

User's Industry Perspectives & Expectations from the Valve Industry

TATA POWER LIMITED

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Tata Group: Introduction . USER EXPECTATION &

India's largest business Group
Diverse businesses in 7 sectors
International Income 61 % of Group revenue
Operations in over 80 countries
Products and services exported to 85 countries
Largest employer in private sector over 300,000 employees
Group revenue FY 2008 : Rs 251,543 cr / \$ 62.5 bn
Group profit FY 2008 : Rs 21,578 cr / \$ 5.4 bn

Tata Power: Who are we?

- ▶ Largest private, integrated utility company in India today with presence across the value chain in fuel, generation, T&D and trading
- ▶ Founded in 1906, to supply hydro-electric power to Mumbai. Set-up thermal generation in Trombay in 1960s
- ▶ Expanded outside Mumbai with IPP (Belgaum) and CPP (Tata Steel) in 1990's
- ▶ Thrust on renewables including wind, hydro and solar
- ▶ Successful Public Private Partnerships in generation, transmission and distribution

EVALUATION CRITERIA

- ▶ Higher reliability, Long life with trouble free service particularly in areas with high pressure & temperature, higher flows and systems handling fuel oil, chlorine & other Hazardous Fluids
- ▶ Better Controllability, accurate control of flow & pressure over a wide range of operation with faster ramp rates.
- ▶ Safe & Reliable cyclic operation for wide variation in temperature, pressure & flow with lower noise & zero leakages
- ▶ Mode of actuation (Pneumatic / Electrical / Hydraulic) for valves

- operating across high pressure differential
- ▶ Material of Construction (Durable, non-corrosive, specific application, easy to weld & erect)
- ▶ Fail Safe conditions (End positions / Stay put)
- ▶ Ease of Maintenance, availability of Valve Accessories, Spares leading to lower cost of ownership.

AREAS OF APPLICATION IN THERMAL POWER PLANT

- ▶ Main Steam and Reheat Steam Circuit
- ▶ High Pressure Feed water cycle
- ▶ Medium Pressure Condensate water cycle
- ▶ Lube Oil & Sludge Oil circuit
- ▶ Sea water / Fresh water applications
- ▶ Instrument / Service Air application
- ▶ DM water application
- ▶ HFO / LDO / LSHS & other fuel oil systems, highly viscous & flammable
- ▶ Plug / Ball Valves for Fuel Gas system

SPECIAL FEATURE

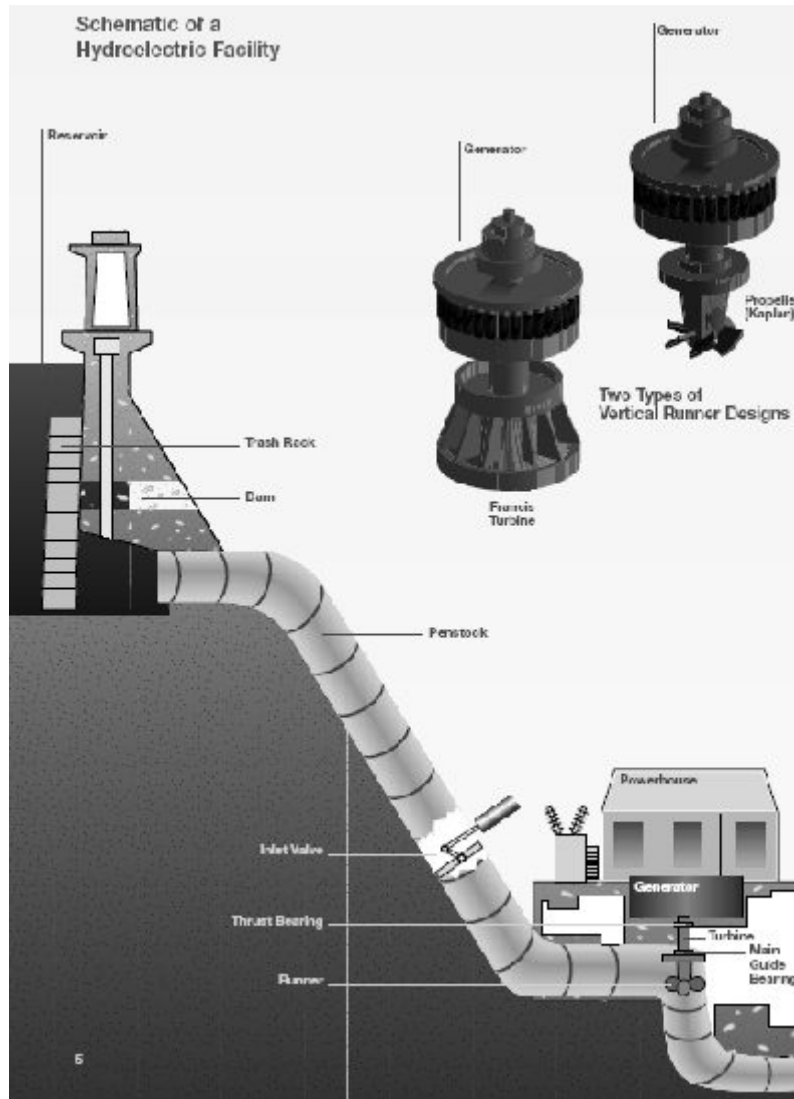
AREAS OF APPLICATION IN HYDRO POWER PLANT

