

TOSHIBA DUAL FUEL INLET STEAM TURBO / GENERATOR

TURBINE

Specification:

- Extraction & condensing, Inlet pressure: 104 bar, Output: 215MW

Extractions:

- MP2: 22 bar, MP1: 10 bar, LP: 4.5 bar, Feed Water: 0.4 bar

Minimum load:

- No extractions, Only bleeds, Steam flow: 45 kg/s

Maximum load:

- Steam flow: 270 kg/s



GENERATOR

- 250 MVA, Air to Water Cooled, 18 kV, 8019 A, 50 Hz, 3000 rpm



CONDENSER

- Average: 17 °C, Min: 15 °C, Max: 25 °C



FREIGHT

- Total weight ~2,800 Freight ton
- Total items: 74

Heavy Lifts:

- Condenser Top Cover: 2 x 15 ton
- Condenser: 2 x 85 ton
- Turbine: 268 ton



WEIGHT

- Total weight: ~2,800 Freight ton
- Total items: 74

Weight:

- Condenser Top Cover: 2 x 15 ton
- Condenser: 2 x 85 ton
- Turbine: 268 ton
- Generator: 277 ton
- Misc: 50 ton
- Total: 795 ton

Remaining:

- Misc: 2,800 – 795 = ~ 2,000 m3 wooden boxes



STORAGE CONDITIONS

- Delivered 2009, currently stored indoors and secured, Turbine & Generator completely sealed, silica gel is inserted in the Turbine & Generator and regularly replaced. Equipped with electronic monitoring sensors for humidity & temperature with criteria from Toshiba for storage, monitoring report generated monthly, inspection of unit every (2) weeks, thorough Inspections were done every (6) months until 2012, then yearly, inspection protocols available.



This turbine is a single flow extraction condensing type. Steam initially enters the steam inlet flange near the end of the high-pressure section and flows through the turbine stages toward the generator end of the unit. After passing through the turbine stages, the steam is exhausted to condenser. The exhaust hood is keyed to the foundation plates at a point near its center of the exhaust hood to prevent axial motion. The turbine expands axially from this point. The front standard is free to slide axially but the standard and hood are guided to prevent transverse movement.

CONTROL VALVE (CV) OF MAIN STEAM

Steam, after passing through the MSV, is admitted through the CV to the high-pressure turbine. CV controls the amount of steam passing to the turbine. It is opened and closed by an actuator and is controlled by a Digital Electro-Hydraulic Control (D-EHC) system through the turbine hydraulic system.

TECHNICAL SPECIFICATION OF STEAM TURBINE & AUX TYPE

- Single Casing Single Flow impulse type
- condensing turbine
- Rated Output: 188,000 kW at Generator terminal
- Speed: 3,000 rpm
- Rotation: CCW (Viewed from front of Turbine)
- Last Stage Bucket Active Length: 42" (Nominal)
- Allowable Cycle Change: 48,5 - 50,5 Hz

CONDENSATE SYSTEM TYPE

Horizontal Surface
Cooling, with divided waterbox, Two-Pass Type

GENERATOR

The generator consists of the stator, rotor, cover, bearing, air-to-water cooler. The stationary armature is attached to and supported by generator base. The rotor is supported by the bearings. Air-to-water coolers are mounted above the stator. The cooling system is completely enclosed to prevent entrance of dust and moisture.

EXTRACTION SYSTEM

The brushless generating system consists of main generator, rotating AC Exciter, Rotating Rectifier (R-RF), Direct Coupled PMG (Permanent Magnetic Generator) and AVR (Automatic Voltage Regulator). Main components of the AVR are the digital automatic controller, AVR Amplifier, three phase thyristor rectifier and U-ISO Isolation Unit.

