

# Valves: corrosion and maintenance

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*A survey of valve manufacturers gives basic tips on selecting, protecting, and maintaining valves.*

At its simplest, a valve is little more than a stopcock, an on-and-off switch that lets gas flow to the kitchen range or water pour from the faucet. In pulp and paper mills, valves can become much more complex. They are often built from special alloys to resist corrosion and specially designed to minimize cavitation, noise, and vibration. They may be specially equipped with sensors to monitor flow and pressure. And they must be trusted to function properly and protect against the release of hazardous substances.

A mill setting is without doubt a harsh, demanding environment for valves. In a polling of valve suppliers, several areas were identified as the most corrosive to valves, particularly chemical pulping, bleaching, chemical recovery, and waste-water treatment.

"Due to a combination of high pressure, temperature, velocity, and the composition of the cooking liquor, the digester blow valve on a batch digester is the worst service," notes Honeywell's Thomas F. Murphy, director of pulp and paper marketing in Phoenix, AZ. "The recovery/causticizing area and the bleach plant are also very corrosive."

In some uses, a valve may only last 12–18 months. Depending on the alloy and seat material used, the life expectancy can also exceed 10 years in some applications, said David Johnson, pulp and paper business manager at Neles Jamesbury in Worcester, MA.

According to James W. Bennett, general manager for the valve group at Larox, Inc., in Columbia, MD, the average life expectancies for valves in some typical applications might be as follows:

- Lime mud: 3–5 years
- Green liquor: 2–3 years
- Black liquor: 1–5 years
- Fiber lines: 3–5 years
- Reject lines: 2–3 years
- Coating lines: 3–5 years

Proper initial selection, installation, and maintenance will all help extend the useful life of a valve. "A recycle plant usually has stock that contains sand, wire, glass, etc., which can cause tremendous wear due to abrasive actions," Murphy observed. Keeping cost in mind, though, he suggests cast iron as an acceptable valve material for use in recycling applications. For steam and water uses, carbon steel is a better choice, he said.

For pulping lines, the consensus is to choose stainless steel (316, 317 or 317L). For liquor lines, Alloy 20 and Hastelloy are common choices, Murphy said. Alloy 20 and titanium are good choices for low-pH cooking, "especially in the vapor phase on top of the digester," added Johnson.

Teflon gives added protection to valves in bleaching areas said Fred M. Green, industry marketing manager for Keystone Valve USA, Inc., in Houston, TX. Teflon plus steam-hardened, heat-resistant materials such as stellite (a nonferrous alloy of cobalt, chromium, and tungsten) and chromium coating are warranted on waste treatment lines, he noted.

Both Bennett and John Casner, vice president and general manager of Hayward Industrial Products' Plastic Valve Division, in Elizabeth, NJ, suggest elastomers such as SBR styrene, SBR-T, butyl rubber, and nitrile rubber for use in valves.

The valve design itself influences how well the unit holds up in use. "The number of turns in the body design affects the velocity and the erosion effects of the solution," notes Murphy.

To assess the condition of a valve, first consider whether it's operating smoothly and at prescribed specifications. Has there been an increase in control tuning problems? Is it cycling smoothly?

Visually inspect the valve for leaks, damage, or corrosion. Listen for sounds or an increase in noise that might indicate a problem. Cautiously sniff the air for unusual odors that might indicate a leak.

The most common problems to check for include erosion or corrosion of the working parts. Matching the valve and valve materials to the conditions in which they will be used can reduce those problems. Teflon, one of the most common seal materials, may suffer under extremes of pressure and temperature, notes Murphy. Permeation of liners is another problem that can be corrected through proper material selection, said Green.

Steam or shaft leaks may be corrected by adjusting the valve packing. Seat or seal wear may simply require periodic replacement of components as part of a preventative maintenance program. A valve diagnostics program may help locate the cause of control loop instability.

When repairing valves or fittings, maintenance staff should follow approved safety and lock-out procedures. Also be sure replacement parts are available to allow a full bench inspection, if warranted.

The pump should be flushed full with water or an inert solution. Then make sure there is no pressure on the system before loosening fittings, Casner said. Also be sure replacement equipment is compatible with the system.

Another important rule for installing or replacing a valve or parts is to follow the manufacturer's instructions. Follow torquing and loading recommendations, make sure the working parts are properly lubricated, avoid nicking the sealing surfaces, and check that the valve is properly seated in line, cautions Green. **□**

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