33.99	33.2	31.6
Gross heat rate	KJ/KWH	7192.754	7211.347	7284.057
Exhaust gas flow	Kg/Sec	546.769	518.908	481.317
Exhaust gas Temp	Deg C	515.7	525.9	539.1
Fuel oil flow	Kg/Sec	11.94	11.23	10.07
Gas Flow	Kg/Sec	10.742	10.105	
Lube Oil Tank (11/12MBV10BB001)				
Make		King AG		
Type		PAG		

Dimensions(L x W x H)	mm	11000 X 2800 X 1473	
Capacity	M3	7.55	
Oil tank vacuum	mmwc	15-25	
Lube Oil Tank Air Filter(11/12 MBV10AT001)			
Make		Oscar Fäh AG / 9245 Oberbüren	
Type		45.138.77.126	
Volume flow	M^3/min	7 at 2.8 mbar	
Absolute Filter fineness	µm	2.5-3 with a loading less than 3.5 m²/min	
Material		Impregnated paper	
Lube Oil Cooler (11/12MBV21AC010/011)			
Make		ALFA LAVAL LUND AB	
Type		Plate heat exchanger M15-BFG8	
Dimensions	mm	1460 L x650 Wx1885 H	
Plates	Nos	187 / 185 Effective	
Heat transfer area/heat load	M^2/KW	114.7 / 840	
Plate Heat Exchanger		Hot(Lube oil ISO VG46)	Cold(CCW)
Volume	Lts	145.7	145.7
Flow rate	Lt/Sec	41.27	20.03
Inlet / outlet temp	Deg C	71.9 / 60	53.6/63.81
Pressure drop	Bar	0.884	0.156
Flow direction		Counter current	
Filters		Lube Oil (MBV21A001/002)	Power Oil(MBX21AA001/002)
Equipment			

Make		Pall Industrial Hydraulic	Pall Industrial Hydraulic
Type		PED 97/23/EC Class - S.E.P	HH8671F20DSTWRYE95SF
Filtering medium		LUBOIL ISO VG 46	LUBOIL ISO VG 46
Volume	Lts	183	5
Operating pr / temp	Bar/Deg C	16 / 65	40 / 65
Viscosity		20 mm ² /S	
Bypass valve diff cracking pressure	Bar	1.2	--
Accumulator		Lube Oil	Power Oil
Make		Olaer AG / CH-3186 Dürdingen	Olaer AG / 3186 Dürdingen
Type		IBV 475-8/90	IHV 32 - 210 / 05

Max working pr bar	Bar	16	210
Working temp range	Deg C	-15°C to +90°C	-15°C to +90°C
Gas volume	Lts	454.2	
Useful volume		between 6 bar (87 psig) and 4.5 bar (62.25 psig) at connection P guarantees 67.5 liter with in 2 sec	Between 40 bar and 32 bar at connection Guarantees 3.32 ltr. within 2 seconds
Prefilled to		Po= 3.7 bar (53.65 psig) at 20°C	Po= 27 bar (at 20° C)
HSD Filter Element HSD			NOx
Quantity	Nos	2	1
Material		S.S	S.S
Pressure drop	mbar		200 / 800(max)
Filtration	microns	30	
Filter rate	M^3/Hr	65	65
Rated pressure	Bar(g)	10	10
Vessel capacity	Lts	27	
Ignition Transformer			
Make		LODGE-Flameproof High Energy Ignition Unit	
Type		HEU/16/FP/S	
Power Supply	Volts	230	
Current	Amps	0.5	
Output		16 Joules , 60SPM	
Fuel Gas Skid Filter(11/12MBP02)			
Make		ZUILEMAER B.V/Petrogas Gas Systems	
Service		DUST FILTER	
Max pr. / allowable temp	Bar/ °C	40(G) / 80	
Filtration	microns	50	
Capacity	M^3	260	
GT Air Intake filters (11/12MBL30AT001/AT002)			
Make		G+H SCHALLSCHUTZ GMBH	
Design air flow / filter	M^3/Sec	429	

Filter	microns	5
No of pre filters	Nos	414
Type		High Performance Pocket Filters, Cartridge Mounted In A Frame
Guaranteed pressure drop	mbar	7.0(2.5+4.5)
Max allowed pr drop	mbar	12
No of blow in doors	Nos	5
Opening pressure for blow in doors	mbar	15

Description	Pump										Motor				
	Make	Qty	Stages	NP SH	Suct	Disc h	Flow	Input	Speed	Make	Power	Voltage	Current	Speed	Class/Duty /Prot
		Nos	Nos	Mts	Bar	Bar	M3/Hr	KW	RP M		KW	Volts	Amps	RP M	
Main Lube Oil (11/12MBV21AP 001/02)	ALLWEILER	2	1	5.5	1.05	7.05	142	35	2975	ABB	45	415	74.5	2970	F / IP55 /S1
Emergency Oil (11/12MBV22AP 001)	ALLWEILER	1	1	6	1.05	2.8	101	8	1600 / 1050	EWHO	2.7/8.5	220	14/38	1600 / 1100	F / IP54 /S1
Jacking Oil (11/12MBV50AP 001/002)	Robert Bosch	2	6Cy 1	--	1.8	700	--	--	1320	GAA	2.2	220	12.0	1055	H/ IP55/ S1
Rotor Barring (11/12MBX22AP 002)	REXROTH	1	1	--	--	25	--	--	--	GAA	0.3	220	2.3	1510	F/ IP54/ S1
Power Oil (11/12MBX21AP 001/002)	ALLWEILER	2	1	4.5	1.8	37.5	8.4	12.3	2915	ABB	14	415	24.5	2925	F / IP55 /S1

Nox WATER (11/12MBU32AP001)	SULZER	3	16	2.1	3/6	95.2	15/57.6	218	2980	ABB	230	415	375.0	2979	F / IP55 /S1
Fuel Oil (11/12MBN32AP001)	SULZER	2	14	2.1	3/6	92.4	18/58.3	227.5	2980	ABB	230	415	375.0	2979	F / IP55 /S1
Centrifuse Pump (11MBZ10AP001)	Rickmeier	1	1	--	2	6	--	--	1450	Leroy Somer	3	415.0	6.4	--	F / IP55 /
Vaccum Pump (11MBZ10AP010)	Leybold	1	1	--	--	--	65		1450	--	1.5	415	3.2	1450	F / IP55 /
Wash Cart Pump	DP PUMPS	1	1	--	--	6.3	4.8	--	2850	ABB	7.5	420	4.7	2855	F / IP55 /

Description	Fan/Blower							Motor					
	Make	Qty	Suc t	Dis ch	Flo w	Inpu t	Spe ed	Make	Pow er	Volta g	Curre n	Speed	Class/Duty /P
		Nos	Bar	Bar	M3/ Hr	KW	RP M		KW	Volts	Amp s	RPM	
Propane Gas Ventilation	Luscher	1		15	145				0.55	415	1.25	2800	F / IP55 /S1
Wash Cart Compressor		1	1.013	5	12				8.6	415	4.4	3455	F/IP55
OVEF	UMWE LTTE	4						ABB	1.5	415	3.8	2800	F / IP55 /S1
SAM11 FANS		4			16750			Ferari Bisenger	7.5	415			

SAM12 FANS		2			189 00			Ferari Bisenger	3	415			
SAM13 FANS		2			216 00			Ferari Bisenger	5.5	415			

