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TEES | TEXAS A&M ENGINEERING EXPERIMENT STATION

Excerpts from Independent Engineering Study performed by the Texas A&M Engineering Experiment Station

Application Notes are by Smart Water Valve Texas

Smart Valve Project Report Prepared by Akash Sali

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Scope of Test: The smart valve will be tested for its functionality features such as arresting flow rate variability, resistance against sudden pressure surges and rectification of water meter reading error against air in the pipeline.

Test Strategies

a. Variation in fluid flow rate
b. Variation in supply pressure
c. Introduction of air in the flow
d. Measurement of flow & volume in the system for various combinations of [above] parameters

Test Cases

Case 1: Flow Rate Test

Purpose - To test the effect of smart valve at different water flow rates.

Conclusion -

1. There was a rise in upstream pressure.
2. There was a fall in downstream pressure.
3. Flow rate in the system reduced.
4. Volume recorded by the water meter in a set amount of time reduced.
5. These differences increased after the smart valve spring was tightened.

SWVT Application Notes *– While the Smart Valve also controls pressure surges and removes air from the system, it also reduces the flow rate. This has the effect of conserving water and reducing water bills in cases where the flow rate "at the faucet" is reduced. Many factors go into determining whether or not the final user's flow rate is reduced such as the use of an open tank, the type of pumps used if any or in areas of high pressure the presence of a pressure reducing device.*

Case 2: Pressure Surge Test

Purpose - To test the effect of smart valve on sudden pressure surges.

Conclusion -

1. Downstream and upstream pressure spike decreased.
2. Rise in flow rate caused by pressure spike decreased.
3. Volume of fluid recorded by water meter in a set amount of time decreased.
4. Above difference increased as the smart valve spring was tightened.

SWVT Application Notes *– This is a byproduct of the internal spring that not only reduces cavitation at the meter but it also modulates sudden changes in pressure. This ability to reduce spikes may also reduce the noise created by the piping and the wear on the piping connections.*

Case 3: Air Bubble Test

Purpose - To test the air bubble reduction feature of smart valve.

Conclusion (to Air Bubble Test)

1. Volume of air bubbles in the system reduced.
2. The rate of reduction increased as the smart valve spring was tightened.

SWVT Application Notes *– We have seen the isolated effect of this in open house tank applications where the volume of water used is the same with or without the valve. In this application, prior to using a smart valve, the clay valves would open and close and the sudden change in pressure across the valve would cause air to be measured as water. We saw results in the first three months of a 35% YOY reduction in the water bill.*

Case 4: Air (Only) Test

Purpose - To test the effect of smart valve on air flow

Conclusion

Smart valve reduced the flow of air in the system, thereby preventing rise in water meter reading.

SWVT Application Notes *– This test affirms that the smart valve keeps entrained air compressed.*

Case 5: Fixed Volume Test

Purpose: To test the effect of smart valve on water meter reading when a known volume of fluid is flowed through it.

Conclusion

1. No to very small change was observed in the volume recorded by water meter.
2. It took more time to fill the 5-gallon volumetric container at the outlet.
3. Time difference increased as the spring was tightened.

SWVT Application Notes *– A primary benefit of the smart valve is in extending the city main pressure zone across the meter. This reduces the amount of cavitation across the meter as the valve turns on and off. In cases where the valve goes on once and then off once after the tank is full – such as the first time filling of a pool or an open vat, the benefit in controlling cavitation may not be significant. If, however, there is a significant amount of entrained air in the water, then the smart valve would be beneficial because it will prevent the entrained gases from expanding as the water (and air) flow across the meter.*

Case 6: Variable Flow Rate Test

Purpose - To test the effect of smart valve continuously varying flow rates.

Conclusion

1. There was a reduction in flow rates.
2. Volume of fluid recorded by water meter decreased.
3. Above difference increased when the smart valve spring was tightened.

SWVT Application Notes *– This test just showed that at lower initial flow rates the effect of the adjustments of the valve is greater.*

Overall Conclusion

1. Smart Valve's functionality in reducing water flow rate, reducing effect of pressure spikes, and reducing air bubble volume in a piping system is validated.

2. The effect of smart valve on each of the above conditions is dependent on its spring setting.

    a. Low to no effect is observed when the spring is in lowest setting.
    b. The effect increases as the spring is tightened

SWVT Application Conclusion Notes: *In most all situations apart from a one-time on and one-time off filling of a tank when the water has little entrained air, The Smart Valve will save the client money on their water bill. In some cases, where the flow to the final user is reduced, apart from an open tank application such as a house tank or a toilet, the valve will also save water.*

Smart Water Valve Texas
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