WATTS®

The Who, the What, and the Wye

Everything You Need to Know About Strainers

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Co-author

Cameron Rapoport is part of the Backflow product management team at Watts. His industry experience spans multiple industry verticals - from Pulp & Paper, chemical processing, and commercial and residential plumbing.

Cameron is recognized industry wide for his expertise in Backflow technology and applications and can often be found leading technical and application based Backflow training for Watts customers and industry trade associations.

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The Basics

What is a strainer?

A simple, yet effective device designed to filter out sediment, particulates, and foreign matter in your plumbing or piping system large enough to clog or damage your equipment if left unchecked.

A strainer can trap particles or debris capable of damaging important or expensive equipment, such as pumps, control valves, or backflow devices by utilizing either an inserted mesh, perforated sheet, or combination screen—depending on the application.

Types of Strainers

There are various types of strainers that work in different ways.

- **Duplex basket-type strainers** are suitable for continuous flow applications where the process cannot be shut down for cleaning.

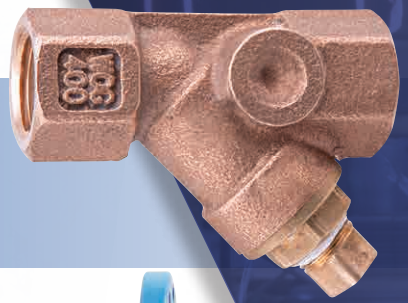
- **T-type basket strainers** are designed for applications with higher flow rates and provide the utmost protection of control valves.

- **Wye (Y) strainers** are for applications where only small amounts of solid particulates are expected to be drained and frequent clean out would not be necessary.

In this E-book we focus on the Y-Strainer, your everyday strainer named for its y-shaped form.

Material Selection

Strainers come in a variety of materials, each with their own advantages and disadvantages. Size, media, and chemical exposure can all change the ideal material for your application.



Bronze

- Typically used for smaller diameter applications (<2”)
- The standard for plumbing due to ubiquity of copper, ability to solder
- Reasonably high corrosion resistance, especially for water applications

Cast Iron

- Typically used for larger diameter (>2 1/2”) applications due to cost
- Can have corrosion issues, but can be epoxy coated for corrosion resistance
- Durable, but heavy, construction

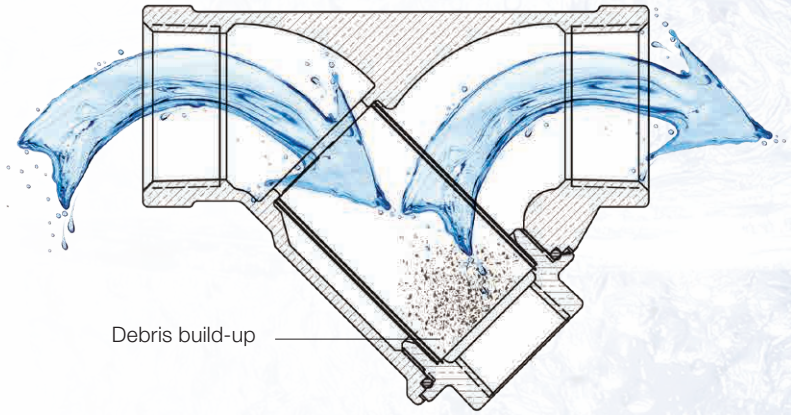
Stainless Steel

- Typically chosen for corrosion resistance, especially in larger diameters
- Fabricated stainless steel valves can be significantly lighter than cast iron equivalents

