

CHENNAI PETROLEUM CORPORATION LIMITED
(A Group company of IndianOil)

Brief write-up & List of Equipments – Slave Turbo Generators

Two steam driven generators (SIEMENS make, Year 1982) designed to produce 2.75 MW each with fully condensing steam turbine (BHEL make, Year 1982) operating on steam (3.5 Kg/cm², 190 deg.c, 9000 RPM are available.

Turbine is provided with Hydraulic speed governing system / vacuum condenser / oil circulation system with necessary coolers, oil storage Tank & Pumps (Both AC & DC).

Generators are of 6.6. KV, 1500 RPM, Closed air-cooled / Brush less type excitation system with inter connecting transformers of 1:1 ratio to match fault level and electronic controlled AVR & associated electronic relays.

Details of STEAM TURBO GENERATORS (2 X 2.75 mw) with sub systems.

1. TURBINE:

Make		: BHEL –1982/Commissioning-1985
Maximum output	..	: 2.75 MW
Normal output	..	: 2.58 MW
Normal speed	..	: 9000 RPM
Type	..	: Single cylinder axial flow type, Fully condensing
Stages	..	: Single row impulse & 12 rows of reaction
Inlet steam pressure	..	: 3.5 kg/cm ²
Temperature		: 190 deg C
Flow	..	: --
Exhaust steam pressure		: 0.12 kg/cm ²

2. CONDENSER:

Type	..	: Surface condenser
Cooling medium	..	: Water
Cooling surface	..	: 325 m ²
Dimension	..	: 1870 mm Dia x 5360 mm Long

Ejectors for condenser vacuum:

One hogging ejector for starting and two service ejectors with coolers Using condensate water as the media. All three ejectors are used on steam at 3.5 kg/cm². (As per design)

3. REDUCTION GEAR BOX:

Make	..	: MAAG of Switzerland
Rated power	..	: 2885 kw
Rated speed input	..	: 9050 rpm
Output	..	: 1500 rpm
Gear ratio	..	: 6.033

4. GOVERNING SYSTEM:

Hydraulic speed governor provided with mechanical over speed trip / Operation of emergency stop valve and two governing valves (servo operated).

5. OIL SYSTEM:

Main oil pump	..	: Main turbine driven
Discharge pressure	..	: 9.5 kg/cm ²
Auxiliary oil pump	..	: 415 V, 3ph, Electric motor driven
Rating	..	: 37 kw
Discharge pressure	..	: 9.5 kg/cm ²
Emergency oil pump	..	: 110 V DC motor driven
Discharge pressure	..	: 2.5 Kg/cm ²
Governing oil pressure..		: 9 kg/cm ²
Lube oil pressure	..	: 3 kg/cm ²

6. LUBE OIL STORAGE TANK:

Storage capacity	..	: 5600 ltrs
Lube oil cooler	..	: Dual redundant type with online change over.
Lube oil strainer	..	: Dual redundant type with online Change over.

7. CONDENSATE EXTERNAL PUMPS:

No. of pumps	..	: 2 (Electric motor driven vertical mounted)
Rating	..	: 22 kw, 415V, 3 ph.
Flow	..	: 37 m3/hr
Pressure	..	: 8 kg/cm2

8. GENERATOR:

Make	..	: SIEMENS – German –1982 / Comm.1985
Rating	..	: 3.44 MVA
Voltage	..	: 6600V
Current	..	: 301 A
Power factor	..	: 0.8
Speed	..	: 1500 rpm
Insulation	..	: Class F
Excitation	..	: Brush less type
Excitation volts	..	: 87 V
Excitation current	..	: 340 A

DC GENERATOR:

Rating	..	: 35.1 kw
Voltage	..	: 95 V
Current	..	: 370 A
Speed	..	: 1500 rpm
Excitation voltage	:	: 123 V
Excitation current	:	: 2.9 A

9. AUTOMATIC VOLTAGE REGULATOR: (AVR):

Type	..	: Electronic type
Make	..	: SIEMENS

10. GENERATOR COOLING SYSTEM:

Closed air circulation type with cooling water as media

Cooling water flow	..	: 358 l/min
Temperature	..	: 33 deg C

11. GENERATOR PROTECTION RELAYS WITH CONTROL PANELS:

Make	..	: ASEA –Sweden
Type	..	: Electronic

12. INTER CONNECTION POWER TRANSFORMER:

Make .. : NGEF – 1983
Type .. : ONTU 4000/11
Rating .. : 4000 kva
Rated voltage at no load: HV – 6900 V
LV – 6900 V
Rated current : HV – 334.7 V
LV – 334.7 V

	<u>HV</u>	<u>LV</u>
Insulation level	: KV - 20	20
	KVp 60	60

Phases : 3
Frequency : 50 hz
Tap changer : Off circuit tap changing
No of taps : 14
Voltage range : 7245 V to 6555 V
Vector group : Dyn 1
Type of cooling : ONAN

13. NEUTRAL GROUNDING RESISTOR: (NGR) – 2 Nos.

Make: PEFCO FOUNDRY & CHEMICALS LTD, PUNE
Resistance: 12.7 OHMS
Current: 400 Amps
Rating: 30 Seconds
Amb.Temp: 45 DEG C
Temp.Raise: 260 DEG C

14. LUBE OIL COOLER (Two Nos)

Make : BHEL
Shell: Design pressure : 9 Kg/cm²
Test pressure : 14 Kg/cm²
Area : 18 m²
Temp : 100 DEG C

Tubes: Design pressure: 6 Kg/cm²
Test pressure: 9 Kg/cm²
Temp: 100 DEG C

15. CIRCUIT BREAKERS: 2 Nos.

Make: NGEF LOW OIL CONTENT CIRCUIT BREAKER.

Type: E 7525/10

Voltage: 6.6/11 KV

Current: 2500 Amps

Frequency: 50 Hz

Breaking current: 44/39.4 KA

Peak making current: 120 KA

Oil per pole: 4 Kgs.

Weight: 220 Kgs.

Short time current: 50/40 KA for 1/3 Sec.

**16. SLAVE I & II – MOTOR CONTROL CENTRE (MCC) PANELS IN
NGR ROOM.**