

Sioux Chief Manufacturing

Technical Report #998

Water Hammer Arresters

Subject: Arrester sizing

Question: The Sioux Chief C thru F size arresters all have 1" connections, but a few arrester competitors have similar rated C thru F size arresters with different connections (1", 1¼", 1½", and 2" respectively). How can Sioux Chief arresters be equal to them in arrester size and rating? Also, along that same line of thinking, shouldn't a 2" pipe line be sized with a 2" arrester?

Answer: The main factor in the shock absorbing capacity of an arrester is the *volume of compressed air or gas within the arrester chamber*. Since the shock producing energy in any given piping system can be calculated, the volume of compressed gas needed to absorb the energy can also be calculated. It is this shock absorbing capacity (volume) that gives the arrester its AA thru F size rating—not the connection size.

Although some arresters have different barrel diameters and pipe size connections, simply matching pipe size with arrester connection size is *not* a recommended method for sizing arresters. A proper sizing method recognizes the *volume of gas* required to safely absorb the energy and all the factors that contribute to the total shock energy within a given piping system. That's why all certified arresters are classified by arrester size (AA thru F) rather than connection size. The different sizes and types of connections are only intended for the convenience of the installer.

The connection size itself, has little or nothing to do with the shock absorbing capacity of the arrester. For example, we offer our F size arrester (No. 657-F series) that has a 36 in³ volume with four different connection options (1" stock, 2", 2½", and 3" custom). Since all four F size arresters have the same volume, they all have the same shock absorbing capacity.

Any arrester sizing method that does not consider flow pressure, flow rate, pipe diameter, and effective pipe length is *incorrect*.* Using this incorrect method of sizing, the customer will end up buying an arrester that is either oversized, i.e. paying for something he doesn't need, or undersized which means too little protection from water hammer.

* On smaller arrester applications (AA thru C) a simplified sizing formula is commonly used, based on plumbing fixture units. This formula is calculated based on maximum conditions and could be considered "oversizing" in some cases; but this method is very acceptable by the plumbing community due to the insignificant price difference between these smaller sized arresters. However, when sizing larger, more expensive arresters (D-E-F +) the price difference is very significant, and a more detailed sizing formula should be considered to insure the best arrester efficiency.



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