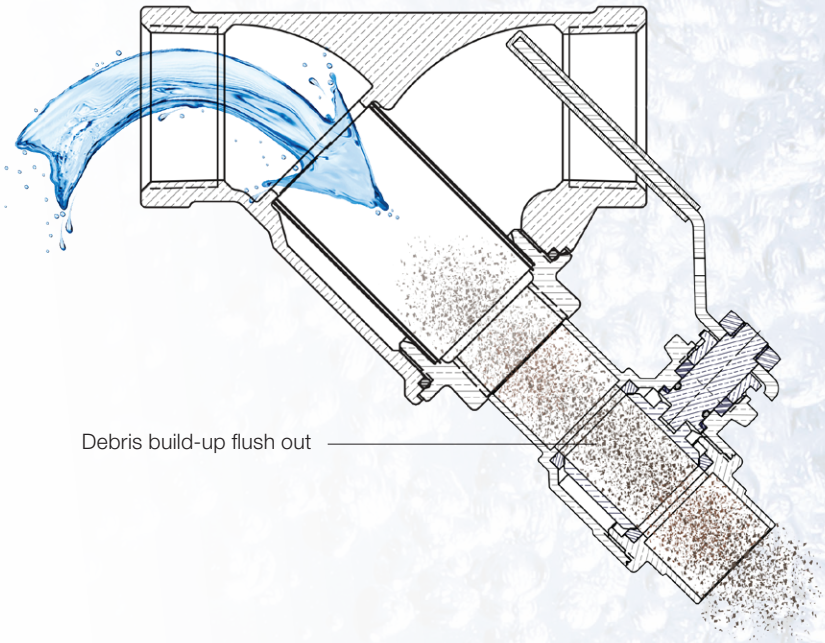
Exotic materials

- i.e. Titanium, hastelloy, monel, etc.
- Chosen for corrosion or abrasion resistance
- High cost, often custom

Normal flow: Water flows through the top of the strainer, and out the side, leaving debris captured in the strainer basket.



Strainer Blow-Down: A ball valve can often be attached to a port on the drop leg to allow for emptying of debris from the strainer basket without taking the valve offline.



A Bit about Y-Strainers

Y-Strainers are one of the most common types of strainers, ordinarily used for pump protection.

Y-Strainers are used for the mechanical removal of unwanted solids from liquid, gas, or steam lines by means of a perforated or wire mesh straining element. A Y-strainer has a drop leg from the line that they are providing protection for to hold the strainer element and provide the ability to clean the element without the need to remove the housing from the protected line.

The Perks:

- Good filtration area
- Low cost
- Compact design
- Low weight
- Debris is collected away from the flow

Let's Not Rush Things

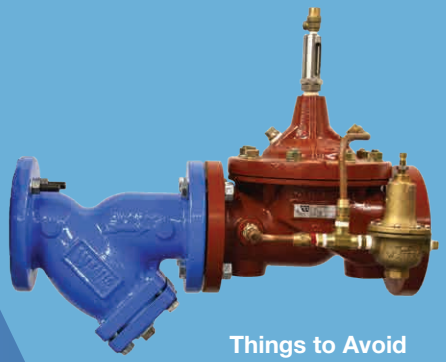
Before installing the Y-Strainer, be sure its pressure rating is correct for the system by checking the maximum working pressure rating listed on the valve's specification sheet. The strainer must be installed in the correct direction to function properly, which is identified by a flow direction arrow. Refer to the maintenance instructions for your specific strainer for more detail.

Threaded Connections

Ensure the piping is straight and thread the inlet pipe into the strainer body. Ensure that the drop leg of the Y-Strainer is oriented down to aid in the capture of foreign matter and assist during the cleaning of the strainer element. Then thread the outlet piping into the downstream end of the strainer body. Additionally, ensure the cap securing the element into the strainer body is tight to avoid leaks. It's important to confirm the threaded end cap is installed properly and not angled or offset. The instructions would be the same for any connections designed for soldering or brazing.

