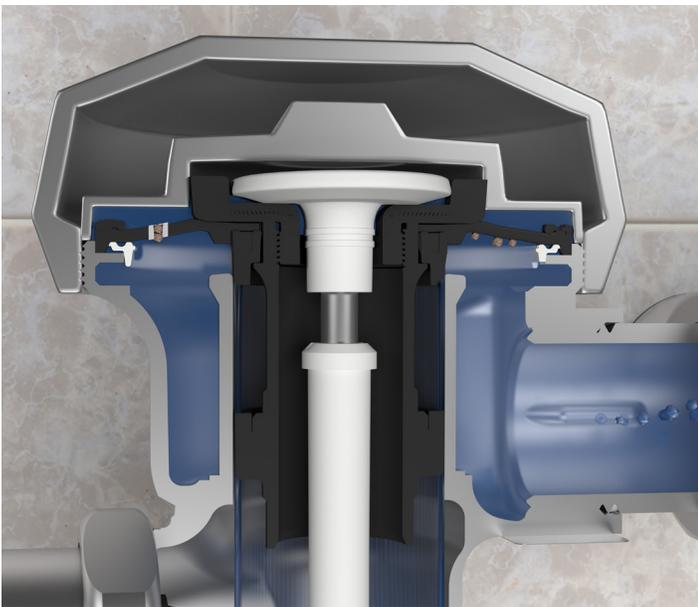


THE NEXT EVOLUTION OF DIAPHRAGM FLUSH VALVES

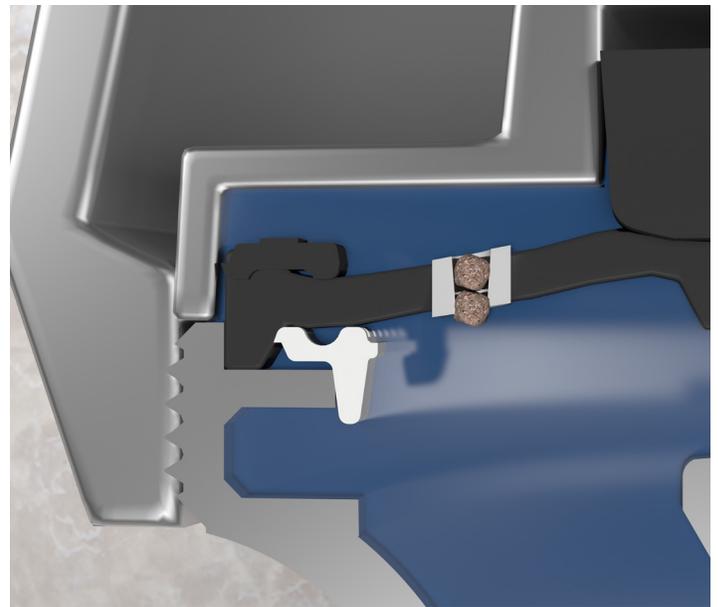
EXECUTIVE SUMMARY

Commercial toilets and urinals with diaphragm flush valves depend on a proper refill cycle to maintain flush performance and reliability. The challenge with traditional diaphragm flush valves is the refill orifice is susceptible to clogs which causes the valve to run continuously. A clogged refill orifice will lead to a maintenance headache with the diaphragm needing to be cleaned—or worse, replaced—resulting in maintenance costs and frustrating downtime for building occupants.

A new engineering solution is available that combines a diaphragm flush valve with proven self-cleaning technology, using an integral wiper spring. The wiper spring prevents the buildup of dirt and debris in the refill orifice, ensuring a reliable, consistent flushing cycle. The advantages of combining a diaphragm flush valve with self-cleaning wiper spring technology are fewer part replacements, less downtime, reduced labor costs and more water savings.



Flush valve



Clogged refill orifice

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THE PROBLEM WITH A CLOGGED REFILL ORIFICE

It's not a matter of if your diaphragm flush valve will fail, but when.