HRSG SPECIFICATION DETAILS

Make/Year	ALSTOM Power Energy System, Indonesia-2005.						
Boiler Certification Numbers	HRSG-11(HP/IP/LP):AP-4126/AP-4127/AP-4128 HRSG-12(HP/IP/LP):AP-4129/AP-4130/AP-4131						
Type	Water Tube, Vertical Flow, unfired, natural draft Triple Pressure, Horizontal flow of flue gas, Bottom support						
Stack Details	Height:70Mts,Material:Carbon Steel, Design Pr:50mbar,Design Temp.:175° Dia:6.5mts;Exit Velocity: 21.22m/sec						
Parameters	Units	HP Circuit		IP Circuit		LP Circuit	
		NG	Oil	NG	Oil	NG	Oil
Steam Flow	kg/sec	56.945	57.63	11.072	11.33	9.705	11.4
Steam Pressure	bar	96.4	96.9	24.7	24.9	4.85	4.03
Steam Temperature	°C	508.2	505.1	505.9	502.3	153.3	147.1
Blow Down	kg/sec	0	0	0	0	0	0
Attenuation Flow	kg/sec	0.17	0.2	0.03	0.04	--	--
Continuous Blow Down	kg/sec	0.057	0.057	0.01095	0.01095	0.096	0.096
Intermittent Blow Down	kg/sec	17.5	17.5	7.5	7.5	2.8	2.8
Start up Vent Valves Capacity	Te/Hr	60.5 At > 60 bar.		11.8 At > 15 bar.		11.2 At > 2.5 bar.	
Safety Valves							
		OPENIN	CLOSING	OPENING	CLOSING	OPENING	CLOSING
DRUM-1	Kg/Cm2	117	114	35	35.5	8	7.7
	Kg/sec	29.9		4.63		5.86	
	Kg/Cm2	119	118	33.5	35.0	9	8.9
DRUM-2	Kg/sec	29.9		4.63		6.4	
	Kg/Cm2	176		66		--	--
Economizer	Kg/sec	27.49		42.72		--	--
	Kg/Cm2	111.3		30.20		--	--
Super Heater	Kg/sec	14.95		2.47		--	--
		Tubes	Headers	Tubes	Headers	Tubes	Headers
WATER REOUIREMENT							

Economizer	M^3	42	2	10.5	0.5	--	--		
Evaporator	M^3	21.5	1	12.5	0.5	14.3	0.6		
Drum	M^3	36.01		9.43		18.87			
Super Heater	M^3	12	1	6	0.5	--	--		
Total	M^3	116.5		40.5		34.9			
Drum Details									
Design Pressures	Bar	117		35		9			
Design Temperature	Deg C	323		243		175			
Inside Diameter	mm	1981		1219		1524			
Wall Thickness	mm	95		20		12			
Length	mm	10536		7600		9760			
Volume	M^3	36.01		9.43		18.9			
Material		SA299		SA516-70		SA 516 - 70			
Retention Time	Min	2.5		5		8			
Moisture separators (Corrugated Plate Dryers)	Nos	36		16		1			
FLUE Gas Parameters (Stack Outlet)									
Contents (Volume %)	O2	N2	CO2	H2O	Ar	SO2	Flow(kg/s)	Velocity	Temp
Design(Cooler ON - NG)	13.65	73.46	3.08	8.93	0.88	0.00	511.884	21.22	99.9
Design(Cooler Off - Oil)	12.76	71.95	4.39	10.03	0.86	0.0048	518.908	23.91	141.2
Volumes	Water	Steam	Piping	Flue gas	Total				
M^3	144	48	22	5853	6067				

STEAM TURBINE TECHNICAL DETAILS

Description	Units	Specification Details
Model		VLA - HDC080 - 120 / G120 - ZLN - ND33AS - ATG
Manufacturer		ALSTOM POWER
Type		TRIPLE-PRESSURE
Overall length	M	15
Overall height	M	5.3
Overall width	M	7.2
Design Data		
Output load	MW	166.6

Speed	RPM	3000
HP steam pressure	BAR	Max: 93.1 / Min:50
HP steam temperature	DegC	511/435
IP steam pressure	BAR	Max:23.8 / Min:13
IP steam temperature	DegC	510
LP steam pressure	BAR	Max:4.49/ Min: 3.5
LP steam temperature	DegC	150
LP steam exhaust	%	12(Moisture)
Condenser pressure	BAR	0.119
Critical speed(first/second/third)	RPM	860-1250 / 1530-1920 / 2290-2620
HP/IP Section		
HP Inlet section		HDC80/2-G120
Hp stages	Nos	22
IP stages	Nos	12
Hp casing design		Horizontally split
Casing support		Centre-line
Type of HP blading		Reaction
Rotor type		Mono blocked without centre bore
Gland sealing type		Spring-backed labyrinth
Inter-stage sealing type		Labyrinth
Thrust bearing type		Multi-pad
Turbine weight	KG	9000
Weight of rotor blade	KG	15000
LP Section		
LP outlet section		NDS33
LP stages	Nos	6
LP flows		2
Exhaust area	M ²	12.2
LP casing design		Double shell horizontally split
Type of LP blading		Reaction

Type of last stage blading		Free standing
Rotor type		Welded built up
Gland sealing type		Spring-backed labyrinth
Inter-stage sealing type		Labyrinth

Thrust bearing type		Na
Weight of rotor bladed	KG	45000
Exhaust orientation		Lateral
Ejectors / Air Removal System		
Design Data		
Suction Pressure	mbar	32.87
Suction Temperature	Deg C	21.87
Suction Load(Water Vapour / Air)	Kg/Hr	30.9/13.4
Motive Steam Pressure-Service Ejector	Bar(a)	8
Motive Steam Temperature Startup / Service Ejector	Deg C	Saturation-490 / 400-525
Condensate flow(Min./Nor./Max)	M ³ /Hr	180/560/620
Noise level(from 1 meter Distance)	dba	83 f
Startup Ejector (18MAJ50BN001)		
Make		Mazda limited
Stage		1
Motives fluid		steam
Motive steam pressure	Bar(a)	7
Capacity	cum/hr	550
Final suction pressure:	Bar(a)	0.2
Evacuation time for 0.7bar(a) / 0.2bar(a)	minutes	2 / 10
Consumption	Kg/hr	8750
Minimum / maximum temperature	°C	sat/490
Noise level at 1 m from silencer	dB (A)	95
Steam jet Ejector		First Stage Second Stage
Make		Mazda limited
Qty	Nos	2(1Operating+1 Standby)
suction Pressure	mbar	32.78 300
Discharge Pressure	mbar	300 1037
Motive Steam pressure	Bar(a)	8 8

Motive Steam Consumption	Kg/Hr	260	78
Condenser		Inter	After
Type		Shell and Tube	
Quantity		2(1 Operating+1 Standby)	
CW inlet /out let Temperature	°C	45.3/46.36	46.36/46.67
CW quantity (min./nor./max.)	m ³ /hr	180/560/620	180/560/620
Surface area	m ²	15	7
Tube length / qty / pass	meters	1400/140/1	700/140/1
CW side velocity	m/sec	0.9/2.71/3.0	0.9/2.71/3.0
CW side pressure drop	Bar	0.015/0.135/0.165	0.012/0.114/0.139
Design pressure (shell/tube)	kg/cm ² g	1.5/18	1.5/18
Design temp (shell/tube)	°C	250/80	250/80
Gland Steam Condenser(18MAW30AC001)			
Type		CSKK36-1F-2V	
No. Of tubes / area	m ²	143 / 14.8	
Tube dimensions	mm	22 O.D X 0.7 SWG X 1500 L	
Tube material		STAINLESS STEEL X6CrNiTi 18-10 / 1.4541	

STEAM TURBINE AUXILIARIES

Description	Pump								Motor						
	Make	Qty	Sta g	NPS H	Suc t	Disc h	Flow	Input	Speed	Make	Pow er	Volt	Current	Speed	Class/Duty/Prot
		Nos	Nos	Mts	Mts	Mts	M3/Hr	KW	RPM		KW	Volt s	Amps	RPM	
Auxiliary Oil	BUFF ALO	1	1			17.7	285		2900	ABB	22	415	37.5	2930	F / IP55 /
Emergency Oil Pump	BUFF ALO PUM	1	1						2900	Reliance electri	2.3	220	14.0	1500/4500	H / IP54
Turning Gear	REX	1				283/80	19/2		1450	ABB	22	415	53.0	1475	F / IP55 /

