Contents

• Process
• Steam Turbine & Auxiliaries
• Sealing
• Protection
• Controller
• Startup & Shutdown
• Trip
• Losses
ST Process

Steam → Shutoff Valve → Control Valve → Steam Turbine → Generator

Boiler Heat Recovery Boiler → Deaerator → Condenser
BPST Process

Steam → Shutoff Valve → Control Valve → BPST Steam Turbine → Generator

Boiler Heat Recovery Boiler → Desalination Plant → LP Header → MP Header
Main Components

• Rotor
• Casing
• Blades (Impulse & reaction)
• Gland & Labyrinth seal
• Shrouded disc
• Thrust & Journal Bearing
• Balancing Piston
• Multi valve turbine & Full arc admission
• Condenser for Steam Turbine
Auxiliaries

- Lubrication Oil
- Jacking system
- Hydraulic System
- Bearings
- Turning Gear

For BPST
- Hp/LP bypass

For ST
- Vacuum Pump and Ejector
HRSG4 STEAM LINE ....ON STEP 32 HRSG4 MASTER PRG ....ON
HRSG5 STEAM LINE ....ON STEP 32 HRSG5 MASTER PRG ....ON

HRSG5
26.7 t/h 4.5bar 215Cel 216Cel

LP STEAM
HRSG4
26.7 t/h 4.6bar 216Cel 214Cel

HRSG5
130 t/h 49.9bar 514Cel 512Cel

HP STEAM
HRSG4
129 t/h 49.2bar 511Cel 513Cel

TO DEARATOR
GLAND STEAM
P >MON 130Cel

STEAM EJECTOR
13.8bar

GLAND STEAM

13.8bar 52.4%
Protection

Electrical Protection
Lube Oil Pressure
Lube Oil tank level
Inlet pressure
Electronics control failure
Exhaust Pressure
Vibration
Bearing Temperature
LP blades Temperature

– Testing:

• Over speed protection
• Valves testing (open / close)
Controller

- Speed Control
- Load Control
- Back pressure
- Hp Pressure Limit

Main Steam Stop VALVE Control

Control Valve Control
Start Up

• Turbine reset
• Pre-start check (turbine’s condition)
• Run-Up (Acceleration rate & target speed)
• MSV/CV transfer (for warming up the line)
• Limit speed matching (heat soak time & synchronization)
• Initial load
Shutdown

• Change over from LP control mode to Bypass
• Decrease the Generator load
• Remove the Generator from the Grid
• Decrease PMC load demand
• Turbine Trip
Losses

- Initial friction in the nozzle
- Outlet steam kinetic energy
- Through the glands
- Humidity in the steam
- Towards the outside (thermal insulation)
- Mechanical losses
Trip

- Generator Trip.
- Over speed.
- Oil Tank level low.
- High or Low Back Pressure Steam.
- Bearing white metal temp High.
- Hydraulic Oil pressure Low.
- Rotor axial displacement exceeded set point
Thanks for your attention

Any Questions