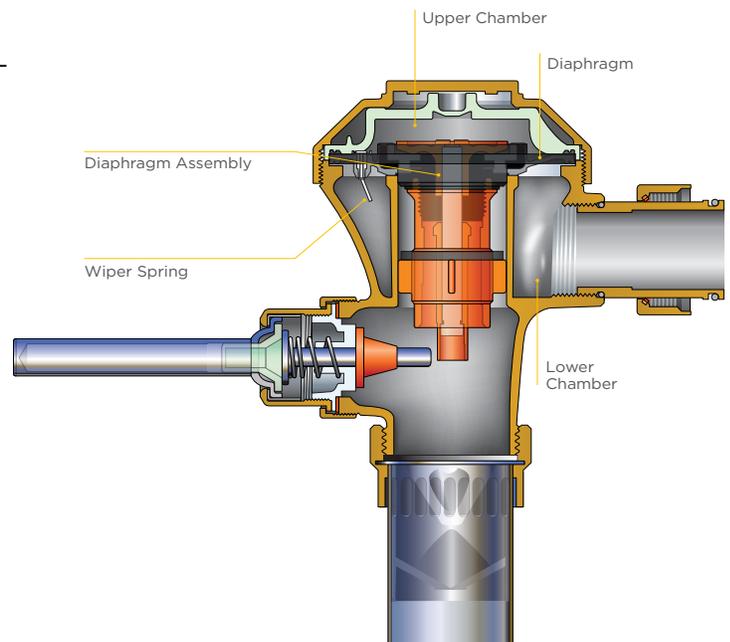
Flush valves, or flushometers, are automatically-timed self-closing valves. For the flush valve to function properly, it relies on a small bypass hole called a refill orifice that connects the upper and lower chamber of the valve. At rest, when the valve is closed, the upper chamber is pressurized which keeps the flexible diaphragm closed tightly on the valve seat.

As the flush is initiated by the user pressing the handle, the handle pin opens the relief valve. This allows the water to start flowing and venting the pressure from the upper chamber. Water from the main inlet lifts the diaphragm off the seat and allows the water to flow

through the down tube into the fixture. A small amount of water flows through the refill orifice into the upper chamber, continuously filling and increasing the pressure in the upper chamber. The diaphragm closes onto the valve seat as the upper chamber is filled and pressurized fully, thus ending the flush.

Despite its importance to the flush process, many diaphragm flush valves have an unprotected refill orifice that is prone to clogs. The bypass hole is typically less than half a millimeter wide, which is small enough to accumulate dirt, sand, lime, and other debris. These particles are common in the potable water supply throughout the United States due to variations in the quality of natural water sources and municipal filtration practices.

While municipal water treatment plants are required to filter water for contaminants like fecal matter or chemicals hazardous to human health, the extent to which they filter for particles is a matter of discretion. Many plants use screens to catch sediments that could interfere with



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distribution pipes, but it is an added equipment and labor cost to process water for superfine particulates. Even if a city has a stellar record for water filtration, pipe infrastructure made of metal or clay leach impurities over time. While some buildings use an on-site filtration system to combat this issue, internal water lines remain susceptible to debris and rust particulates.

When debris starts to clog the bypass, the accumulation slows the upper chamber from filling with water. This causes the diaphragm to stay open longer than usual, which prolongs the refill cycle and wastes water with every flush.

In the case of a complete clog, the flush valve continually running becomes an ongoing source of water waste, with a malfunctioning valve consuming a gallon or more per minute. The only way to resolve this issue is to take the toilet or urinal offline and replace the diaphragm. However, the fixture is unavailable until the diaphragm flush valve is repaired and the diaphragm replaced. This is an inconvenience to restroom users and may leave a negative impression about the business or building owners.

Including the cost of parts and labor, replacing a diaphragm is approximately \$40. Diaphragm assemblies are typically stocked to assure they are readily available, which is another added expense. Especially for large facilities with multiple restrooms, the ongoing costs of replacing diaphragm assemblies represents a significant operational expense.

The latest type of diaphragm flush valve can now eliminate persistent run-ons. This newly engineered solution combines a diaphragm flush valve with an integral wiper spring — a mechanism that prevents debris from entering the refill orifice.