Power Oil Pump	LEIS TRIT Z	2					3			ABB	22	415	37.5	2930	F / IP55 /
Gland Steam	WIRZ VEN TILA	2	1							ABB	3	415	6.3	2860	F / IP55 /

Steam Dump Device Capacity	100%(Boiler maximum Output)		
Steam Flow	Kg/Sec	69.7(HP+IP)	
Steam Pressure at control valve inlet	Bar	HP:92.9	IP:23.7
Steam Temperature at control valve inlet	Deg C	HP:493.3	IP:490.6
Steam Temperature at SDD inlet	Deg C	505	
Main condensate injection Flow	Kg/sec	24.8	
Main Condensate Temperature	Deg C	80	
Design over pressure	Bar(g)	1 st Stage:46	2 nd Stage:6/-1
Design Temperature	Deg C	517	498

Condenser(18MAG01 AC 001)		
DESIGN	UNIT	Data
Type		CM/5 45+58-2-108.6-4x3064/24/.5/SS
Passes	Nos	2
Diameter	mm	0.7
Diameter	mm	0.5
Tubes	Nos	12256
Condenser(18MAG01 AC 001)		
DESIGN	UNIT	Data
Type		CM/5 45+58-2-108.6-4x3064/24/.5/SS
Passes	Nos	2
Diameter	mm	0.7
Diameter	mm	0.5
Tubes	Nos	12256

CLOSED COOLING WATER SYSTEM

Plate Heat Exchanger			
Make		IDMC Limited	
Model	Type	S-188	
Quantity	Nos	2	
Flow	Type	Counter current	
		Primary side	Secondary Side
Fluid		Hot(CCW)	Cold(MCW)
Flow	M ³ /Hr	720	720
Inlet / Out Let Temperature	Deg C	47.8 / 34.3	30.5 / 44
Design Temperature	Deg C	60	60
Operating Pressure	Bar	4.3	
Design Pressure	Bar	7	
Heating Exchanged	Kcal/h/Mw	9622800/11.18	

DE AERATOR & FEED WATER TANK

Feed water Tank(18LAA10BB001 / 18LAA10 AC001)			
Make		ALSTOM	
Type		SWB 34-127	
Design pressure gauge	Bar(g)	3.0 / -1.0	
Design temperature	°C	160	
Volume	m ³	139	
Net contents	m ³	102	
Diameter x Length	m	3.4 x 15.0	
Operating Data(WITH 100% TURBINE LOAD, HEAT BALANCE)			
		FUEL GAS	FUEL OIL
Feed water outlet flow	Kg/s	197.3	204.5
Pressure	bar	0.2	2.7
Temperature	°C	60	130
Dearating (oxygen)	%ppb	7	7
DEARATOR			
Make		ALSTOM	
Type		MVE/H22-0.5	
Diameter	mts	2.2	

Operating Data(WITH 100% TURBINE LOAD, HEAT BALANCE)			
Fuel	Type	GAS	OIL
Steam flow	Kg/s	0	23.06
Steam pressure	kg/m ³	0.2	2.7
Temperature	°C	60	130
Main condensate flow	kg/s	160	141.4
Main condensate I/p temp	°C	38.8	37.4

WATER STEAM CYCLE DRIVES

Description	Pump									Motor				
	Make	Qt	Sta	NPS	Suc	Dish	Flow	Inpu	Speed	Make	Power	Voltag	Current	Class/Duty/Pr
		No	Nos	Mts	Mts	Mts	M ³ /	KW	RPM		KW	Volts	Amps	
HP Boiler Feed	sulzer	3	11	4	2/2 7	1325	220	1004 .1	2980	CGL	1185	6600	21/263	F / IP55 /
LP boiler Feed	sulzer	3	6	4.25	2/2 8	450	155	249. 35	2950	CGL	340	6600	8/35	F / IP55 /
Main Cooling	Worth ing	3	1	--	--	26.7 6	1380 0	104. 88	498	CGL	1250	6600	62/144	--
Condensate Extraction	Sulzer	3	3	1.9	3.4	135	334	162. 83	1475	CGL	175.08	415	324.0	F / IP55 /
Closed Cooling	Flow More	2	1	--	300	250	720	87.9 7	1485	ABB	110	415	185.0	F / IP55 /

SWITCH YARD EQUIPMENT TECHNICAL DATA

400KV SF6 Breaker		
Make		ALSTOM LIMITED, INDIA
Type		GL 316 (SF6)
Rated voltage	KV	420
Normal current	Amps	2000
Power frequency withstand voltage across contact	KV (RMS)	610
Power frequency withstand voltage to earth	KV (RMS)	520
Lightning impulse withstand peak voltage	KV	1425

Rated short time withstand current, 3sec	KA	40
Short circuit making current peak	KA	100
Line Charging breaking Current	Amps	600
Operating sequence	sec / min	0-0.3S-CO-3MIN-CO
Total Mass of SF6 Gas	KG	45.5 PER POLE
Sf6 gas pr at 20degc , 1013mpa (g)	M Pa	0.85
Pressure switch will give alarm/cut off	M pa (A)	0.74 / 0.71 AT 20 DEG C.
Making time / breaking time	mill sec	117 / 22
Tripping and closing circuit voltage	Volt DC	220
Isolator		

Make		GR POWER SWITCHGEAR LTD
Type		TRIPLE POLE HCB
Voltage	KV	420
Current	Amps	2000
Closing time	secs	8.0-10.0
Earth Switch		
Operating Mechanism		Manual
Control	Volt DC	220V DC
Surge Arrestor		
Make		ALSTOM
Rating KV (RMS)	KV (RMS)	390
Type		ZODIVER
Style		SMX, GAPLESS
Material		ZINC OXIDE
Current Transformers		
Make		Alstom Instrument Transformers
Type		Oil Filled Hermitically Sealed
Design		DEAD TANK
Voltage / frequency	KV / HZ	420 / 50
Current	Amps	2400
No. Of primary winding	Nos	1
No of cores per current transformer	Nos	5
Current ratio(for all cores)	Amps	2000-1000-500 / 1
Capacitive Voltage Transformers		
Make		Alstom instrument transformers
Type		Oil filled

Rated primary voltage	KV	400/SQRT 3
Rated secondary voltage	KV	110/SQRT 3
Accuracy class		713-B-110 / 713-B-111
Rated capacitance for CVT		PF 4400 (+10/-5%)
No. Of secondary windings	Nos	Three for bus and line CVT one for ict bay CVT
Connection		STAR

GT GENERATOR CIRCUIT BREAKER TECHNICAL DATA

Make		ABB
Type		
Rated voltage	KV	23
Rated continuous Current	K Amps	9.6
Rated full wave impulse with stand peak voltage	KV	150
Rated short circuit duty cycle		CO-30min-CO
Rated short circuit breaking current symmetrical	KA	80
Rated interrupting time	ms	60
Making time / breaking time	miLli sec	

GENERATOR

Description	Units	Specification Details
KKS number		11/12/18MKA10
Type		50WY21Z-092 With Static Excitaton
Rated active power	MW	168
Rated apparent power	MVA	210
Rated power factor	PF	0.8
Armature voltage	Volt	15750+ 5.0% / - 5.0%
Rated current / number of phases	Amps/ PH	7698 / 3.0
Connection		3-STAR
Stator winding insulation	Class	F
Generator field current at no load	Amps	397
Generator field voltage at no load	Volt	73
Generator field current at rated output	Amps	1555