Flanged Connections

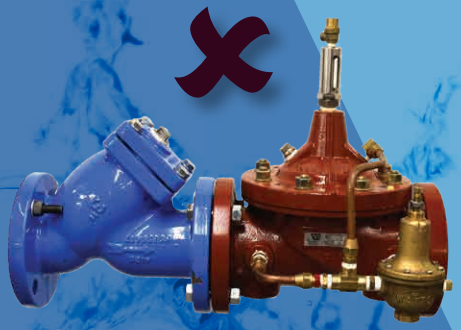
Align flanges so that the connecting piping is square with the pipe. Tighten flange bolts in sequence, crossing to opposites. Make certain the piping is not stressed when tightening flange bolts.



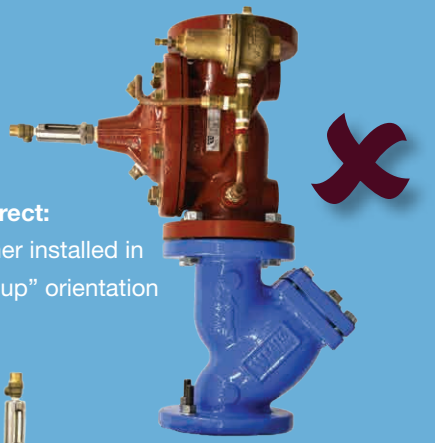
Correct installation:
Upstream of delicate equipment, correct orientation

Things to Avoid

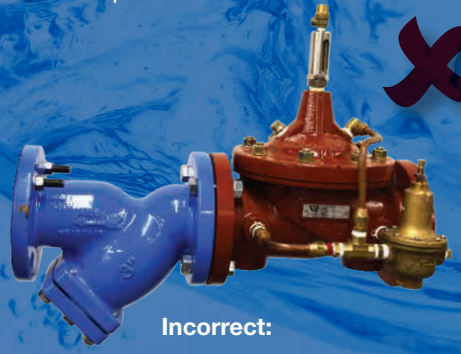
1. Installing downstream, rather than upstream of sensitive equipment
2. Putting the strainer in the wrong location in the system
3. Putting the strainer in backwards or upside down
4. Installing a Y-strainer in a "flow up" orientation



Incorrect:
Upside down



Incorrect:
Strainer installed in "flow up" orientation



Incorrect:
Strainer installed backwards

Wrong location:
Strainer is downstream of delicate equipment and will not provide protection

Take Care

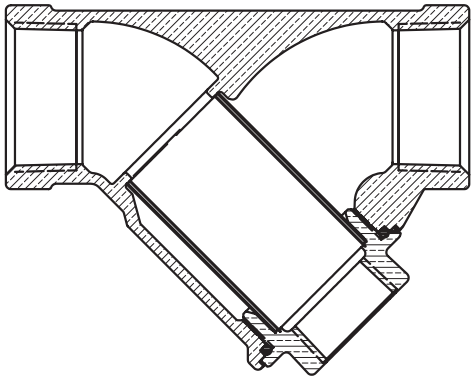
All strainers should go through regularly scheduled maintenance checks and pressure readings should be carefully monitored. Keeping your screens clean saves on downtime due to equipment failures and low pressure performance. Refer to the maintenance instructions for your specific strainer for more detail.

Watch for these signs

A systems engineer consistently monitors downstream pressure. If inlet pressure is maintaining, but downstream pressure shows a loss it means excessive sediment has built up. This reduces the amount of free flow area of the screen, creating a pressure drop, meaning the screen needs cleaning. Strainers should have regular cleaning/maintenance schedules based on the application and the type of operation. Different areas may have their own considerations for levels or types of contaminants/sediments in their water supply resulting in a more or less frequent maintenance schedule.

