

44 MW MAN Power Plants, HFO, 1991/1992

(4) X 10.89 MW, 11 kV, 50 Hz, 600 RPM

(4) X Diesel Engines:

Make: MAN B&W AG, Germany

Type: 18V 40/ 45

Rated Output: 10.89 MW @ 600 RPM

Fuel Oil Consumption (Current Site condition): approx. 226 g / kWh

First Commissioned in 1991/1992 and Operated until 31st. Dec., 2005

	Engine 01	Engine 02	Engine 03	Engine 04
New	1991	1991	1992	1992
Shut Down	2005	2005	2005	2005
Total Hour	30723	32172	26164	24570
Overhaul Hour	30000	30000	22500	22500
Overhaul Date	Mar. 2004	Jan. 2004	Apr. 2004	Sep. 2004
Hours since Overhaul	723	2172	3664	2070

(4) X Alternators:

Make: SIEMENS

Type: 1DK-5037-3DE05-E

Rated Capacity: 13200 kVA

Rated Voltage / Frequency: 11 kV / 50 Hz

3-phase Synchronous / Brushless Excitation

F Class Insulation

(2) X Station Transformers:

Type: Trafo-Union

Model: TS6241G

Capacity: 1600 kVA

HV Rated Voltage: 11 kV +/- 2 x 2.5% / LV Rated Voltage: 0.4 kV

HV Rated Current: 84.0 A / LV Rated Current: 2309 A

3-Phase / 50 Hz

(2) X Step-up Transformer, 100/110 kV

Make: Fuji Electric, Japan

Capacity: 25 kVA

Includes:

- Two (2) units of Transformer (each unit includes 2 pieces, total 4 pieces)
Rated Capacity: 20 MVA
Natural Wind-Cooling: 20 MVA / Forced Wind-Cooling: 25 MVA
Rated Voltage of H.V side: 115 +/- 8 x 1.25% kV
Rated Current of L.V: 1050 / 1320 A
Wiring Mode: Yo □ Y-11
Insulation: SF6 / C-GIS
- One (1) unit of Receiver Transformer with all relevant Control, Measuring, Protection Panels

- The Final Scope of Supply is subject to final reconfirmation from the end-user.
- All Engines already overhauled in accordance with MAN services / technical requirements / instructions.
- Please see Attachment – I for detailed description of Mechanical Parts
- Please see Attachment – II for detailed description of Electrical Parts

Attachment – I

Mechanical Parts

Technical Data of Diesel Engine

- Make / Type : MAN B&W Germany / 18V 40/45
- Continuous Rating : 10.89 MW (Mechanical side)
- Speed : 600 RPM
- Max. Firing Pressure :145 bar
- Mean Effect Pressure: 21.4 bar
- Compression Ratio : 12.5
- Turbo-charge type : NA 48, MAN B&W Germany
 - Max. Permissible Operating Speed: 16500 RPM / Capacity: 1400 kg/h
- Exhaust Gas Temperature before Turbine : 550 +/- 30 degrees C
- Heavy Oil Separator / Type : Westfalia / OSA20-01-066, Capacity : 4200 L/h
- Heavy Oil Separator / Type : Westfalia / OSB35-02-066, Capacity : 4200 L/h
- Exhaust Gas Boiler Type : Clanton 2J, Capacity : 4000 kg /h

Lube Oil System

- Lube Oil Pump / Self-flushing Filter (Maker : Boll& Kirch)
- Duplex Filter (Maker : Boll & Kirch)

Lube Oil Separator

- Lube Oil Separator (Maker : Wesfalia)
- Steam Heater and Electric Heater

Cooling System

- Cooling Water Pump
- Plate Heat Exchanger (Maker : GEA)

Raw Water System

- Cooling Tower and Raw Water Pump
- Plate Heat Exchanger and Charging Air Cooler

Heavy Fuel Oil System

- Viscosity Module (included : Mixing Tank, Steam Heater, Filter & Viscosity Monitor) and Fuel Pump

Heavy Fuel Oil Treatment

- Heavy Fuel Oil Separator (Maker : Westfalia) / Steam Heater

Heavy Fuel Oil Supply System

- Heavy Fuel Oil Transfer Pump / Heavy Fuel Filter Combination

Intake System

- Intake Chamber (included : Intake Silencer and Air Filter)
- Charging Air Cooler and Compressor