Generator field voltage at rated output	Volt	304
Field winding. Insulation	Class	F
Station core and field winding. Coolant		AIR
Generator output with one cooler out of service	%	66
Short-circuit ratio SCR	SCR	0.56 SCR
Generator total losses at rated load	KW	1136
Generator Slip Ring Brushes		
Material		Carbon
Number in use	Nos	30
Generator Cooler (11/12/18MKA13AC100/200/300/400)		
Make		GEA
Type		Closed Cycle Counter Flow
Design capacity	KW	1570
Surface area / heating load		2629 M ² / 2333 kW
Number of coolers	%	4 X 25
Excitation		
Make		Alstom
Rated Current	A	1987
Rated Voltage	V	389
Ceiling Current	A	2488
Positive Ceiling Voltage	V	608
Negative Ceiling Voltage	V	-527
Excitation Transformer		
Make		
Type		Cast Resin acc. IEC 76 & 148
Rated Power	KVA	1460
Secondary Voltage	KV	15.75
Primary Voltage	KV	520
Insulation Class		F
Starting Excitation		
DC Breaker		OETL 630K4
Design Current	Amps	295
Design Voltage	Volts	60
Control voltage	Volts	220VDC

Field Flashing		
DC Breaker		IOR-85-20 AMA
Design Current	Amps	192
Design Voltage	Volts	30
Control voltage	Volts	220VDC
Supply Voltage	Volts	415
Transformer Secondary voltage	Volts	25V AC
Transformer Rating	KVA	7
Rectifier		KGDK020S025 M01
De excitation Circuit		
Type	MEGT 2007 from GE Motor charged, SU controlled. Spring loading to OFF acc. To FV2	

PLANT SWITCHGEAR TECHNICAL DATA

6.6 KV Switch Gear & Breaker		
Make		ABB
Type		HPA,SF6
Rated voltage / maximum voltage	KV	6.6 / 7.2
Rated current	Amps	2000/1600/1250
Operating time	msec	45(Opening) / 75(Close)
Short circuit rating for 1 sec	KV	40
Short time current for 1 sec	KA rms	40
Total breaking time	mill seconds	60 (45 TO OPEN + 15 FOR ARCING)
Total closing time	mill seconds	75
Operating SF6	Bar	3.0-3.5(Normal) / 2.8-3.5(Minimum)
Volume of SF6	Kg	0.8(0.25/Pole)
Breaker closing / Opening		Spring Operated / Shunt Trip
415V Circuit Breaker		
Make		Schneider Electric India Pvt. Limited
Type		Master Pact for 3200A, Enerpact for 3200A
Continuous current carrying capacity	Amps	3200
Rated operating duty		CO-3min-CO
Total tripping time	msec	<40
Total closing time	mill sec	<70
Type of arc control		AIR
Breaker Opening / Closing		Spring Operated / Shunt Trip

6.6KV Circuit Breaker(CANAL PUMP HOUSE)		
Make		MEGWIN
Type		Vacuum
Rated voltage / current	KV / Amps	6.6 / 1250
Short time current for 3 sec	KA Rms	40
Breaker closing / Opening		Spring Operated / Shunt Trip
415V Circuit Breaker(CANAL PUMP HOUSE)		
Make		L&T
Continuous current carrying capacity	Amps	1250
Type of arc control		AIR
Breaker closing / Opening		Spring Operated / Shunt Trip

TRANSFORMERS TECHNICAL DATA

Transformer		Step Up (11/12/18BAT 10)	Station Service (11BBT10/20)	Startup (11BPT10)	Unit Auxiliary (11/12BBT10)	Auxiliary (18/19/20BFT10 &20)	Canal Pump House
Quantity	Nos	3	2	1	2	6	1
Make		AREVA T&D	ALSTOM	ALSTOM	ALSTOM	ALSTOM LTD,	Voltamp Transformer
Type of Cooling		OFAF	ONAN/ONAF	ONAN	ONAN	ONAN	ONAN
Type		2 Winding Oil Filled	2 Winding Oil Filled	2 Winding Oil Filled	2 Winding Oil Filled	2 Winding Oil Filled	2 Winding Oil Filled
Rated Capacity	MVA	210	15/20	5.2	1.6	2000	750
Rated Voltage HV /	KV	400 / 15.75	15.75 / 6.75	6.6/2.1	6.6/.433	6.6 / 0.433	6.6 / 0.433
Rated Current HV / LV	Amps	303.5 / 7707.1	549.9/1283(15M VA)733.1/1710.7 (20MVA	454.88/1429. 63	139.96/2133.4	175 / 2666.7	65.61 / 1000.83
Connections MV /		Y / ▲	▲ / Y	▲ / Y	▲ / Y	▲ / Y	▲ / Y
No Load/ Full Load Losses	KW	150 / 565	14.5 / 71at 15MVA & 125 at 20MVA	4.2/45	2.0/15	2.5 / 19.5	1113/7416

Max / Full Load Efficiency at 75 OC & 0.8 PF	%	99.604 / 99.738	99.056 / 99.548	99.471 / 98.831	99.320 / 98.689	98.64 / 99.307	98.60/98.33
Oil/ Winding Temperature raise	DegC	50 / 55	50 / 55	50 / 55	50 / 55	50 / 55	50 / 55
Oil Capacity	Lts	68000	8400	2800	880	1200	525
Conservator Oil Capacity	Lts		630	235	125	88	
Conservator Level High & Low	Lts		420	156	83	58	

TAPPINGS							
Make		BHEL	Alwaye Engg, Works		Alwaye Engg, Works	Alwaye Engg, Works	
Type		REVERSING	Off-Circuit Rotary	Off-Circuit Rotary	Off-Circuit Rotary	Off-Circuit Rotary	Off-Circuit Rotary
Range - Steps X % Variation		+10% TO - 10% X 1.25%	+/- 5% X 2.5%		+/- 5% X 2.5%	+/- 5% X 2.5%	+/- 5% X 2.5%
Taps Provided		HV Winding	HV		HV	HV Winding	HV Winding
Steps /Step Voltage	Nos / Volt		4.0 / 393.75		4.0 / 165	4.0 / 165	5.0 / 165

STANDBY DIESEL GENERATOR SET

Diesel Engine		
Make		Cummins
Type		Veeconfig/VT-A-28-G51
Rating	KW	500KW at 0.8Lag
Speed	rpm	1500
Critical speed	rpm	2100

Cylinders	Nos	6
Method of starting		Electrical, Self starting
Time required for starting	Sec	10 Intervals between starting (3 Sec)
Governor		Electronic
Vibration	microns	250-300
Overload capacity	%	10
Fuel / Lube oil consumption		
Full Load	Kg/Hr	146/BHP/Hr
3/4Load	Kg/Hr	151/BHP/Hr
Fuel Tank	Lts	1010
Lube oil pressure	Kg/Cm2	0-7
Lube oil consumption	Gms	0.18/BHP
Specification		15W 40
Generator set		
Make		STAMFORD
Type		HC634W1(self Excited)
Rating	KVA	625
Rated current	Amps	870
Terminal Voltage		415V +/- 0.5%
Frequency	HZ	50
Over load capacity		50%
Excitation current		2-5Amps 52V
Insulation		H

DC & UPS SYSTEM

220V DC /24V DC CONVERTERS

Quantity	Nos	4
Make		Statcon power controls ltd
Type		DC to DC
Input DC	V	220
Maximum Output	Watts	600
Output DC	V	24(22-26 Adjustable)
Output current	Amps	10.5
Cooling		Natural
Guaranteed efficiency	%	>90

220V DC SYSTEMS TECHNICAL DATA					
Location	Unit	GT-1/2	Station	SWYD	Canal Pump House
Make		GUTOR	STATCON power Controls LTD	STATCON Power Controls LTD	DUBAS
KKS		11BTL/BTM	19BTL/BTM	19BTP/BTN	FCBC+DVR+DCD B
Type			SFCB-220	SFCB-48	
Voltage		220	220	48	24
Rated Capacity	KVA	82	357		
INPUT AC	Volts/Hz	415 / 50	415 / 50	230 / 50	230 / 50
Input Current (Battery	Amps	113.7	497	35	20
Output DC (Float/Boost)	Volts/Cell	2.43 /2.59	2.23 /2.7	2.23 / 2.70	2.2- 2.4 / 2.6-3.3
Output Current	Amps	250	850	70	20
220V DC BATTERY BANK(11BTA10/BTB10)					
Banks	Nos	2	2	2	2
Make		HOPPECKE	EXIDE	EXIDE	AMCO PWR SYS.
Type		OSP HC680	TH1600H HDPII	TM120H HDPII	Nickel Cadmium
Type of Cell		Led Acid Tubular	Led Acid Tubular	Led Acid Tubular	Dry
Rated Capacity for 10Hrs at 27	Amp-Hour	680AH	1600AH	120AH	100
Voltage(Float/Equalizing/Ope	Volts/Cell	2.20 / 2.30/ 2.05	2.20 / 2.30/ 2.05	2.20 / 2.30/ 2.05	2.20 / 2.30/ 2.05
Cells in Battery Bank	Nos	108	108	24	20
Efficiency after 10Hrs Discharge	%	>90	>90		
UPS SYSTEM					
		GT-1/2	Station	DM Plant	--
Quantity	Nos	4	2	2	--