Clean Strainer

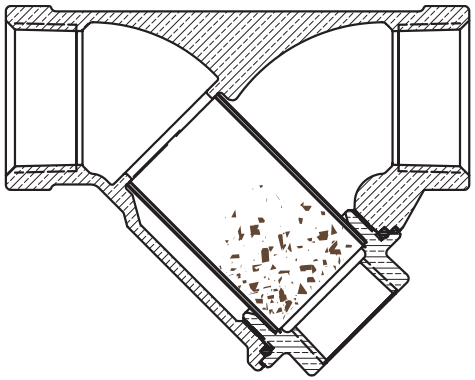
60psi



59psi

Slightly Dirty Strainer

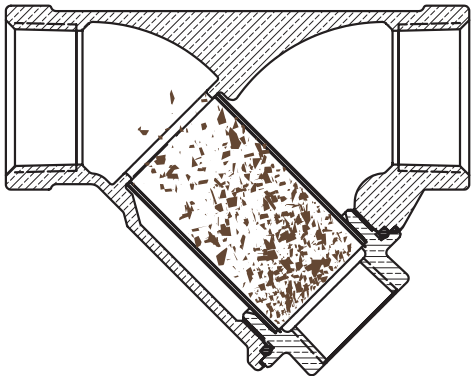
60psi



55psi

Dirty Strainer

60psi



50psi

Maintain & Replace

When a differential pressure gauge is installed across the inlet and outlet it will indicate pressure loss due to clogging. Typically, when the gauge reaches 5-10 psi, the screen should be cleaned in order to ensure maximum efficiency. Keeping a spare, clean screen on-hand at all times will help minimize shut down time.

For Y-Strainers with Blow-Down Valve

- Open and flush the Y-strainer until any sediment is removed

For Y-Strainers without Blow-Down Valve

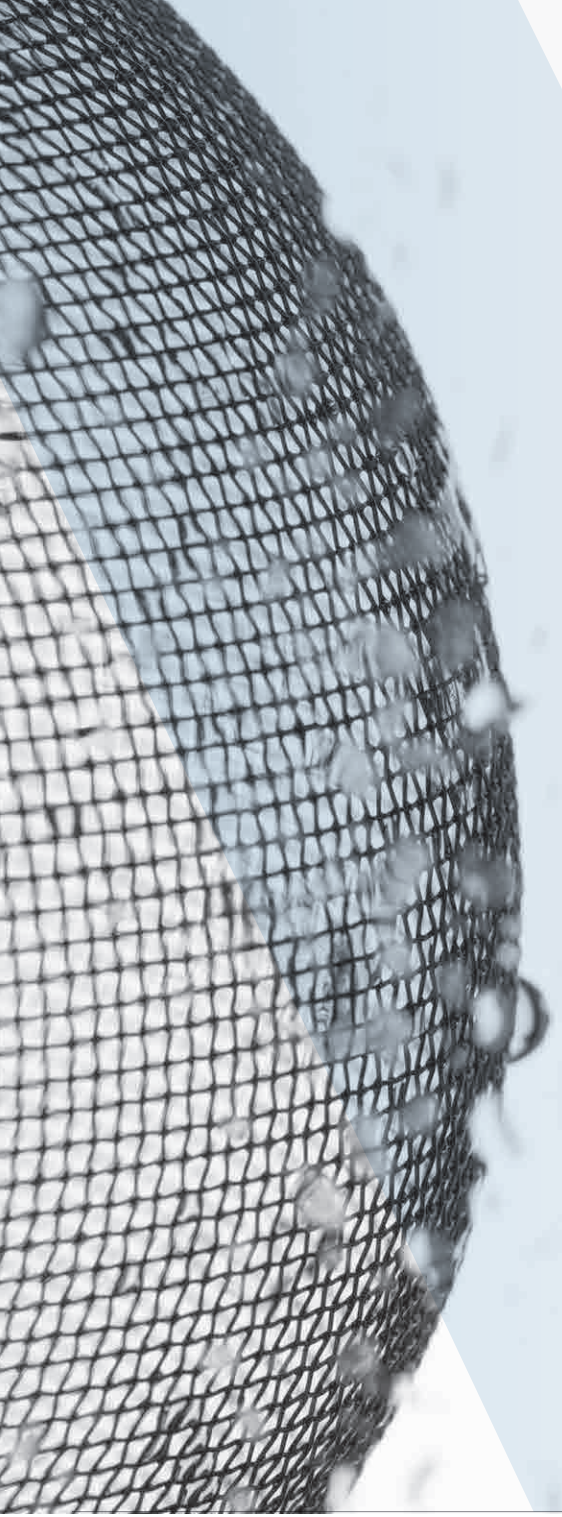
- Take strainer off-line
- Remove the cover or cap and clean the screen
- Reinstall the screen in the strainer in the same position as before
- Replace cover or cap

