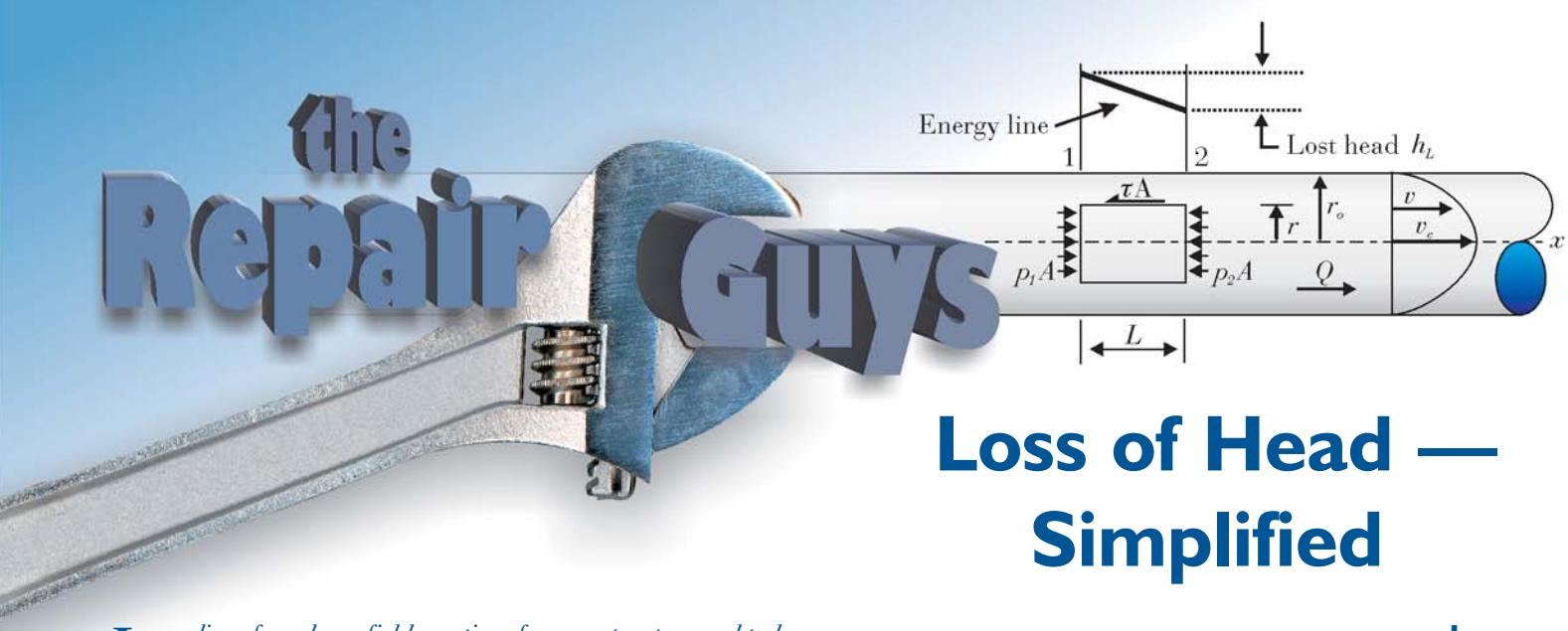


Loss of Head — Simplified

In our line of work, we field questions from contractors and technicians concerning repairs, installations, and general backflow prevention practices. We'd like to share some questions we receive and our answers. Everyone has different opinions on these subjects and we would like to hear yours. Contact us with your questions and ideas via email at: imark@backflowparts.com or mail us at American Backflow Products Co., Post Office Box 37025, Tallahassee, FL 32315.