Make		GUTOR	HI-REL	LIBERT(Emerson)	--
Type			PWM, IGBT Based	True online Double conversion	--
Ac Output	V/HZ/Phi	230/50/0.8	230/50/0.8	230/50/0.8	--
Inverter Capacity	KVA	15	70	10	--
Output Current	Amps	63	304		--
DC INPUT		220 V DC	220 V DC	351V/32A/500ma	--
Rated Current	AMPS	78	282/12	43.4	--

MAIN COOLING WATER SYSTEM

Cooling Tower		
Make		PAHARPUR COOLING TOWERS LTD
Type		Induced draft counter flow
Model NO		84848-6.0-09
Type of Fill		PVC
Number of Cells	Nos	9.0 (8 WORKING+1 STAND BY)
Liquid Handled		Circulating water at 4 C.O.C
Flow per Cell / Max Flow	m ³ /hr	3275 / 4020
Design Inlet / Outlet Temp.	DegC	41.7 / 30.2
Cooling Range / Approach	DegC	11.5 / 5.0
Design Wet Bulb Temp.	DegC	24.6 (29Deg C & 70% RH)
Effective Capacity(Max/Min Level)	m ³	2730
Heat Load	Kcal/hr	3176.87 E5
Blow Down	m ³ /hr	167
Cycles of Concentration	coc	4
Makeup Flow	m ³ /hr	709
CW Flow Rate	m ³ /hr	26200

INSTRUMENT AIR COMPRESSOR

Make		INGERSOLL-RAND(I) LTD
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Speed	RPM	550
Stages		2
Capacity	Nm ³ /Hr	450(14.4PSI, 42 Deg C, 70% RH)
Discharge pressure	Kg/Cm ²	8.7(8.5 After cooler)
Air Receivers		
Instrument Air Capacity	M ³	12
Service Air Capacity	M ³	5
Safety Valves		
Inter cooler safety valve	PSIG	45
After cooler safety valve	PSIG	135
Cooling Water side	PSIG	74
Instrument Air Receiver	Kg/Cm ²	9
Service Air Receiver	Kg/Cm ²	9.35
AIR DRYING UNIT		
Make		GEM
Quantity		2(1W+1S)
Type		Desiccated, Blower Reactivated Type
Capacity	m ³ /hr	450
Air Temp	Deg C	Inlet:45(Max), Outlet:45-50
Cycle time	Hrs	8(Adsorption) + 8(Regeneration)
Heating / Cooling /Re-Pressurization	Hrs	5 / 2.5 /0.5
Pressure Drop across Dryer	Bar(g)	0.25
Dew Point of outlet air	Deg C	-40 Deg C at Atmospheric pressure
Desiccant		
Type		Activated Alumina
Quantity	Kgs/tower	370

FUEL OIL SYSTEM

Type	Cylindrical, Vertical, Non-Pressure, fixed cone roof & floating suction cum swivel joint assembly	
Quantity	Nos	2
Capacity	M ³ /KLts	4500 / 5325
Dimensions(DXH)	Mts	20 X 15.7
Liquid Level Height	Mts	14.325
Fuel Parameters		
Lower heating value	KJ/KG	42000
Acidity, total	mg of koh/g	0.2
Ash	by mass	0.005
Carbon residue	%	0.15
Cetane number		48
DENSITY AT 15 c	kg/m3	820-870
Total sulphur	%by mass	0.25
Calcium(ca)max	ppm	2
Vanadium(v)max	ppm	0.5
Nickel(Ni)max	ppm	1
LEAD+ZINC(Pb+zn max)	ppm	0.5
TOTAL HEAVY METALS(V+Pb+zn+si)MAX	ppm	1
Water and sediment(max)	%	0.1
Pour point(max)	Deg C	10 c below average temp. in winter
Fuel oil system Filters		
Unloading Pump suction	Microns	500
Forwarding pump suction	Microns	200
Oil recovery pump Discharge	Microns	500
GT Fuel supply pump suction	Microns	30
Foam Tank		

Type	Cylindrical, Horizontal & Flat Ends, FRP lining	
Nos		1
Capacity	KLts	1.65(1.5 Effective)
Dimensions	D X H	1.0 X 2.1
Working Pressure	Kg/Cm ²	0.1 (0.105 Design)
Working Temperature	Deg C	50
Fuel Oil Storage Tanks(MVW Spray System)		
Discharge Density	Lt/Min/m ²	3
Discharge Pressure		1.4(Min) / 3.5(Max)
Foam System		
Discharge Density	LPM/M ²	5
Pressure at Foam unit inlet	Kg/Cm ²	3 to 7

FUEL GAS SUPPLY SYSTEM

DESIGN	UNIT	DATA	
Fuel Gas Composition	Present		Design
Methane	%VOL	91.06	98.04
Ethane	%VOL	3.51	1.39
Propane	%VOL	2.02	0.22
I-butane	%VOL	0.27	--
N-butane	%VOL	0.52	--
I-pentane	%VOL	0.12	0.08
N-pentane	%VOL	0.1	--
Nitrogen	%VOL	0.2	--
Co ₂	%VOL	1.93	0.27
C ₆ plus	%VOL	0.21	--
H ₂ O	PPM		<100
Density	KG/M ³	0.78	--
Specific gravity		0.63	--
LHV	KJ/M ³	37177	44628.41
HHV	KJ/M ³	41150	49542
UEL	%	3.8	--
LEL	%	17	--
Auto ignition temperature	Deg C	>482	--
Main inlet Emergency and safety shut down skid Operating Conditions			

Gas Flow (Nor/Max/Min)	Kg/Sec	18.54/20.4/0.6
Pressure(Nor/Max/Min)	Bar	28.2/40/28.2
Temperature(Nor/Max/Min)	Deg C	30/50/10
Pressure reduction skid Operating Conditions		
Gas Flow (Nor/Max/Min)	Kg/Sec	18.54/20.4/0.65
Skid inlet Pressure(Nor/Max/Min)	Bar	25.7/40/25.7
Skid outlet Pressure(Nor/Max/Min)	Bar	23.85/23.85/23.85
Temperature(Nor/Max/Min)	Deg C	30/50/10
Fuel Gas Scrubber(19EKB10AT001)		
Make		Gastech Process Engineering (IND) Pvt Ltd
Design pressure	bar(g)	45
Design temperature	°C	60
Capacity gas	Kg/Sec	20.4
Dust separation efficiency	microns	99.99% >5
Gas controlling Skid		
Make		ZUILEMAER B.V , HOLLAND
Design temperature	°C	80
Capacity	m ³	260
Condensate Tank(19EKR10BB001)		
Make		Gastech Process Engineering (IND) Pvt Ltd
Design pressure	bar (g)	3
Design temperature	°C	60

GAIL GAS STATION:

Parameter	Unit	Filtration Skid	Pressure reducing skid	Metering Skid
Design Code		B-31.8	B-31.8	B-31.8
Design Pressure(I/L)	Kg/Cm ²	72	72	49
Design Pressure(O/L)	Kg/Cm ²	NA	40	NA
Temperature	Deg C	0 - 65	0 - 65	0 - 65
Operating Pr(I/L)	Kg/Cm ²	35-65	35-65	25-40
Operating Pr(O/L)	Kg/Cm ²	NA	25-40	NA