NOTE: Gasket should be replaced as needed

⚠ WARNING

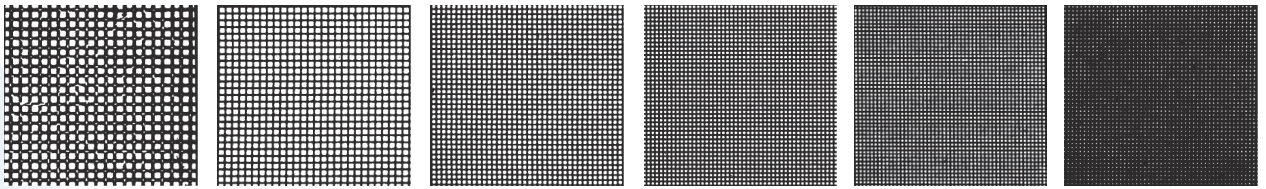
Individuals performing removal and disassembly should be provided with suitable protection from possibly hazardous liquids.

Refer to the maintenance instructions for your specific strainer for more detail.



The Screening Process

Wire Mesh Screens: While mesh screens are satisfactory for smaller sized Y-pattern strainers, they are not suitable for larger strainers; unless furnished as a liner for a perforated metal screen. Mesh screens are used primarily for very fine straining, with openings so fine they could not be obtained in perforated metal.



20 MESH
(46% Open Area)
.016 Wire Dia.

30 MESH
(42% Open Area)
.012 Wire Dia.

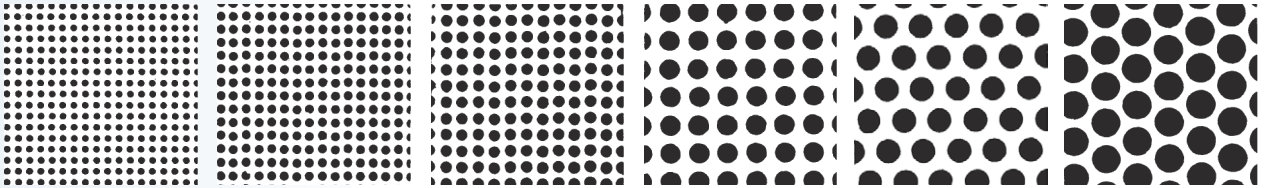
40 MESH
(36% Open Area)
.010 Wire Dia.

60 MESH
(30.5% Open Area)
.0075 Wire Dia.

70 MESH
(31.4% Open Area)
.0055 Wire Dia.

100 MESH
(30.3% Open Area)
.0045 Wire Dia.

Perforated Screens: Rather than use the light gauge sheet metal which would be necessary to obtain exceptionally small perforations, we suggest using a heavy gauge perforated metal screen with large perforations and lined with wire mesh cloth. This would not apply in the case of smaller sizes where lighter wire mesh screens perform adequately.



