

Backflow and Backflow Technologies

by Sean Perry, Product Manager
Wilkins/Division of Zurn Industries

Backflow technology is a term that most people in the backflow industry would not first think of when the topic of backflow prevention comes up. Backflow prevention is just the desired goal and different products allow this to be accomplished. However, backflow technology is what sets different manufactures apart from each other. Backflow prevention is the purpose, but the technologies and advancements in how that purpose is accomplished is what distinguishes a quality Backflow Preventer. To understand backflow technology, we must first understand the purpose, which is to prevent backflow.

Backflow is the undesirable reversal of flow of water or mixture of water and other liquids, gases, or other substances into the distribution pipes of the potable water supply from an outside source. Backflow may be caused by conditions of gravity, vacuum, or other pressure changes.

Two factors contribute to reversal of flow in pipelines one is *back-siphonage* and the other is *backpressure*.

Back-siphonage conditions exist when there is a negative or sub-atmospheric pressure in the supply piping, allowing downstream substances to be siphoned into the potable water supply. Pipeline breaks and high withdrawal rates can create vacuums, which can cause back-siphonage.

Backpressure conditions exist when a pressure higher than the city supply, is created in the downstream piping, allowing downstream substances to be pushed into the potable water supply. Backpressure can occur when higher pressures downstream are generated by pumps, thermal expansion and elevation.

The term Cross-Connection refers to any unprotected actual or "potential" connection or structural arrangement between the potable water system and any other source through which it is possible to introduce any used water, industrial fluid, gas, or substance other than the intended potable water with which the system supplied. By-pass arrangements, jumper connections, changeover devices, and other devices through which backflow can occur are considered cross-connections.

Mechanical backflow prevention devices and assemblies offer the best protection against potential backflow hazards and cross-connection hazards. Backflow prevention devices and assemblies include Atmospheric Vacuum Breakers, Dual Check Valves, Pressure Vacuum Breakers, Double Check Valve Assemblies, and

Reduced Pressure Principle Backflow Assemblies. The proper selection of a backflow preventer is crucial to insure that the device works properly and is providing adequate protection for the specific application. It must be stressed that these devices are not all equally acceptable as protection against all types of hazards and other factors must be taken into account with each application. For help in figuring out what type backflow preventer is needed for a particular system, check with the local water purveyor or Authority Having Jurisdiction (AHJ) in that area.

The constant with all Backflow Preventers is that they are held to the same standards and approval agencies. When a new Backflow Preventer is introduced, they must first go through very strict tests to ensure that they do, in fact, work as intended. All manufactures are required to perform these evaluations in order to sell an "approved" device or assembly. Therefore, what sets backflow preventers apart from each other is the technology and features that are offered. This is where manufactures have the opportunity to separate themselves from their competitors.

Pressure loss is one area where a manufacturer's technology can be noticed. Backflow Preventers such as the Double Check and Reduced Pressure Principle Backflow Preventers come standard with two independently acting check



Wilkins 3/4" 350 double check demonstrates complete pressure vessel repair technology.



Wilkins 350A double check. Notice compact size and compound check technology.

valves. These check valves are spring loaded and naturally create a pressure loss across the valve. Check design can drastically change the amount of pressure loss that a system experiences. Compound checks and clapper style checks offer better pressure loss characteristics than most other style checks. The checks allow the ability to either remove a portion of the check out of the flow of water or can offer variable spring tensions as the valve goes through different stages of flow conditions. Other style checks, such as a spring loaded poppet style check do not allow for the same pressure loss benefits. In those style checks, the spring continues to become stronger as flow increases therefore creating a higher-pressure loss.

The exterior valve characteristics are another area that allows manufactures to be competitive in technology for Backflow Preventers. Lay length, weight, and coatings are all characteristics that manufacturer's take into consideration while designing a Backflow Preventer. The lay length is the total space in the piping system that the assembly will take up during installation. Weight is a technical challenge as well. Using the correct materials, such as stainless steel or ductile iron, instead of cast iron, can greatly reduce the weight of a backflow preventer. This makes it easier and less costly to install. A lower weight can also put less strain on your piping system. Coatings are another issue that manufactures put technical investment in. Making sure a coating can hold up to not only exterior wear and tear, but internal as well. Installation requirements for different water districts can dictate if Backflow Preventers features are acceptable. For example, can the valve be painted? Some features that seem like nice features can actually restrict other necessities for a Backflow Preventer installation. All of this technology needs to be considered when a manufacturer designs a new Backflow Preventer.

Noticeable progress is being made in recent years in one specific Backflow Preventer technology. This area is in maintainability. When the concept of a Backflow Preventer was first invented, the main concern was to stop backflow from happening. Not much emphasis was placed on how hard it would be to keep that valve working in the future. As the technology for backflow preventers has advanced, so has the emphasis on the end user. Older Backflow Preventers, many times, would have multiple repair parts and even potentially hazardous access covers that were spring loaded. This made Backflow Preventers very difficult and time consuming to work on. Presently check modules, single access covers, retaining rings, less usage of bolts and fasteners, bulkhead fittings, and grooved couplings have greatly reduced maintenance time and difficulty. These advancements have even allowed Backflow Preventers to experience greater life spans for the customer and plumbing system. Future technologies are making even further steps; with pressure vessels that can be completely changed out in smaller Backflow Preventers, literally making a complete valve rebuild a matter of seconds instead of hours!

Technically speaking, a Backflow Preventer only needs to be worried with stopping backflow from happening, therefore protecting our potable water system. Backflow technology allows this to be done in the most efficient way possible. Taking into consideration the total cost of a valve, maintenance, labor involved in repair, installation cost, maintenance cost, and most importantly performance, must be considered when choosing the best valve for your system. Advancements in Backflow Preventer technology may not always reduce the initial cost of a valve, but long-term reliability and ease of maintenance can reduce the long-term investment drastically. The simple fact that a Backflow Preventer is needed, or is required, does not help in choosing the valve for you. The technology and features that a Backflow Preventer may offer are well worth the time to investigate the options available. This allows one to make sure that the valve with the best features and benefits for your system's needs is chosen. L