

## Boiler Feedwater Regulator

Application Discussion

AD116

June 15, 2003

The boiler feedwater regulator valve used in many power plants is required to transition from feedpump recirculation to operation of the unit. Not only is the valve used to initially fill the steam drum, it is also used to control flow during normal operation when the steam drum is under pressure. This valve, therefore, must address cavitation during initial operation and provide adequate rangeability to address the entire feedwater requirements. Turndowns of at least 75:1 are common.

During initial operation the service conditions for the feedwater regulator valve nearly match that of the feedpump recirculation valve with the exception of the flow rates. The regulator valve will begin to transition the flow from the recirculation valve and will open as the recirculation valve closes (Figure 1). The valve must have adequate cavitation protection during initial filling of the drum and then transition to flow control mode.

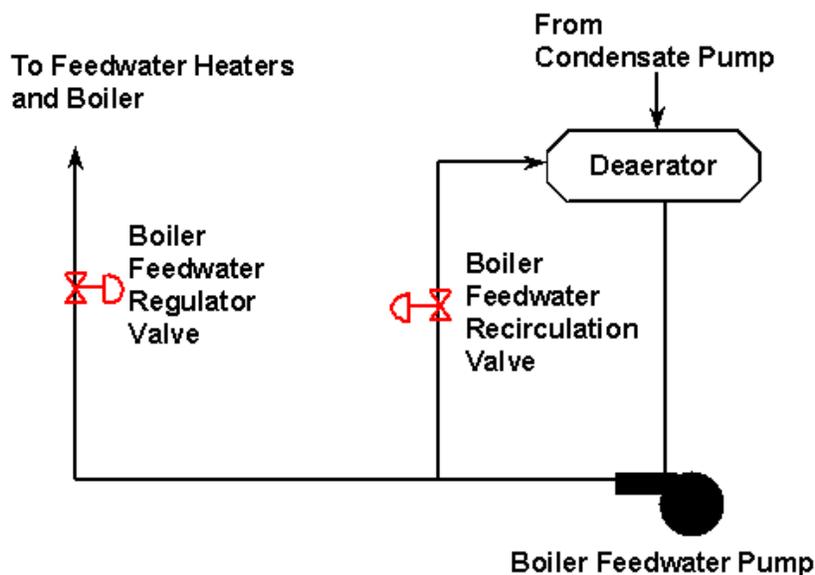


Figure 1: Typical Feedwater System

The service conditions for the valve will vary depending on plant size and unit operation. Inlet pressures can reach as high as 5500 psig, but most plants see operating pressures between 2500 psig and 3500 psig. Fisher's recommendation for this service is a globe or angle valve utilizing Cavitrol protection. The three-stage design capable of withstanding 3000 psid is the most common offering. However, the four-stage design that can withstand pressure drops up to 4000 psid is also available.

The Cavitrol trim is designed to eliminate the formation of damaging cavitation. However, in this application, trim characterization is required to provide the required flow. A characterized trim utilizing cavitation protection at low valve travels addresses the initial filling operation. This is the point where the pressure drop is the highest and can cause the greatest amount of damage. As the pressure in the drum increases so does valve travel decreasing the level of cavitation protection required. The level of cavitation protection is decreased to provide additional flow

while providing a smooth transition. This will ensure that control is not affected as the gain in the trim changes. This is a common problem seen in the characterization of many tortuous path trim designs.

Tight shutoff is also recommended to ensure long lasting trim life. This is especially important when the boiler feedpump is operating in recirculation mode. High pressures will be seen at the valve inlet with minimal pressure on the backside. If any leakage does occur, the valve trim can be washed out in a short amount of time. This will cause a high level alarm in the steam drum that could lead to dumping treated feedwater to the wastewater system let alone affect the controllability of the valve. Because of this, all Cavitrol designs come standard with Class V shutoff protection.