PERFORMANCE UNDER PRESSURE

Principles Of Backflow Prevention

WILKINS

with performance curves
& typical weights & dimensions
for Wilkins Backflow Prevention Assemblies

The Health & Liability Risks Of Contaminated Drinking Water

Most of us take the quality of our drinking water for granted. But when water is contaminated, it could cost you your life. Over the past 31 years, contaminated drinking water has been blamed for more than 12,000 cases of illness. In addition, over $20 million has been paid out to settle with victims sickened by backflow.

Generally, public water supplies are safe and clean. Contaminants infect municipal water when pipes are improperly installed or when a hose is connected to a non-potable water supply. The American Backflow Prevention Association estimates more than 100,000 incidents happen every day in the United States. Not every incident results in illness, but every incident poses a threat.

In order to understand the concept of backflow prevention, there are some terms that must be identified and understood. Understanding the terminology is the key to knowing which backflow assembly is appropriate for a given installation. Although most municipalities that have a cross-connection control program certainly can tell the consumer which backflow prevention assembly is appropriate, many areas of the country do not have cross-connection control programs, as of this writing. Therefore, it is incumbent upon the manufacturers and their representatives to ask the correct questions in order to offer the correct backflow assembly for the application at hand. Backflow prevention assemblies are life safety products. If the wrong assembly is specified, the end result can be disastrous.

What Is Backflow?

Backflow is the undesirable reversal of the flow of water or mixture of water and other liquids, gases, or other substances into the distribution pipes of the potable supply of water from any source or sources.

When Does Backflow Occur?

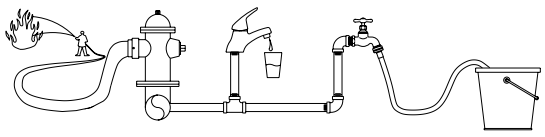
Backflow may be caused by conditions of gravity, vacuum or other pressure changes. There are two factors that contribute to reversal of flow in pipelines. One is ***backsiphonage*** and the other is ***backpressure.***

Backsiphonage 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. Under-sized pipes, pipeline breaks, and high withdrawal rates can create vacuums, which contribute to the occurrence of back-siphonage.

Backpressure conditions exist when a pressure higher than the 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.

What Is A Cross-connection?

The term ***Cross-connection*** refers to any unprotected actual or potential connection or structural arrangement between a public or consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable water system any used water, industrial fluid, gas or substance other than the intended potable water with which the system supplied.



By-pass arrangements, jumper connections, removable sections, swivel or change-over devices and other temporary or permanent devices through which or because of which backflow can or may occur are considered to be cross-connections.

It is evident that we cannot eliminate either the occurrence of backflow nor can we prevent cross-connections from being created. We must therefore provide a means of protecting drinking water systems from the hazards of backflow occurrences through cross-connections.

The Solution Is Clear!

Assemblies vs. Devices

Mechanical backflow prevention ***devices*** and ***assemblies*** offer the best protection against cross-connection hazards. Backflow prevention ***devices*** prevent backflow by stopping the reversal of flow, are not testable once installed because they do not have inlet and outlet shut-off valves or test cocks. Backflow prevention ***assemblies*** include an inlet and outlet shut-off valve and test cocks to facilitate testing of the assembly while it is in its functional in-line position. Furthermore, backflow preventers may be installed at the source of potential contamination or on the water service line itself.

Standards, Approvals, and Listings

Approval agencies, representing many diverse geographical areas and levels of government, have established performance criteria regarding the function, manufacturing, installation, testing and maintenance of backflow prevention devices and assemblies. Wilkins participates in the formation and implementation of these standards to the greatest degree possible.

The overall objective of the performance criteria is to ensure the sanctity of drinking water; however, each standard specifies different requirements relating to mechanical function, material requirements and testing for backflow preventers.

It is the task of backflow prevention manufacturers to produce a single product within a product category that complies with all applicable standards and the acceptance of such products are driven by the state, county and even the local city.

Selecting A Backflow Preventer

What type of backflow preventer should be used?

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 backflow preventer is crucial to ensure 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. In general, there are four elements to consider when designing your backflow prevention program: system characteristics, degree of hazard, type of application and type of installation.