THE ADVANTAGES OF AN INTEGRAL WIPER SPRING

Integral wiper springs are not a new technology; this proven solution has been used in different types of valves for many years. The wiper spring supports a pin that moves up and down through the bypass hole during each flush preventing debris from building up. Because the integral wiper spring is activated during each flush, it ensures the refill orifice flush valve maintains consistent operation.

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MAINTENANCE BENEFITS THAT ENSURE PERFORMANCE

In addition to the integral wiper springs, the next generation of flushometers also has enhanced materials for durability. High-performance internal components are engineered to withstand deterioration caused by water treatment chemicals.

Chlorine damage to traditional diaphragms is a persistent issue. Present in potable water, chlorine is an oxidizing acid which causes inferior materials to swell and the surface to deteriorate. As the diaphragm material starts to disintegrate, it loses its elasticity and tensile strength. Once degradation occurs, the diaphragm cannot create a tight seal against the valve seat. This leads to leaking water from the upper chamber, inconsistent flushes, and the risk of run-ons.

While many diaphragms are made of natural rubber, others use an ethylene propylene diene monomer (EPDM) elastomer which is more chlorine resistant. EPDM is a synthetic rubber and is used in robust applications such as commercial roof membranes, electrical insulation, hoses, and automotive seals.

Newer valves have diaphragms made from an advanced EPDM material which is formulated for superior chlorine resistance. These new diaphragms retain their shape better, ensuring flushing performance that is more reliable and accurate.



Diaphragm assembly with integral wiper spring

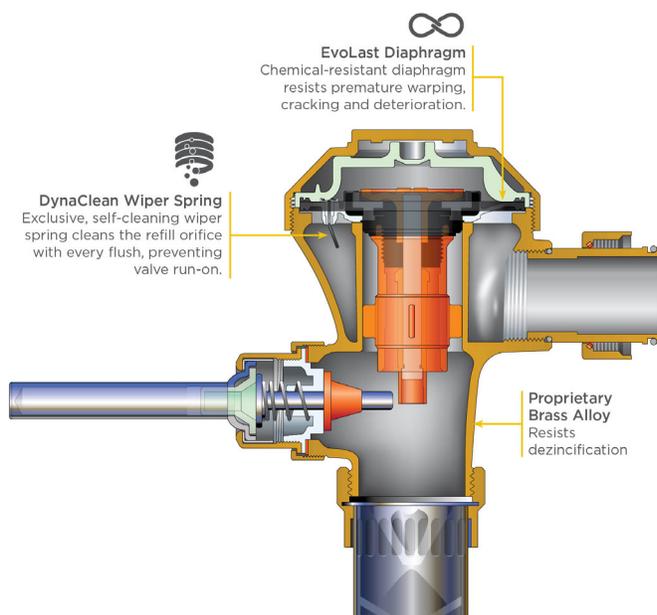
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INTRODUCING ULTIMA® AMERICAN STANDARD DIAPHRAGM FLUSH VALVE

Ultima is the American Standard diaphragm flush valve engineered with zero downtime in mind. This innovative new flush valve features clog-resistant technology that significantly reduces maintenance. Ultima includes the power of DynaClean™ Technology, a self-cleaning wiper spring that cleans the refill orifice with every flush. The wiper spring eliminates inconsistent flushes and valve run-ons, preventing costly water usage and reducing cost of ownership.

Ultima delivers a longer life span in harsh environments. It uses EvoLast™, which is an advanced EPDM material specifically formulated to offer superior chemical resistance to last longer and perform more reliably than conventional diaphragm materials. The EvoLast diaphragm won't warp, crack, or deteriorate. Additionally, its dezincification-resistant brass alloy is third-party tested to withstand severe water conditions.

The diaphragm assemblies are fully interchangeable with leading competitor diaphragm flush valves and can be installed to improve their performance and reliability. This compatibility ensures facility professionals will always have the right replacement part on hand and the expertise to quickly install the flush valve.



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