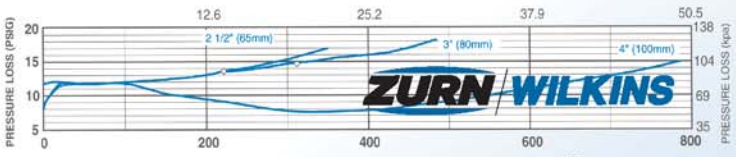
— Mark Inman and Jason Gregg

QUESTION —

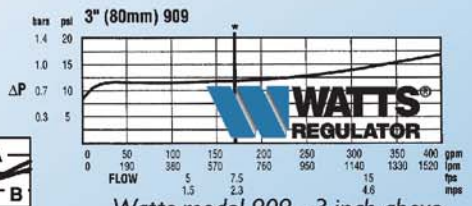
I will be installing a 6-inch reduced pressure principle assembly on an existing system. Can you tell me what the 'pressure loss' or CV factor is for that particular assembly?

Mark -

This is probably the most common question that is asked by plumbing contractors, fire-line contractors, and even engineers for new or retrofit backflow prevention assembly installations. Obviously, anytime a backflow prevention assembly is specified for an installation, it is very important to know what the pressure loss is for that assembly. The problem we find many times is that the answer can be easily misunderstood. For example, when we call our supplier and ask this question, normally they will look it up and find a flow curve not a specific number. This can be confusing, so many times they may guess, or give an estimate of the overall pressure loss. It is important that we understand how it is represented on a flow curve, so that pressure loss can be calculated correctly.



Wilkins model 375 -3 inch at left



Watts model 909 - 3 inch above.

Each manufacturer, model and size will generate a unique flow loss curve. If pressure loss is critical, obtain a loss curve from the manufacturer, usually located in its literature.

FEBCO model 880 - 3 inch at left.

- Jason

Basically, pressure loss is present in any plumbing system. It normally starts with the friction of the water against the interior walls of 'fixed orifice items' such as pipe, valves, and fittings. They are called fixed orifice items simply because the pathway that the water flows does not change, so it is easy to calculate the pressure loss for that item. The pressure loss for a fixed orifice item is identified as the CV factor. A backflow prevention assembly is not a fixed orifice item so it cannot have a CV factor. The check valves within the assembly are force loaded to the closed position. This means that the orifice or pathway that the water flows through is constantly changing (As the flow of water increases or decreases, the check valves are opening and closing). This opening and closing of the check valves changes the amount of friction within the assembly.

Mark -

With that in mind, the best way to show the flow characteristics of a backflow preventer is by a 'pressure loss verses flow rate' curve. This type of flow curve will show the pressure loss of the assembly throughout its full range of operation not just at a single point. So, to determine the pressure loss, we need to know at what flow rate the assembly will be operating. Then it is just a matter of reading the curve. We know that as the flow rate varies, the pressure loss through the assembly will vary as well. For example, you could have a 6-inch reduced pressure principle assembly that has a pressure loss of 12 PSI at 140 GPM and then a pressure loss of 9.5 PSI at 840 GPM.

- Jason

It is important to remember that the values we get from a flow curve are for the assembly itself and does not include any of the piping and fittings required to install the assembly. There have also been some questions concerning pressure loss tables that are published by approval agencies. These tables are used to show the 'maximum allowable pressure loss' requirement for a specific size and type of backflow prevention assembly. Basically, these tables show the standard by which assemblies are evaluated by that agency or lab. To find the pressure loss for a particular model of backflow preventer, you will normally have to refer to the manufacturer's specification sheet.

Size	AVB / PVB	Dual check	DCVA	RP
½	10	10	10	22
¾	10	10	10	20
1	10	10	10	18
1½	10	10	10	16
2	10	10	10	16
2½	10	10	10	16
3	10	10	10	15
4	10	10	10	14
10	10	10	10	14

The backflow preventer product performance standards and specifications in the United States define the maximum allowable headloss for a given maximum flow. The maximum flow is generally tied to the maximum flow for a domestic water meter. The maximum loss for an AVB, PVB, dual check or double check valve is 10 psi, for example. However, the maximum loss for an RP will vary with the size of the assembly. As shown in the table at the left, the smaller the backflow preventer, the greater the allowable loss. dw&bp

Double check valve assembly pressure loss hysteresis curve.