



Application No. 7

STEAM PRESSURE REDUCING VALVE / TURBINE BYPASS VALVE

In most large plants steam is used both to generate electricity and for process heating. The power turbines are supplied with high pressure superheated steam (typically 3100 kPag @ 400°C) from the boilers. The exhaust steam will be at a considerably lower pressure and temperature (typically 100 kPag @ 180°C) and this is desuperheated to just above saturation temperatures and used in the process for heating. There are occasions when the turbine is off-line or not producing sufficient exhaust steam when it is necessary to augment the supply of low-pressure steam to the plant. It is the function of the turbine bypass valve to perform this task.

Since the pressure drop seen by this valve is from 3000 to 100 kPag and the flow rate is often as high as 100t/hr the application is potentially very noisy. The valve size will tend to be large because of the need to control the velocity at the outlet.

Mitech's philosophy on this application is to use a disk stack valve to handle the high pressure drop conditions that the valves will see at low flow rates and to fit downstream diffuser plates to create a back pressure on to the valve at high flow rates – this enables the valve size to be reduced whilst still controlling the steam velocities at acceptable values.



Customer – SASOL SYNFUELS, Steam Station
Date supplied – 2002/07/12

Customer Application Data

The customer wanted the valve to operate under the following conditions:

◆ Max flow rate	= 186 000 kg/hr
◆ Min flow rate	= 13 300 kg/hr
◆ Inlet pressure - norm	= 40 bar (g)
◆ Pressure drop - norm	= 36 bar (g)
◆ Temperature	= 420°C

Description of Valve Supplied

Mitech supplied a 300mm energy dissipating disk stack globe control valve with stellite coated plug and seat. The noise level of the installed unit is less than 85 dBA.



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Type = Energy Dissipating Disk Stack
 Plug material = Stellite coated 316 StSt
 Seat material = Stellite coated 316 StSt
 Seat diameter = 150mm

CV selected = 487.5
 Flow direction = Under
 Leakage rate = ANSI V
 Characteristic = Bi Linear

Body

Size = 12" – 300mm
 Style = Globe Control Valve
 Material = Chrome Moly WCB Carbon Steel
 Flange Type = Integral
 Flange rating = ANSI 600#

Bonnet

Material = Chrome Moly WCB
 Carbon Steel
 Guide-Upper = StSt Graphoil
 Guide-Lower = Stellite
 Packing = Graphite Braid
 Gaskets = StSt Grafite
 Live loading = Yes

Actuator

Type = Piston
 Size = 500 square inch

Positioner

Type = E/P

Problems experienced: _____

Vibration, noise and expensive

Other references: _____

- Engen
- TSB - Malalane
- ILLOVO - Maragara (Mozambique)
- ILLOVO - Noodsberg
- ILLOVO - Nchalo (Malawi)
- ILLOVO - Dwangwa (Malawi)
- TONGAAT HULLETS - Amatikulu
- TONGAAT HULLETS - Refinery

