Preparing piloted control valves for winter

By **Mark Gimson**

As temperatures drop, water system operators face freezing conditions that can impair or disable piloted control valves. These play a critical role in regulating pressures, flows, and levels throughout potable water networks, and proper winter preparation is essential to ensuring uninterrupted operation.

Piloted control valves contain small-diameter tubing, pilot controls, and internal passageways that are vulnerable to freezing. When water expands within these confined spaces, the resulting damage can compromise valve operation and lead to significant system disruption. Taking proactive steps before winter reduces the likelihood of freeze-related failures and protects system performance.

These valves rely on stable hydraulic signals transmitted through tubing, pilot assemblies, and internal components. Even minor freeze events can block these pathways, alter setpoints, or fully immobilize valve operation. While many valves are constructed from durable materials, such as ductile iron and stainless steel, the precision components within the pilot system remain susceptible to freeze damage if not adequately protected.

When pilot lines freeze, the valve can no longer modulate or control system behavior, which creates operational risks, pressure fluctuations, and potentially costly service interruptions.

Different valve functions present different winter vulnerabilities. Common installations include pressure reducing valves, which are highly dependent on clear, unrestricted pilot lines; among the most susceptible to freeze-related malfunction. Pressure relief valves are important for system safety. A frozen pilot system can prevent proper opening during an overpressure event. Altitude valves are frequently installed in elevated or exposed locations, increasing exposure to extreme temperatures and wind chill.

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Understanding the valve inventory, site conditions, and historical cold-weather challenges will help operators prioritize winterization efforts. Before temperatures drop, each valve station should be assessed for vulnerabilities. Inspect for cracked, aging, or stressed pilot tubing, leaking fittings or joints, corrosion or deterioration on valve bodies and external components and evidence of previous freeze damage.

Any compromised tubing or fittings that allow moisture intrusion can become problematic once freezing conditions begin.

Valve vaults, pits, and chambers often accumulate water from storm infiltration or groundwater intrusion. If left unaddressed, these confined spaces can freeze, encasing pilot lines and valves in ice. Key actions include confirming all vault drains are clear and functional, ensuring sump pumps are operational and verifying that heaters or insulation systems, where installed, are in working condition. A dry, well-maintained vault is one of the most important defenses against freeze damage.

Pilot systems regulate valve performance and are particularly vulnerable to freezing because of their small water volume. Recommended practices include insulating exposed pilot lines, installing heat trace where feasible, inspecting and cleaning inlet strainers to ensure unrestricted pilot flow, and confirming tubing routing minimizes exposure to cold surfaces. Because frozen water expands, even robust pilot components can be damaged if not properly shielded from extreme temperatures.

Operational testing prior to winter is essential. This should include cycling valves fully open and closed, confirming that pilots respond accurately to pressure changes, inspecting gauges to ensure they operate correctly and are not sticking, and checking responsiveness across the full control range. A valve that operates smoothly before freezing temperatures is far less likely to experience mid-winter performance issues.

Winter often exposes weak spots in elastomers, seals, O-rings, and pilot components. Keeping an inventory of essential spare parts enables timely repairs even when supply chains are strained by weather. Recommended spares include diaphragms and elastomers, tubing and fittings, pilot component kits and O-rings and sealing materials. A well-prepared stock ensures minimal downtime during winter events.

Accurate documentation is a critical part of long-term winter readiness. Records should include valves inspected and exercised, components repaired or replaced, condition of vaults, drains, and heaters and implementation of pilot protection measures. Comprehensive documentation supports operational continuity, regulatory compliance, and informed decision-making for future maintenance cycles.

When valves are properly winterized, they perform their function quietly and reliably, even in the harshest conditions.

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