.033 Diam. (1/32")
324 Holes/sq in
28% Open Area

.045 Diam. (3.64")
225 Holes/sq in
36% Open Area

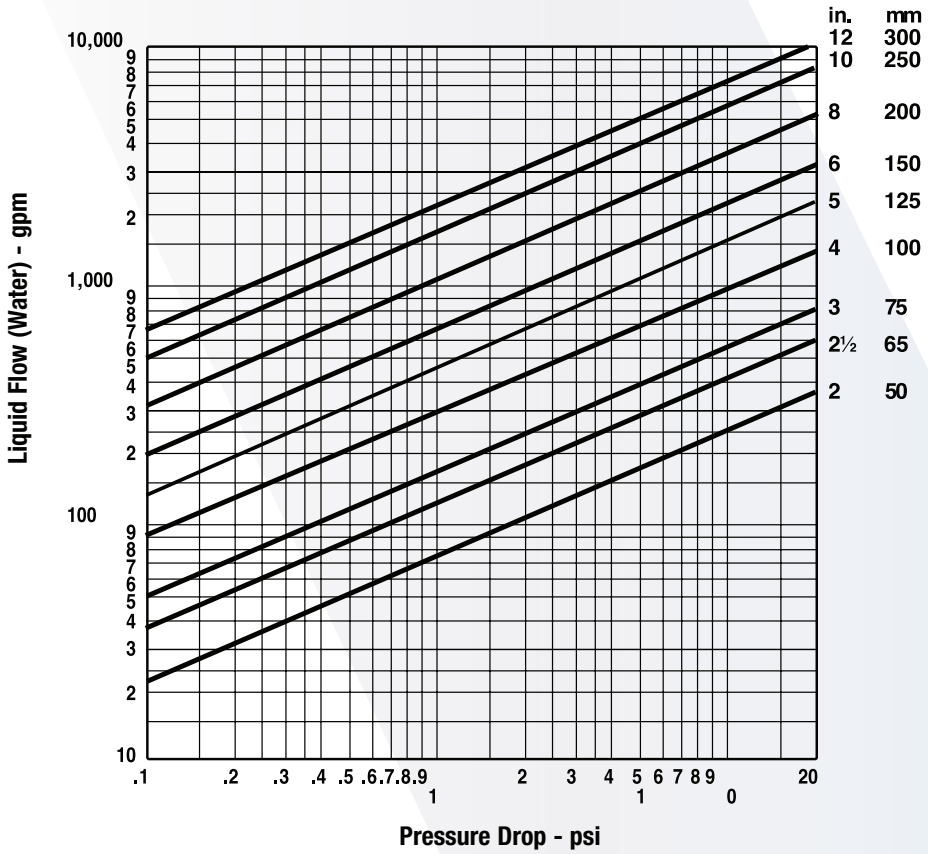
.062 Diam. (1/16")
132 Holes/sq in
37% Open Area

.125 Diam. (1/8")
32 Holes/sq in
40% Open Area

.188 Diam. (3/16")
18 Holes/sq in
50% Open Area

.250 Diam. (1/4")
8 Holes/sq in
40% Open Area

Flow/Pressure Drop Chart



Performance Review

Standard Screen Flow-Coefficient:

