

SINGER SOLUTIONS

Yarra Valley Water, Melbourne Australia



Client:
Yarra Valley Water

Challenge:
Prevent Cavitation with extreme pressure drop

Singer Solution:
150mm (6") S106-PR-AC

Result:
By replacing the 50mm (2") valve with the 150mm (6") SRD and Anti-Cav, not only is cavitation eliminated but the stability is so good that the other two valves are no longer needed.



Anti-Cavitation Trim

Singer's Single Rolling Diaphragm Valve with Anti-Cav Trim Reduces Yarra Valley Station from 3 Valves into 1.

Yarra Valley Water (YVW) is the largest of Melbourne's three water corporations providing water supply and sewerage services to over 1.7 million people and over 50,000 businesses in the northern and eastern suburbs of Melbourne. The district covers approximately 4,000 square kilometres (2485 mi) from as far north as Wallan and extending to Warburton in the east. They maintain over 9,000 km (5592 mi) of water mains and nearly 9,000 km (5592 mi) of sewer mains.

The Wandin North site had three Singer Pressure Reducing Valves (PRVs) of differing sizes. The 50 mm (2") valve was used during periods of low demand in the zone whilst the 100 mm (4") valve supplied water during periods of high demand which left the 150 mm (6") valve to supply water during extremely high demand periods, such as fire fighting. In early 2012, YVW's Field Service technicians (Lend Lease), observed severe erosion within the 50mm valve during routine maintenance at this site so they contacted Metaval to investigate.

After arriving at the site, Steven Hill, Sales Engineer at Metaval, noted that the noise from the valves could clearly be heard from the in-ground concrete valve chamber with the concrete lid on. The three valves at the site were not fitted with Anti Cavitation (Anti-Cav) Trim at the time of installation as the design did not require it. Typically an Anti-Cav Trim is needed when the inlet pressure is 3 times higher than the required outlet pressure or when the Sigma¹ is below 0.8. Inspection showed the site's upstream (inlet) pressure transmitters to be 68 m (97 psi) and downstream (outlet) to be 6.6 m (9 psi). This meant the downstream pressure (desired setpoint) which feeds into residential homes was fluctuating due to the cavitating valves that were struggling to provide a stable downstream pressure. Excessive noise, damage to the valve and downstream pipeline were consequences of the cavitating valve and so it was clear that an Anti-Cav Trim was needed and the damaged 50mm valve would have to be replaced.

If the 50mm valve was replaced with an added Anti-Cav Trim, it would still leave the other two valves vulnerable to cavitation. Smaller diameter valves can maintain control at lower flow rates but at the same time they offer limited capacity for high flow rates, hence the additional valves in the system. As luck would have it, Singer Valve had just added new sizes in their Single Rolling Diaphragm (SRD), starting at 150mm. This unique technology offers a

¹ Sigma = $P_2 - P_v / \Delta P$ (P₂ = Downstream Pressure, P_v = Vapour Pressure, Delta P = Differential Pressure)

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huge advantage over a flat diaphragm operated valve in that it does not need to be operated between 20-80% open, so a larger diameter valve can be used to control low and high flows in the same valve.

Most distribution systems have a combination of extremely low flow and high pressure periods. Traditional automatic control valves often experience seat chatter under these conditions. As a result, a smaller bypass valve is needed to control the lower flows. With the Singer SRD technology, the moulded diaphragm provides a constant surface area no matter the valve position and avoids injecting small pressure pulses into the piping. By doing this, the valve eliminates seat chatter at low flows helping to prevent water loss and leakage while providing smooth precisely controlled flow.

"It goes against the "rule of thumb" to remove a smaller diameter valve from a system and expect a larger diameter valve to control pressure during low and high flows," said Steven Hill. "But the SRD worked like a charm", he concluded.

By replacing the 50mm valve with a 150mm SRD fitted with Anti-Cav Trim, it removed the need to protect the other two valves with Anti-Cav Trim as the one valve can now do it all.

Cavitation can be an extremely damaging force with loud noise, excessive vibration, choked flow, destruction and erosion of control valves and their components which results in disruption of water distribution or plant shutdown. Singer's Anti-Cavitation technology contains two heavy stainless steel sliding cages that maximize the full flow capacity. The first cage directs and contains the cavitation recovery, allowing it to dissipate harmlessly. While the second cage allows further control to a level as low as atmospheric pressure downstream. The cages are engineered to meet the flow/pressure differential of each application.

By installing a valve with both of these features (SRD and Anti-Cav), the 150mm S106-PR-AC valve addressed cavitation and provides better stability with having one valve in control. "Another advantage that is significant over time is that we now have fewer assets requiring less maintenance," said Fiore DiPietro, Specialist Technician – Operations at Yarra Valley Water. With an organization that requires 650 people to maintain operations, finding ways to reduce maintenance time and costs can make a big difference.

The Yarra Valley customers are back to enjoying constant stable water pressure without cavitation noise and YVW has extended the life time of its pipeline with the Anti-Cav protection.

SINGER INSTALLATION



Yarra Valley Water's Fiore DiPietro with Steven Hill of Metaval

"Another advantage that is significant over time is that we now have fewer assets requiring less maintenance."

*Fiore DiPietro
Specialist Technician, Yarra Valley Water Operations*

SINGLE ROLLING DIAPHRAGM



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Connect with a Singer Valve Solutions Specialist today!