

B & W's ONCE THROUGH BOILERS Main Start-up Valving

Before steam can be supplied to the turbine, the boiler must be brought from a virtual cold condition to supercritical pressure and temperature. It is the purpose of the start-up system to perform this task. Although operation may only be for a short time, the valve and actuator requirements are severe.

TECHNICAL DESCRIPTION OF APPLICATION

There are a number of variations to the start-up system that have evolved to suit specific plant environments. The description below is the basic approach established by the boiler manufacturer. Our actuators are applicable to both this and modified start-up systems.

The three units to be discussed are:

- 201;** Primary superheater pressure reducing and stop valve
- 202;** Primary superheater bypass valve
- 207;** Secondary superheater bypass valve

During start up, the bypass valves (202 and 207) serve to maintain boiler pressure. While the fluid temperature up stream of the primary superheater is below 600 degrees F, the 207 valve is in control of boiler pressure. As the boiler outlet temperature rises above 600 degrees F, the 202 valve begins to open and the 207 valve throttles back. The 202 valve gradually takes over control of the boiler pressure. As the pressure reducing valve (201) begins to open, the 207 valve begins closing to maintain a constant flow through the primary superheater.

Steam flow to the turbine is gradually increased by the 201 valve. This valve is used to raise and control the turbine throttle pressure to 3500 psig. At this point the flash tank drains and steam from the flash tank will be reduced until the turbine is carrying 25% of the boiler capacity. The bypass system is then out of service. The 202 and 207 valves are closed and the 201 valve is open. The 202 valve functions as a powered pressure relief valve with a setpoint of 4000 psi. Unless a problem occurs, the turbine throttle valves are able to control throughout the remainder of the capacity range.

TYPICAL ACTUATOR PROBLEMS

As the pressure and temperature build in the boiler, the water will undergo a change of phase. The start-up valving will experience water, cavitating water, flashing water and steam. During these transitions, severe vibration and dynamic forces will cause erratic operation and poor control.

MAJOR ADVANTAGES OF REXA

- a. **HIGH STIFFNESS** - dynamic plug forces have no effect
- b. **COMPACT SIZE** - reduces potential vibration damage
- c. **100% DUTY CYCLE** - smooth transition between valving