Exhaust Gas System

- Manifold Branch, Main Piping
- Turbocharger, Exhaust Gas Boiler
- Silencer and chimney

Water Supply System

- Booster , Treatment and Dosing Pump(Dosing Tank)

Pressure Air System

- Air Compressor, Air Receiver and De-compressor

Attachment - II

11 kV Electrical Part (Supplier: SIEMENS)

3-phase Synchronous Generator

- Generator Type : 1DK 5037-3DE05-E
- Rated Capacity : 13200 kVA
- Power Factor : 0.8 (lag)
- Rated Voltage : 11 kV
- Stator Current : 693A
- Frequency : 50 Hz
- Rated Rotation Speed: 600 ver.
- Insulation Grade : F
- Excitation Mode : Brushless
- Exciter Type : KGM240/15
- Connection : Y
- Pole Number : 10
- Efficiency : 97.1 %
- Cooling Mode : Open Wind Cooling
- Bearing Temperature: Max. 90 degrees C

11 kV Switchgear Cabinet & Star-point Earthing Equipment

11 kV Switchgear Cabinet includes:

- Main-outgoing Feeder, Bus-coupler (each with a 2500 A Vacuum Circuit Breaker)
- Generator Cabinet & Station Service Transformer Cabinet
- PT Cabinet including Bus Measure & Over Voltage Depressor

Main Technical Data for Switchgear Cabinet:

- Rated Voltage : 12 kV
- Working Voltage : 11 kV
- Frequency : 50 Hz
- Short-circuit Shutoff Current : 40 kA
- Bus-bar rated Current : 2500 kA

Main Technical Data for Star-point Earthing Equipment:

- Rated Voltage : 12 kV
- Frequency : 50 Hz

Structure of the Cabinet

- Load Switch (with Manual Operation), Lightning Arrester, Insulator, Copper Bus-bar,
- 11 kV single-phase Earthing Transformer

Lower-Voltage Parts

- MCB used for Earthing Transformer, Load Resistance unit and Terminal

Control, Measuring & Protection Panel

- The Control, Measuring & Protection Panels are used for main-outgoing Feeder, Bus-coupler, Generator, Station Service Transformers and Local Outgoing Feeder etc...
- Alarm Signals are processed by SIEMENS - S5 programmable Controller

Engine Control & Monitor System

The operating situation is monitored by SIEMENS S5-115S programmable Controller.

Cables in the Power House:

Included: 110 kV Power Cable, 400 V Power Cable and 400 V Control Cable

Low-voltage Distribution Panels (Type: 3 WN1)

Rated Voltage: 400/230 V

Rated Current: 2500 A

Frequency: 50 Hz

Main Low-voltage Distribution Panels include:

- Distribution Panel for the low-voltage side of Station Service Transformer (2500 A)
- Distribution Panel for Engine auxiliaries (630 A)
- Distribution Panel for common auxiliaries (630 A)
- Distribution Panel for auxiliaries Heavy Fuel (630 A)
- Distribution Panel for Power House Ventilation (800 A)

DC 110V & 24 V Equipments

The DC Equipments consist of Batteries, Chargers and Distribution Panels

Technical Data of Batteries:

	DC 110V	DC 24V
Capacity	125	125
Voltage (V)	1.4 ± 0.02	1.4 ± 0.02
Numbers	90	90

Technical Data of the Charger:

	DC 110V	DC 24V
Type	D380G 110 / 40	E220G 24/40
Input Voltage (V)	380	380
Input Current (V)	10.5	11.5
DC Output	40A 126V	40A 28V

Station Service Transformer

- Included Station Service Transformer #1, #2, Loading Station Service I, II respectively

	# 1 Transformer	# 2 Transformer
Manufacturer	Trafo - Union	Trafo - Union
Type	TS6241G	TS6241G
Capacity (kVA)	1600	1600
Rated Voltage of high-voltage side (kV)	0.4	0.4
Rated Current of high-voltage side (A)	84.0	84.0
Rated Current of low-voltage side (A)	2309	2309
Phase number	3	3
Frequency (Hz)	50	50
Wiring Mode	□ / Yo-11	□ / Yo-11
Impedance Voltage	6%	6%
Cooling Mode	Oil-immersed self-cooling	Oil-immersed self-cooling