

Control valves best practice

Only carefully selected, installed and maintained control valves will manage fluid flow as intended. Brian Wall provides back-to-basics advice

Technical Pointers

- Dynamic performance is installed performance and is very different from measures like hysteresis and deadband, which are measured on a bench with no pressure or flow
- If you invest heavily in advanced control and accurate transmitters, and then install a valve that is not capable of responding to small changes in signal then you have wasted your investment

Automatic control valves, properly selected, installed and maintained, can improve process efficiency and reduce plant operating costs. But, with all the effort that goes into designing and specifying control systems, instrumentation, piping etc, it's easy to forget the 'lowly' valve itself – and the result is plant that fails to perform as intended. So the following is a valves checklist for fitters and technicians.

First, be sure you understand the function the valve is required to perform. Is it, for example, intended to start, regulate or stop flow, control temperature or regulate pressure? Second, what are the properties of the fluid, characteristics of the process, and the max/min flow rates and operating pressures? Third, what dynamic performance do you require from the valve to meet the requirements of the control loop?

Armed with that knowledge, you then need to select the most appropriate control valve, taking into account the style (sliding stem, ball, segmented ball, butterfly etc), operating characteristics, end connections, materials of construction and actuator type. Most control valve vendors will undertake the sizing and selection on your behalf.

As for installation, refer to the installation and operating manuals. The valve body must be installed in accordance with the flow direction indicated on the valve or in the manual. It must also be orientated in the direction the manufacturer recommends. You may need to avoid the inverted position on some sliding stem valves on some duties, because you risk sediment collecting in the bonnet and scoring the stem.

Equally, lines subject to freezing temperatures may result in ruptured bonnets as trapped liquid freezes. Also, you must ensure that the control valve is accessible,

with headroom for operation and maintenance.

Moving on to maintenance, periodic as-found diagnostic testing can be helpful to determine the valve's operating performance. The objective is to compare the valve input signal and/or positioner output against the driven travel of the valve to see how well it is responding to signal changes.

Beyond that, as soon as a potential failure is detected (either by diagnostic tests or visual inspection), quickly determine the cause and apply corrective maintenance. That may be as simple as tightening a packing nut or gland, or recalibrating a positioner. Equally, a leaking flange joint may need only to have the bolts tightened or a new gasket inserted. It is also important to be aware that loose hangers may permit sections of a line to sag, straining flange joints to the point of leakage.

Five key steps

Remember these five basic control valve installation and maintenance steps:

First, take the time to understand the control valve markings and components. Valves are identified by markings inscribed on the body, the actuator, a nameplate or on the adjacent piping. Examples include colour codes, pressure ratings, material designations and arrows. Colour codes, for example, can mean different things on different plants, so users need to be aware.

Secondly, proper valve connection procedures must be adhered to. Pipes should be properly aligned and supported before control valve installation. Valves must not be used to pull piping into alignment – particularly diaphragm valves.

Thirdly, ensure that valves are clean before installation. In some cases, the valve and line may need to be blown out with clean instrument air, steam, or clean water, depending on fluid service.

Fourthly, control valves must be stored carefully, in accordance with the manufacturers' guidelines. This generally means away from dirt and environmental contaminants, and in their covers.

Finally, be sure to inspect control valves on receipt. Generally, that means comparing the valve nameplates against the specification sheet, looking for physical signs of damage and maybe measuring the valve against the drawings. **PE**