System Characteristics

Each backflow preventer is designed to handle a specific group of system characteristics. ***System characteristics*** include the hydraulic requirements of the specific backflow prevention design. Factors such as the need for continuous pressure versus non-continuous pressure, back-pressure versus back-siphonage and flow-requirements versus velocity must be specified to determine the type of device to be used.

Existing conditions of pressure loss must be taken into account prior to the installation of a backflow preventer. All plumbing systems experience pressure loss. Pressure loss begins with the friction of the water against the walls of the pipe and increases with each additional fitting added to the system. Many of the fittings and components in a plumbing system can be identified as fixed orifice items, such as pipes, fittings, gate valves and ball valves. The pressure loss for fixed orifice items can be identified as a constant value and is

characteristic of each type and size of valve. Once this value is established for a particular valve, the pressure loss through that valve or fitting can be calculated by simply knowing the specific gravity of the fluid running through the pipe and the flow rate (in gallons per minute).

Elevation in the plumbing system is also a very large factor. Approximately 1 psi for every 28 inches of elevation can amount to almost a 7 psi loss in just a two-story building. A high-rise building with an elaborate fire sprinkler system cannot tolerate large losses in supply pressure and is therefore highly concerned with the effects of elevation in the supply system.

Degree Of Hazard

The ultimate purpose in control and prevention of backflow is to protect the public health. Should a backflow condition occur, the ***degree of hazard*** must be understood in order to provide the proper backflow preventer to stop the hazard on hand. The degree of protection is determined based on the degree of hazard. A ***low hazard*** application is when potential backflow can pollute the drinking water. Pollution is defined as materials that can cause undesirable effects to the water, such as discoloration, smell or taste, but will not cause sickness or death. A ***high hazard*** application is one where the potential backflow can contaminate the water supply. Contamination is defined as any impairment to the water quality such that contact with this water can result in illness or death.

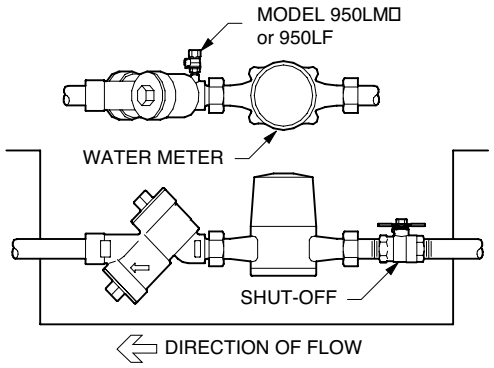
Type Of Application

The ***type of application*** and industry, such as fire protection, irrigation and plumbing, each have particular requirements. Fire sprinkler systems may require detector by-passes or grooved end gate connections. On the other hand, an irrigation system may require pressure vacuum breakers that are not used universally in other types of systems. In certain critical applications, such as hospitals, resort hotels or industrial applications, water must be continually supplied. This requires either multiple connections or manifold assemblies.

Each application is also unique in regards to flow requirements. Plumbing and waterworks require consistent flow of water. Irrigation requires flow 2% of the time and the remaining 98% of the time is in a static condition. Fire protection must stand ready for action with 100% static water pressure. Each condition can pose a unique challenge for the backflow preventer.

Type Of Installation

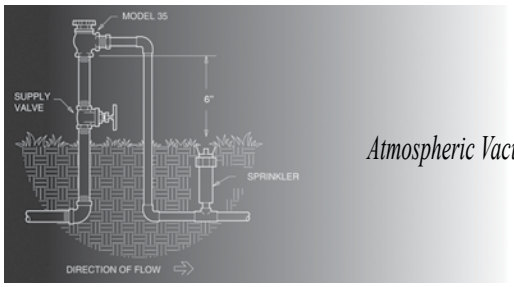
Installations range from indoor to outdoor and "below grade" or pit installations. Where space is an issue, systems can require a vertical installation. Indoor installations must address the issue of discharge. Of the five standard types of backflow preventers, three spill water, two at start-up and one as a basic function of the assembly. Outdoor installations face the potential of vandalism, soil erosion and in some climates, freezing temperatures. An outdoor installation may typically require some type of covering.



