

Water Hammer Control

» An Explanation of, and Solution to Water Hammer

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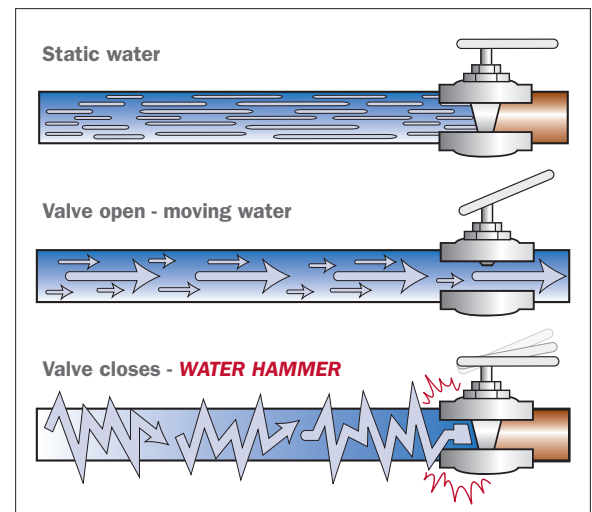
Flowing water, like a train, is hard to stop quickly.

While they can be stopped by a valve or faucet, the sudden stop no doubt results in a serious pressure surge. The analogy may seem extreme, yet the truth is every time a flowing water column is stopped abruptly, a small train wreck occurs in your water line. The longer the line, and the faster the flow, the more momentum the “train” will carry. Even though these collisions in your lines are small, their long-term effects can and will result in large-scale damage throughout the piping system.



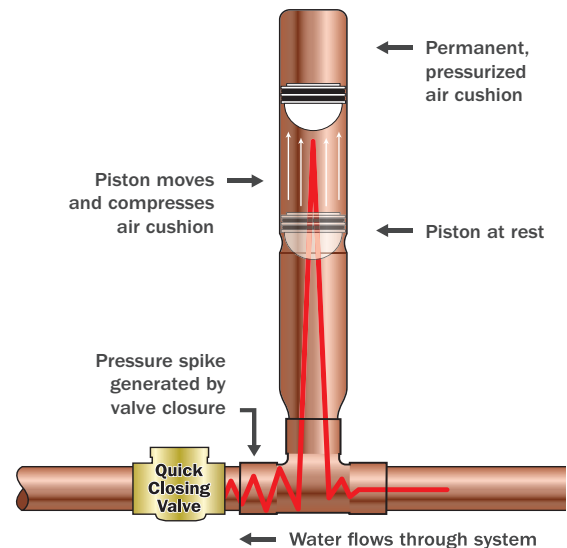
Product Damage Due to Water Hammer

All valves, fittings and appurtenances in the shock wave's path feel the full brunt of this pressure rise each and every time the flow is abruptly stopped. It would be a big mistake to consider only the excessive pressure effects on the pipe itself, because the pipe is not a primary concern for failure. Rather, all other plumbing products within the system are at risk. Certainly, in due time, uncontrolled water hammer will cause premature failure in the following products: Water Heaters, Safety Relief Valves (T&P Valves), Pressure Reducing Valves (PRVs) Backflow Preventers, Faucets, Solenoid Valves, Fittings, Tube Hangers/ Brackets, etc.

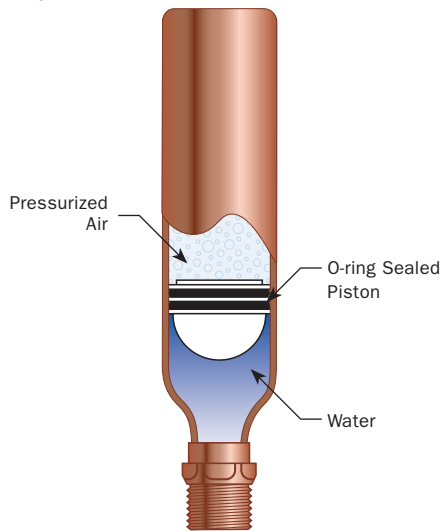


Controlling Water Hammer

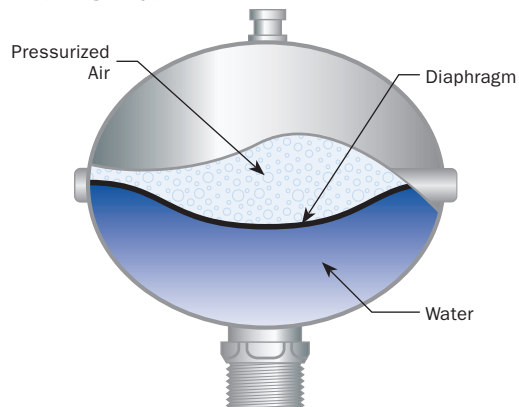
The most effective means of controlling water hammer is the installation of an engineered water hammer arrester. An engineered arrester employs a measured, compressible cushion of air or gas which is permanently separated from the water. When a valve closes abruptly, the moving water column is displaced up into the arrester, compressing the permanent air charge until all the momentum of the moving water is safely dissipated, allowing the column to slow down calmly, preventing the development of water hammer.