Operating Flow	MMSCMD	1-2.2	1-2.2	1-2.2
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SLAM SHUT OFF VALVES & PRESSURE CONTROL VALVES DATA:

Parameter	Unit	Slam Shut Off valve		Pressure control valve
		19EKG01AA001 (Near Gail)	19EKG10/20AA004 (Control Skid)	
Manufacturer		Gortor Controls	Gortor Controls	--
PS/PE-Max	Bar	50	50	50
TS / PT	Deg C / Bar	-20 to 60 / 75	-20 to 60 / 75	-20 to 60 / 75
WAO	Bar	33-46	23-25	--
WAU	Bar	0-1.8	0-1	--
PSO	Bar	43	26	--
PSU	Bar	1	0	--
AGO	Bar	2.5	2.5	--
AGU	Bar	5	5	--
WHO	Bar	20-48	20-48	8-50
WHU	Bar	0-5	0-5	20-50

CONDENSER TUBE CLEANING & DEBRIS FILTER

Ball injection nozzles		
Quantity	Nos	4
Cleaning Balls		
Make		M/s Koller GMBH
Diameter	mm	25
Type		Sponge
Ball vessel		
Capacity	m3	0.05
Ball separator		
Quantity	Nos	2
Make		Multitex

Flow	m3/hr	18000
Debris Filter		
Make		MultiTex
Type		Automatic Self Celaning
Quantity	Nos	2
Fluid		Auxiliary Cooling Water
Design /Operating Pressure	Bar	10 / 6
Design /Operating Temperature	Deg C	60 / 30-60
Flow (Normal / Max)	M3/Hr	720/800
Flushing Flow	M3/Hr	54
Flushing Cycle	min	3
Back Flushing per day	Cycles/Day	3
Filtration rating	mm	1
Pressure Drop (Clean / Dirt)	Bar	0.05 / 0.15

HEATING VENTILATION & AIR CONDITIONING SYSTEM (HVAC)

Compressor (19SAC20AN001/002)		
Make		VOLTAS
Type		Open - Reciprocating
Refrigerant/ first charge	Kgs	R-22 / 136
Rated capacity	TR/KW	70/245
Cooling load capacity	TR/KW	60/120

PACKAGED & SPLIT AIR CONDITION SYSTEM

SWYD		
Quantity	Nos	3
Make		VOLTAS Ltd
Model		DPUW SC110-PACKAGED UNIT
Capacity	TR/KW	70 / 20
Cooling Load	TR/KW	62.3 / 17.9
DM Plant		
Quantity	Nos	2

Make		VOLTAS Ltd
Model		DPUW SC110-PACKAGED UNIT
Capacity	TR/KW	35 / 10
Cooling Load	TR/KW	28 / 8
GT Container		
Make		VOLTAS
Type		Package ac condensing unit
Model		DCU NDD

AIR WASHER UNITS

Air Washer Unit		
Units	Nos	5
Type		Evaporative cooling
Make / Model		Roots / RC-D-400
Flow	M ³ /Hr	72000
Saturation Efficiency	%	90
Velocity across units		1.85
Air charges	Nos	5

FIRE HYDRANT & SPRAY SYSTEM

HYDRANTS STATUS

Area	Hydrant Points	Escape Hydrants	Water Monitor
Plant	47	11	08
Administration Building	02	--	--
Gail Area	03	--	02

Gas Turbine CO2 System Cylinders:		
Make		M/s GINGE KERR(Denmark)
Working Pressure	Bar	140
Cylinder Volume	Lts	67.5
CO2 Gas Filling	Kg	45
Total Weight	Kg	123 Kg Filled /78 KG Empty

Dimensions	mm	267 DIA X 1510 mm H
All areas are flooded with Initial Discharge for 1 min	%	37 % CO2 cons By Volume
Extended Discharge for 20 min	%	34 % CO2 cons By Volume
Flooding Factor	Kg/M ³	0.8
Multiplication Factor	Ratio	1.1

Cylinders Discharge	Main Bank	Standby Bank	Thermal Block	Auxiliary Block	Exhaust End Bearing	Cable cellar
Initial	9	9	8	5	1	5
Extended	19	19	13	8	19	--

Areas	Detectors Type
Critical areas in CCR, SWGR room,	Combination of Ionization(ISD) & Photoelectric smoke detectors (PSD) Per 50m ² of Floor area
Other areas/office in CCB, Off-site SWGR Room, SWYD CCR.	Ionization(ISD) Smoke detector per 50m ² of floor area
Pantries and Battery rooms	Heat Detectors
GT Thermal block enclosures	Dual optic (infra-red)
Exhaust End bearing	Heat & Continuous Length Thermal Detector
GT- Auxiliaries equipment	Dual optic (infra-red) flame & rate of rise detector
Ignition Block	Gas Detector for propane
GT Gen Enclosure (bearing protection)	Rate of rise of detector
GT Control module, Battery module, unit starting module excitation Equipment E-module cable vault, generator breaker electrical cabinet	Smoke detector

HVW & MVW SPRAY SYSTEM DETAILS

Description	Actual Water require LPM	Effecting Working Pressure kg/cm ²	Max. Rated Pressure Kg/Cm2	Nozzles Qty Nos	Operation	Discharge Density
SUT-1(11BAT10)		3.5-5	12.3		Auto	Lt/min per 2

SUT-2(12BAT10)		3.5-5	12.3		Auto	10.21
SUT-3(18BAT10)		3.5-5	12.3		Auto	10.21
SST-1(11BAT20)	1794.2	3.5-5	12.3	18(k-42) & 48(k-23)	Auto	10.21
SST-2(12BAT20)	1794.2	3.5-5	12.3	18(k-42) & 48(k-23)	Auto	10.21
UAT-1(11BBT10)	947.8	3.5-5	12.3	24 (k-42)	Auto	10.21
UAT-2(12BBT10)	947.8	3.5-5	12.3	24 (k-42)	Auto	10.21
Start up Transformer	1375	3.5-5	12.3	12 (k-42)	Auto	10.21
Lube oil Tank	1000	3.5-5	12.3	24 (K-23)	Auto	10.21
HSD Storage Tank-1	3023	1.4 -3.5	12.3	56	Manual	3.0
HSD Storage Tank-2	3023	1.4 -3.5	12.3	56	Manual	3.0
SWYD Cable Gallery	1336.5	1.4 -3.5	12.3	29(K-22) &5(K-30)	Auto	12.2
CCR Cable Gallery	1336.5	1.4 -3.5	12.3		Auto	12.2
Foam Protection System		3.7	NA	NA	Manual	5.0
Hydrant System	NA	3.5		NA	Manual	NA

PRE-TREATMENT

CASCADE AERATOR(19GBC10AT001)		
Make		UEM INDIA LIMITED
No of units		1
Design flow rate	M3/Hr	900
Maximum flow rate	M3/Hr	1080
SOLID CONTACT CLARIFIER(19GBB10AT001)		
Make		TRIVENI
Model no		H-40 LT
No of units		1
Operation		Continuous
Design flow rate	M3/Hr	900
Maximum flow rate	M3/Hr	1080 (120% of design flow)
Guaranteed outlet water quality		
Guaranteed Effluent Turbidity/ TSS	NTU/mg/lit	<10 / 12
Guaranteed Effluent Turbidity at20% overload	NTU/mg/lit	<12 / 12
Colour	Hazen	20 Pt- Co Scale

Residual Chlorine	mg/Lt	5.00
Mn		Nil
pH		7.3-7.8
Oil & Grease		Nil
Iron, BOD, Organics, Mn, H2S in Clarifier outlet (in suspended form)		Nil
Sludge disposal system		
Sludge bleed , continuous/intermittent		Intermittent
No of sludge blow down pipes, size	NB	One no. 300
Chemical dosing		
Chemicals dosed		Alum, Lime and Coagulant aid
Dosing points: Alum/Lime/Coagulant aid		Reaction zone of Clarifier / Inlet pipe of Clarifier / Reaction zone of Clarifier
Chemical dosing rate: Alum/Lime/Coagulant aid	ppm	50 / 20 / 2