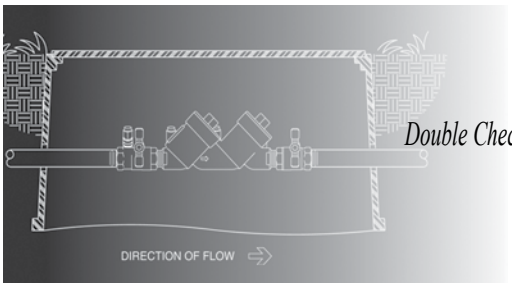
Accessibility is often the most overlooked factor in backflow installations. In general, accessibility is required for any testing, maintenance or repair. Height requirements for backflow preventers are very specific:

Type Of Device

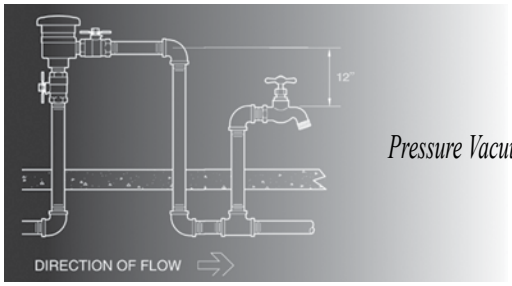
Type Of Device	Height Requirement
Atmospheric Vacuum Breaker	6” above the highest point in the water system downstream
Pressure Vacuum Breaker	12” above the highest point in the water system downstream with adequate clearance for testing and maintenance
Double Check Assembly	Installed between 12” - 30” above the floor or finished grade with adequate clearance for testing and maintenance. If installation is in a pit or vault, provide ample drainage to ensure the backflow preventer does not become submerged.
Reduced Pressure Principle Assembly	Installed between 12”- 30” above the floor or finished grade with adequate clearance for testing and maintenance



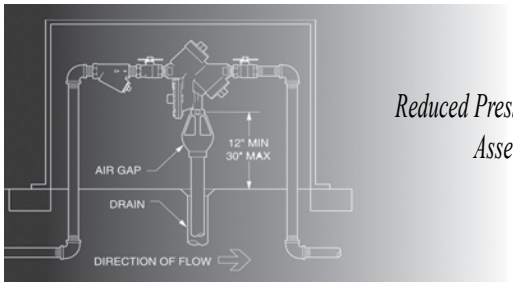
Atmospheric Vacuum Breaker



Double Check Assembly



Pressure Vacuum Breaker



Reduced Pressure Principle Assembly

Side clearance requirement from the wall of Double Check and Reduced Pressure Principle Assemblies (1/2” - 3”) are 24” from side test cocks, 12” from top mounted test cocks, with 24” access from one side. For sizes 4” and above, these requirements are doubled.

The weight of the checks must also be considered, especially if you are looking at a vertical installation. The check assembly weight for an 8” - 10” device may require lifting assistance.

Testable Backflow Prevention Assemblies vs. Non-Testable Backflow Devices

Typically, ***testable backflow prevention assemblies*** are required for use at a service connection. These “Testable” assemblies are used for containment of the entire consumer’s potable system away from the public potable water system. Since their proper function is imperative in order to prevent contamination of the public potable water supply, a method of testing is necessary.

Non-testable backflow devices are usually used for internal protection, within the consumer’s potable system, whereby they are isolating an internal cross-connection from the remainder of the consumer’s potable system. If these types of valves fail, protection of the public potable supply is still facilitated by the “testable” assembly at the service connection.

Types Of Backflow Preventers

Atmospheric Vacuum Breaker (AVB)

An ***Atmospheric Vacuum Breaker*** is a device containing a float-check, a check seat, and an air inlet port. The flow of water into the body causes the float to rise and close the air inlet port. When the flow of water stops, the float falls and forms a check valve against back-siphonage and, at the same time, opens the air inlet port to allow air to enter and satisfy the vacuum. A shut-off valve immediately upstream may be an integral component of the assembly. This valve is intended for use in a non-continuous pressure application (no more than 12 hours of pressure per 24 hour period) in a backsiphonage condition only. An Atmospheric Vacuum Breaker is intended to provide protection in low and high hazard situations.

Testing: This device is not testable once installed.