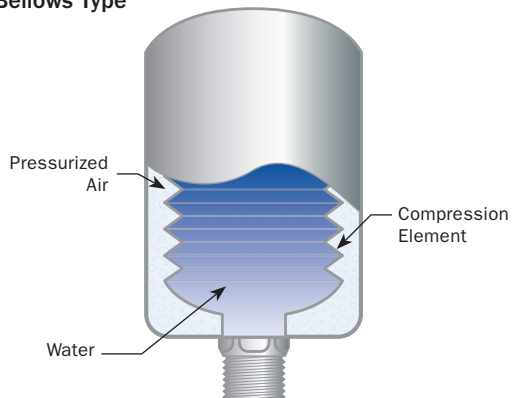
Piston Type



Diaphragm Type



Bellows Type



Examples of mechanical
water hammer arrestors

Historically, manufacturers have employed a rubber diaphragm, a metal bellows or a piston with o-rings to separate the air from the water. Although all of these types of devices have been around for many years, the most efficient and widely used type of arrester is the piston style. Its simplicity of design is cost efficient to produce, yet few moving parts promote high quality and longevity.

ASSE Testing & Certification

To ensure quality, the arrester product standard most widely specified by engineers worldwide is ASSE 1010. The American Society of Sanitary Engineering (ASSE) requires rigorous testing and annual factory quality audits in order for the manufacturer to display the ASSE Certification on their arresters. In addition, national model codes in the USA and Canada require ASSE 1010 Certification on any arrester installed.

The UPC, IPC, IRC model codes, and the National Plumbing Code of Canada, all require the installation of ASSE 1010 Certified Water Hammer Arresters on all quick-closing valves to control water hammer in both residential and commercial plumbing applications:



NATIONAL PLUMBING CODE OF CANADA 2010 (NPC/NRCC)

A-2.6.1.9.(1) Water Hammer Prevention:

Water hammer is a buildup of pressure in a length of horizontal or vertical pipe that occurs when a valve or faucet is closed suddenly. The longer the pipe and the greater the water velocity, the greater the pressure exerted on the pipe, which can be many times the normal static water pressure and be sufficient to damage the piping system. Since air chambers made from a piece of vertical pipe do not provide acceptable protection, pre-manufactured water hammer arresters are required to address this potential problem. **2.2.10.15.**

(1) Water Hammer Arresters: Water hammer arresters shall conform to ASSE 1010.

Installation Options and Sizing Methods

In addition to the many connection types, ASSE Certified AA arresters are also available as integral parts of the supply valves installed in access boxes, such as laundry and ice maker boxes. This makes installation simple for the plumber because the arresters are already the right size and installed in the right place for the application.

For the same reasons, code enforcement is easier for the plumbing inspector. When access boxes with integral arresters are installed, the correct size and placement of the arresters is accomplished every time.

Three different methods of sizing are outlined below for each industry segment.



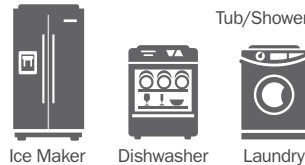
RESIDENTIAL



Single-Fixture & Private Plumbing Groups

Applications: Not just for homes. Plumbing fixtures in homes, duplexes, apartments, condominiums, motels, hotels and military housing.

Sizing/Placement Guideline: Point-of-use AA size arrester on both hot and cold lines. Place on ice makers, dishwashers, washing machines and tub/shower valves.



Arrester Group: Any ASSE 1010 Certified AA size arrester. Various connection size and type are for the installer's convenience.



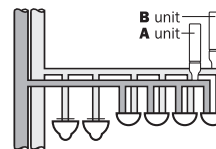
COMMERCIAL



Multi-fixture Plumbing Groups

Applications: Plumbing fixtures in office buildings, retail, schools, hospitals, correctional facilities and public buildings.

Sizing/Placement Guideline: The properly sized arrester corresponds to the total number of fixture units on each hot and cold branch line. Place each arrester at end of the branch line.



Arrester Group: Any ASSE 1010 Certified A, B, C, D, E, or F size arrester. Various connection size and type are for the installer's convenience.



INDUSTRIAL



Large Industrial Piping Systems

Applications: Industrial equipment, food processing, commercial laundry, up-feed pump systems, irrigation and waste treatment systems.

Sizing/Placement Guideline: To size an arrester for industrial applications, use the Industrial Equation, custom sizing the arrester given the information specific to the project. A spreadsheet version of this equation is also available.



Arrester Group: Large industrial size arresters, 200-400 cubic inch size.



Sioux Chief Arresters

Sioux Chief has been an industry leader in water hammer arrester science and solutions for decades. Our arresters are continuously and rigorously tested. The simple but durable piston design provides the longest performance life of any arrester on the market

All arresters are made in the USA from copper, brass, and stainless steel materials.



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