CLARIFIER SLUDGE TREATMENT SYSTEM

Sludge Thickner (19GBS10AT001)		
Type		Fixed Bridge With Lifting Mechanism
Make		TRIVENI
Rated capacity / max capacity	m3/hr	25 / 30
Solid concentration in the influent sludge	%	2
Solid concentration in the thickened sludge at outlet	%	5
Thickened sludge quantity at outlet	m3/hr	10
Total Suspended Solids in treated effluent	mg/Lt	< 200
Sludge Holding Pit		
Dimensions	meter	6.35 X 6.35 X2.5 SWD
Capacity	m3	100
Free board	M	0.3
Solid Bowl Centrifuge(19GDB20AT001)		
Make		HUMBOLD
Solid recovery	%	98 min
Rated cap	m3/hr	10

Outlet solid concentration	%	20-25
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PTP CHEMICAL TREATMENT SYSTEM

Parameter	Polymer Tank (19GBN10/20BB001)	Lime Solution Tank (19GBN40/50BB001)	Alum Tank (19GBN50/60BB001)	Coagulant aid (19GBN70/80BB001)
Quantity	2	2	2	2
Capacity(Lts)	6800	6500	6300	6800
Concentration(ppm)	01	01	50	20
)Duration (Hrs)	12	12	12	12

DE MINERALIZED WATER

DM PLANT TECHNICAL DATA

Dual Media Filters(19GCB10AT001 / 19GCB11AT001)		
Make		VA TECH WABAG
Design Flow rate	M ³ /hr	65
Effective media depth - Sand	M	0.6
Effective media depth - Anthracite	M	0.6
Effective media depth - MnO ₂	M	0.3
Effective media depth provided	M	1.5
Total bed depth	M	1.5
Backwash flow rate	M ³ /hr	200
Duration of backwash	Minutes	10
Waste water per backwash	M ³	33.3
Air scour flow rate	M ³ /hr	290
Activated Carbon Filters(19GCB20AT001 / 19GCB21AT001)		
MAKE		VA TECH WABAG
Design flow rate	M ³ /hr	41
Inlet TSS		2
Effective media depth - carbon	M	1.2
Quantity of filter media - carbon	M ³	3.4
Backwash flow rate	M ³ /hr	41

Back wash frequency	Hrs	Once in 24 hrs
Filter Back wash waster sump		
Capacity	M ³	380
Filter Backwash Tank(19GCK27BB001)		
Capacity	M ³	75

EXCHANGERS & BULK ACID TANK TECHNICAL DATA

		SAC	SBA	MB
Make		VA TECH WABAG	VA TECH WABAG	VA TECH WABAG
No of streams working		One	1W+1S	1W+1S
No of streams standby		One	35	35
Normal flow rate	M ³ /hr	38	36.4	37
Net output between two regenerations	M ³	420	420	5880
Gross output between two regenerations	M ⁴	485	438	5954
Resin Details (Rohm and Hass)				
Type of Resin		Amber jet 1200 Na	IRA 900RF CI Macro porous	IRA 900RF CI Macro porous+ Amber jet
Quantity	Lts	2625+260 Inert	4225+465 inert	467+467
Regeneration details				
Chemical for regeneration		HCl 30%	NaOH 46%	HCl&NaOH
Regeneration mode		Counter current	Counter current	Counter+Co-Current
Injection Concentration		5%	5%	5%
Service Cycle time	Hrs	12	12	168
Bulk Chemical Tank(19GCN15BB001)				
Make		VA TECH WABAG	VA TECH WABAG	--
No of tanks		1	1	--
Chemical handled		HCl	NaOH	--
Chemical concentration %	% w/v	30	48	--
No of days of storage required	days	15	15	--
Storage capacity of tank	Lts	19987	8554	--

Dead level at bottom	M	0.2	0.2	--
Free board on top	M	0.3	0.3	--

DEGASSER & DM STORAGE TANK DETAILS

Degasser Tower(19GCH10AT001)		
MAKE		VA TECH WABAG
Normal flow rate/Max. flow rate	M ³ /hr	38/76
Inlet CO2 as CaCO3	mg/lt	101
Outlet water quality CO2	ppm	5
Degassed Water Tank(19GCK41BB001)		
Volume of water considering 0% margin	M ³	38
No. of tanks		1
DM Water Storage Tank(19GCL10BB00 / 19GCL11BB001)		
Make		VA TECH WABAG
Quantity		2 Nos
Dead level at bottom	mm	250
Free board on top	mm	400
Actual tank volume	Lts	369450

REGENERATION MEASURING TANKS

Parameter	SAC		MB	SBA	MB	N-pit		Naocl
Chemical handled	Type	HCl	HCl	NaOH	NaOH	HCl	NaOH	NaOCl
Chemical concentration	% w/v	30	30	24	24	30	48	6
Storage capacity provided as per specs	Lts	1000	81.2	1000	1000	1000	1000	1000
Dead level at bottom	mm	200	200	200	200	200	200	200
Free board on top	mm	300	300	300	300	300	300	300
Tank depth provided	mm	1400	1400	1400	1400	1400	1400	1400
Actual tank volume	Lts	1560	1560	1560	1560	1560	1560	1560

COOLING WATER CHEMICAL DOSING SYSTEM

Parameter	Bulk Sulphuric Acid Storage Tank (19PBE17/18BB001)	Acid Day Tank (19PBE28/40BB001)	Lime Solution Tank (19PBR50BB001)
Quantity	2	2	1
Capacity(Lts)	15200	1000	2000

BOILER & WSC CHEMICAL DOSING SYSTEM

Parameter	Phosphate Dosing Tank (11LFN01BB001)	Hydrazine Dosing Tank (18LFN20BB001)	Ammonia Dosing TANK (18LFN10BB001)
Quantity	1	1	1
Capacity(Lts)	2500	2500	3000

EFFLUENT TREATMENT PLANT & OILY WATER SYSTEM

Oily Waste Retention Pit(19GDK10BB001)		
Quantity	Nos	1 RCC Construction
Capacity	m ³	250
Oil Skimmer(19GDB30AP001)		
Type		Drum/disc coated with oleophilic resin
Drive of skimmer		Motor driven through gear box
Liquid handled		Oily effluent
Capacity	Lph	500
Flash Mixer(19GDK40BB001)		
Make		GANON
Dimensions	M	1.0 ID , 1.8 H
Internal lining		4.5MM THICK RUBBER
Oil Water Separator (19GDK10AT001I)		

Make		PARAMOUNT
Quantity	Nos	1
Type		Tilted Plate Type
Media		FRP (ORTHO PTHALIC) Inclined Plates

Rated capacity	m3/hr	20
Input effluent		Oil & grease 100-250ppm and TSS: 500ppm
Output effluent		Oil & grease 10ppm and TSS: 100ppm

FUEL OIL DYKE AREA OILY WASTE TREATMENT SYSTEM

Oil Water Separator(19GUE10AT001 / 19GUE20AT001)		
Type		Gravity Type
Quantity	Nos	1 RCC Construction
Rated capacity	m3/hr	300
Floating Oil Skimmer(19GUE50AP001 / 19GUE51AP001)		
Quantity	Nos	2
Type		Drum/Disc coated with Oleophilic resin
Drive for skimmer		Motor driven through gear box
Oil transfer pump		Gear / Screw type
Capacity	LPH	500
Total Developed head	MLC	35
NPSH	MLC	3

SUMPS CAPACITY

Parameter	Oil Collection Tank (19GDK60BB001)	Clear Water Sump (19GDK60BB001)	Sludge collection TANK (19GDK51BB001)
Quantity	1	1	1
Capacity(Lts)	2500	2500	3000