- ▶ BUTTERFLY VALVES ON PENSTOCKS
- ▶ INLET VALVE TO TURBINE (SPHERICAL/NEEDLETYPE)
- ▶ Lube / Governing Oil & Sludge Oil circuit
- ▶ Fresh water applications
- ▶ Drain & Dewatering system

HYDRO POWER PLANT LAYOUT

MAINTENANCE PRACTICES & INSPECTION

- ▶ Adjusting Spring tension, stroke, travel of valves
- ▶ High speed actuators
- ▶ Adjustment of limit switches, over travel of valves
- ▶ Cleaning & sand blasting if necessary
- ▶ Inspection & replacement of valve guards
- ▶ Valve leak test



SPECIAL FEATURE

Types of Valves Required in Power Industry

Area of Application	Size (mm)	Critical Requirements
SUPER CRITICAL PLANTS (800 MW) STEAM LINES (TEMP>550 C)	>65NB & < 50 NB	(For Pipe material P92)
SUPER CRITICAL PLANTS (800 MW) STEAM LINES (TEMP>550 C)	>65NB & < 50 NB	(For Pipe material P91)
SUB CRITICAL 300/ 500/600 MW STEAM LINES (TEMP>510OC AND <550 OC)	>65NB & < 50 NB	(For Pipe material P22)
SUB CRITICAL 300/ 500/600 MW STEAM LINES (TEMP>400 C AND <510 C)	>65NB & < 50 NB	(For Pipe material P11)
SUB CRITICAL 300/ 500/600 MW STEAM LINES (TEMP<400 C), CONDENSATE BLOW DOWN, BOILER FEED SUCTION LINE	>65NB & < 50 NB	
HIGH / MEDIUM PRESSURE (8 / 32 / 160 BAR) LUBE OIL / HYDRAULIC OIL / CONTROL OIL SYSTEM		
Area of Application	Size	Critical Requirements
CONDENSER COOLING WATER SYSTEM WITH SEA WATER APPLICATION	>65	HIGH TDS, SALANITY , CORROSIVE ENVIRONMENT
CONDENSER COOLING WATER SYSTEM WITH FRESH WATER APPLICATION	>65	
LUBE OIL / CONTROL OIL SYSTEM HIGH / MEDIUM PRESSURE (160 / 32 BAR)	>65NB & < 50 NB	HIGH TEMPERATURE APPLICATION, FIRE RESISTANT
INSTRUMENT / SERVICE AIR APPLICATION	>65NB & < 50 NB	
DM WATER / SERVICE WATER MEDIUM PRESSURE APPLICATION	>65NB & < 50 NB	LOW TDS, < 5PPM

CRITICAL VALVES FOR A THERMAL POWER PLANT

Area of Application	Critical Requirements
Feed Water flow control valves	Cyclic operation, 200-450 bar / 1600-2400 T/hr flow
BFP Re-circulation	Cyclic operation, 200-450 bar / 500-800 T/hr flow
Aux Pressure Reducing from Main & Cold Re-heat Steam	240 to 40 bar
Aux Steam De-Super heaters Temperature Control	240 bar / 600 C
Quick Closing NRV for HP / LP heaters & De-aerator heating & pegging steam	Faster actuation,
HP-LP Bypass valve	200-450 bar / 1600-2400 T/hr flow
Group Heater Bypass valve for train of heaters	Isolate at high flows of around 2100 T/hr
Butterfly valves for Condenser cooling water system	25,000 – 75,000 m3/hr
Main Steam / Reheat Steam Spray valves	200-240 C / 200-300 bar
Electrometric Relief valve (ERV)	500-590 C / 200-300 bar
Turbine Stop Valves / Control Valves with hydraulic actuators	500-590 C / 200-300 bar / Quick Closing
Spring loaded safety valves for Boiler	500-590 C / 200-300 bar
Flash Tank Drain valves	High pressure / Throttled conditions
Valves for Chlorine dosing line and other chemical application	Hazardous / corrosive fluids
Gate / Globe valves for Oil system	High viscosity / 30-40 bar

- ▶ Special materials for valve seats, spindle
- ▶ Special lining for valves subjected to corrosive environments
- ▶ Periodic Greasing & lubrication

SOME INSTANCES OF VALVE FAILURE



IPCV – Bush cracked



IPCV – Cracks on spindle

The Emergency Stop valves are provided for rapid interruption of steam flow in emergency situations like on-load unit trip to protect the over-speeding of turbo-generator and subsequent failure.

The Steam Control Valves regulate the steam flow to the turbine during start-up and partial load conditions.

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