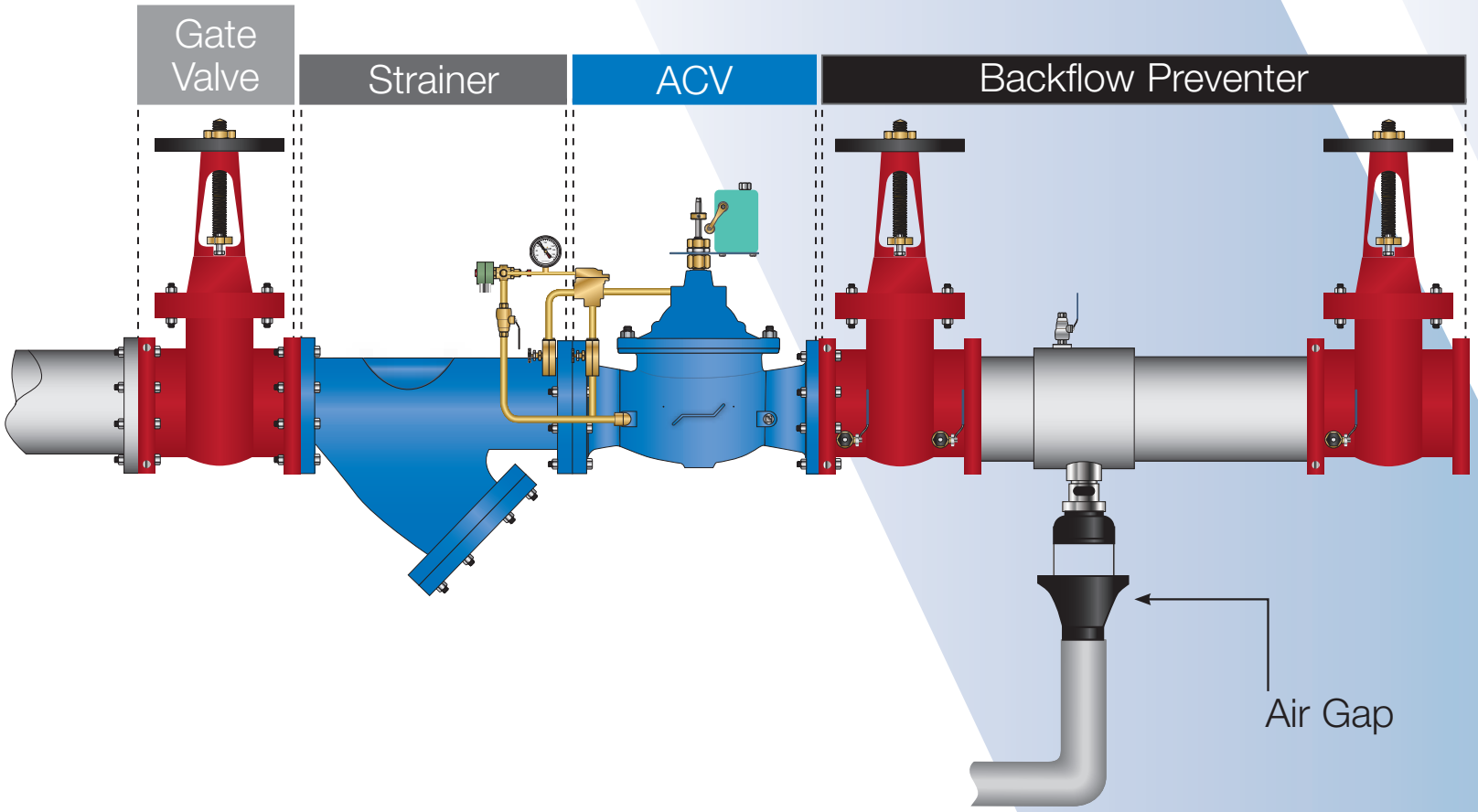
The flow coefficient (Cv) is the number of gallons per minute of water flowing through a given size restriction at a pressure drop of one psi. To obtain the Cv factor for a given size strainer, read the flow capacity curve at intersection with the one (1) psi pressure drop. Pictured is a typical performance chart for the Watts 77F series Y-strainers, e.g. if I have a 4" strainer and a typical flow rate of 200 gpm, to get the pressure drop I would find where the diagonal line for the 4" strainer intersects the horizontal line for a 200 gpm flow rate. In this case, this would result in an approximately 0.45 psi pressure drop. Please refer to product data sheets on Watts.com for more.

Note:

The product specifications shown are in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact the manufacturer for your specific strainer model.

Example of typical wye strainer application

Install a strainer for your application and rest assured your water is protected.



Watts Family of Brands

Watts designs, manufactures, and sells an extensive line of flow control, water safety, water filtration & treatment, drainage, and PEX plumbing products.

The Watts family of companies provides a single source for solutions used to safely convey, conserve, and manage water.

Making Watts your single source for plumbing-related solutions will streamline your operations, save you money, and reduce the variety of repair parts needed for maintenance.

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