BALANCE OF PLANT DRIVES TECHNICAL DATA (VERTICAL PUMPS)

Description	Pump							Motor					
	Make	Qty	Stag	TDH	Flow	Input	Speed	Make	Powe	Volt	Curren	Speed	Class/Duty/Prot
		Nos	Nos	Mts	M3/ Hr	KW	RPM		KW	Volts	Amps	RPM	
Main cooling water	WPIL Ltd	3	1	26.76	13800	104.88	498	CGL	1250	6600	62/144	494	F/S1/IP23
Raw water pump	Flow more	2	1	26.2	1000	84.94	1485	ABB	110	415	185.0	1485	F / IP55 /
Clarifier water pump	Flow more	2	6	75.2	125	30.85	1470	ABB	37/67	415	67/28	1470	
Jockey pump	Flow more	2	10	99.5	25		2900	ABB	15	415	26.0	2905	F / IP55 /
Hydrant & spray	Flow more	2	5	97.5	410	134.4	1485	ABB	180	415	300.0	2905	F / IP55 /
Diesel driven hydrant pump	Flow more	1	5	97.5	410	134.4	1500	--	--	--	--	--	--
Dewatering pump	Flow more	2	1				1425		2.2	415	4.5	1440	E
DM feed pump	Flow more	2	6	66	65	15.78	1460	ALSTOM	22	415	39.0	1460	F/IP55/
Back wash waste	Flow more	2	1	39.2	25	5.02	550	ALSTOM	11	415	20.1	1450	F/IP55/
Hot drain pit pump	Flow more	2	1	80	70	7.95	1460	CGL	15	415	27.0	1460	F / IP55 /
Sludge transfer pump	Flow more	2	1	50	25	1.79	1440	CGL	3.7	415	7.6	1440	F / S1 IP55

Neutralization pit	Flow more	2	1	40	35	7.19	1450	ALST	15	415	27.3	1455	F / IP55 /
Clear water disposal pump	Flow more	2	1	35	23		710	CGL	3.7	415	7.4	1450	F / IP55 /
Oily sludge disposal pumps	ROTO pumps limited	2	1		25		1455	CGL	7.5	415	7.4	1455	
Chlorination plant dilution pit pump	KSB pumps limited	1	1	10	5	1.1	1450	CGL	1.1	415	2.5	1415	F / IP55 /
Cable trench water pump	Flow more		1	15	10	1.36	1425		2.2	415	4.5	1440	F/IP55/

BALANCE OF PLANT DRIVES TECHNICAL DATA (HORIZONTAL)

Description	Pump							Motor							
	Make	Qty	Stag es	NPS H	Suc ti on	Disc ha rge	Flow	Inpu t	Speed	Make	Power	Volt	Curren t	Speed	Class/Dut y/P rot
		Nos	Nos	Mts	Mts	Mts	M3/ Hr	KW	RPM		KW	Volts	Amps	RPM	
Condensate extraction pump	Sulzer	3	3	1.9	3.4	135	334	162.83	1475	CGL	175.08	415	324	1490	F / IP55 /
Closed cooling water pump	Flow more	2	1	4.5	300	250	720	87.97	1485	ABB	110	415	185	1485	F / IP55 /
Cycle make up pump	Flow more	3	1	2.5	--	62	85	24.74	1470	ALSTOM	37	415	65	1470	F / IP55 /
NOx water pump	Flow more	3	1	2	--	65	65	20.54	1470	ALSTOM	30	415	53	1470	F / IP55 /

Degasser water	Flow	2	1	--	--	--	--	17.8	1470	ALSTOM	30	415	53	1470	F/IP55/
DM regeneration pump	Flow more	2	1	--	50	32	20	4.45	2880	ALSTOM	7.5	415	14.6	1450	F / IP55 /
Acid unloading pump	Process pump	2	1	2		10	15	7.5	1440	ALSTOM	7.5	415	14.3	2850	F/IP55/
Caustic unloading pump	Process Pump	2	1	1.25	65	40	15	0.88	1430	ALSTOM	2.2	415	4.7	1430	F / IP55 /
Condensate transfer pump	Kirloskar	1	--				5	1.28	2900	Energy induction	3.7	415	7.1	2850	F
Foam pump	Rotodel	2	1	2		100	75LPM	2.2	1500	Energy induction	3.7	415	7.4	1440	
Barrel unloading pump	Hacopharma	2					100					220		15000	
Centrifuge transfer pump	Roto pumps limited	2			2.5	10	10		700	CGL			2.2	1450/700	
Air washer pump	Kirloskar	10				7.2	2	40	2840	1.5	3.9	415	2840		
CCB AC condensate pump	Beacon weir	2			5	29	65.8		1450		11	415	21	1435	F / IP55 /
SWYD Condensor cooling pump	Beacon weir	2	1	2	1.8	24	18	2.6	1450	ABB	3.7	415	7.5	1425	F / IP55 /

DM Plant Condensor cooling pump	Beacon weir	2			1.8	24	18		1450	ABB	3.7	415	4.8	1425	F / IP55 /
Ball recirculation pump	Kirloskar	2					120		1450	CGL	9.3	415	17.5	1460	F / IP55 /
HRSG-1 blow down tank pit pump		2			2	5	1.1		1450		2.6	415	1415	77	F / IP55 /
Centrifuge Feed pump	Roto Pump Ltd	2		2.5		10	10		700		2.2	415		1450	

PHOTOS:





GT-11 Turbine Left View



GT-11 Turbine Right View



GT-11 Generator



GT-11 Generator Name Plate



GT-11 Generator and Turbine Coupling



GT-11 PECC View-1



GT-11 PECC View-2



GT - 11 Lube oil skid



Jockey Oil Pumps – 2nos



Power Oil Pump – 2nos



Lube Oil Accumulator



Rotor Barring Pump



Main Lube Oil Pump -3nos



Filters – 2nos



Co2 System



Battery Bank



Air Intake System



Avoparater Cooling System



GT-11 Nox Pump



GT-12 Turbine Left View



GT-12 Turbine Right View



GT-12 Generator



GT-12 Generator Name Plate



GT-12 Generator and Turbine Coupling



GT-12 PECC View-1



GT-12 PECC View-2



GT - 12 Lube oil skid



Jockey Oil Pumps – 2nos



Power Oil Pump – 2nos



Lube Oil Accumulator



Rotor Barring Pump



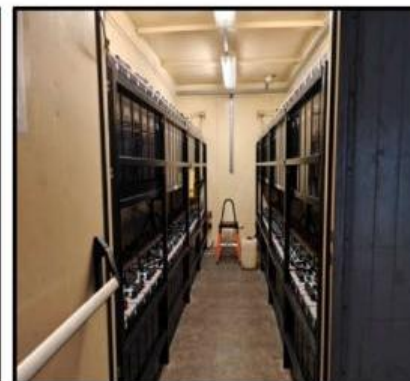
Main Lube Oil Pump -3nos



Filters – 2nos



Co2 System



Battery Bank



Air Intake System



Avoparater Cooling System



GT-12 Nox Pump



HRSG – 11 Left View



HRSG – 11 Right view



HRSG -12 Left View



HRSG -12 Right View



STG HIP Turbine



STG LP Turbine & Name Plate



STG Generator & Name Plate



STG Excitation System



STG Lube oil skid



STG PTQB



Gland Steam MOV



Main Steam System



Control Valves



Safety Valve



Stop Valves



Condenser



Condenser Name Plate



Condenser pumps



Gland Steam Condenser & Name Plate



Gland Steam Fan 1&2



OLTC Pump 1&2



OLTC Pump Name Plate



HPBFP-1,2 & 3





IP/LP-BFP- 1,2 & 3



Chemical Dosing



CCW Pump 1&2



CCW Heat Exchanger-1



Name Plate



CCW Heat Exchanger-2



Name Plate



EOT – 2X Tons



Oil Purifier Pump



Power Block Extra Photos



Power Block Extra Photos

NITIN