Pressure Vacuum Breaker (PVB)

A ***Pressure Vacuum Breaker*** is an assembly containing an independently acting, internally loaded check valve with an independently acting loaded air inlet valve, located on the discharge side of the check valve. Additionally, this assembly shall have two resilient-seated isolation valves attached at each end of the assembly and two properly located resilient seated test cocks. This assembly is intended for use in both continuous and non-continuous pressure applications, in a backsiphonage condition only. A Pressure Vacuum Breaker is intended to provide protection in low and high hazard situations.

Testing: 1) The air inlet valve shall open when the pressure in the body is no less than 1.0 psi above atmospheric pressure. And, the air-opening valve shall be fully open when the water drains from the body.

2) The check valve shall be drip-tight in the normal direction of flow when the inlet pressure is 1 psi and the outlet pressure is atmospheric.

Spill Resistant Vacuum Breaker (SVB)

A ***Spill Resistant Vacuum Breaker*** is the same as a Pressure Vacuum Breaker except that the Spill Resistant Vacuum Breaker is less prone to discharge upon fill.

Double Check Valve Assembly (DC)

A ***Double Check Valve Assembly*** is an assembly containing two independently acting approved check valves, four resilient-seated test cocks, and two resilient-seated

isolation valves. This assembly is intended for use in both continuous and non-continuous pressure applications, in both back-siphonage and back-pressure conditions. A Double Check Valve is intended to provide protection in low hazard situations.

Testing: 1) The No. 1 check valve shall be tight against reverse flow under all pressure differentials. The static differential pressure across the No. 1 check valve must be at least 1 psid.

2) The No. 2 check valve shall be tight against reverse flow under all pressure differentials. The static differential pressure across the No. 2 check valve must be at least 1 psid.

Double Check Detector Assembly (DCDA)

A ***Double Check Detector Assembly*** is a specially designed assembly composed

of a line-sized approved double check valve assembly, with a specific by-pass water meter, and a meter-sized approved double check valve assembly. The meter shall register accurately for all flows up to and including two GPM. The meter shall show a registration of all flows above three GPM. This assembly is intended for use in both continuous and non-continuous pressure applications, in backsiphonage and back-pressure conditions. The Double Check Detector Assembly is intended to provide protection in low hazard situations only.

Testing: 1) The static differential pressure across the No. 1 check valve must be at least 1 psid.

2) The static differential pressure across the No. 2 check valve must be at least 1 psid.

Dual Check Valve Assembly & Dual Check With Atmospheric Port

Dual Checks are designed for use in low hazard applications where a fully approved, testable backflow preventer is not required. Check with the local authority having jurisdiction for acceptance.

Reduced Pressure Principle Assembly (RP)

A ***Reduced Pressure Principle Assembly*** is an assembly containing two independently acting approved check valves together with a hydraulically operated, mechanically independent differential pressure relief valve located between the two check valves. This assembly is intended for use in continuous and non-continuous pressure applications, in backsiphonage and backpressure conditions. The Reduced Pressure Principle Assembly is intended to provide protection in low and high hazard situations.

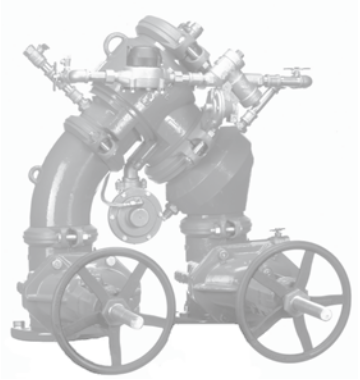
Testing: 1) The pressure differential relief valve must operate to maintain the "zone" between the two check valves at least 2 psi less than the supply pressure.

2) The No. 2 check valve shall be tight against reverse flow under all pressure differentials.

3) The static pressure drop across check valve No. 1 shall be greater than the relief valve opening point (test no. 1), and at least 5.0 psid.

Reduced Pressure Principle Detector Assembly (RPDA)

A ***Reduced Pressure Principle Detector Assembly*** is a specially designed assembly composed of a line-sized approved reduced pressure principle backflow assembly, with a specific by-pass water meter and a meter-sized approved reduced pressure principle backflow prevention assembly. The meter shall register accurately for all flows up to and including two GPM. The meter shall show a registration for all flows above two GPM. This assembly is intended for use in continuous and non-continuous pressure installations, in back-siphonage and back-pressure conditions. The Reduced Pressure Principle Detector Assembly is intended to provide protection in low and high hazard situations.



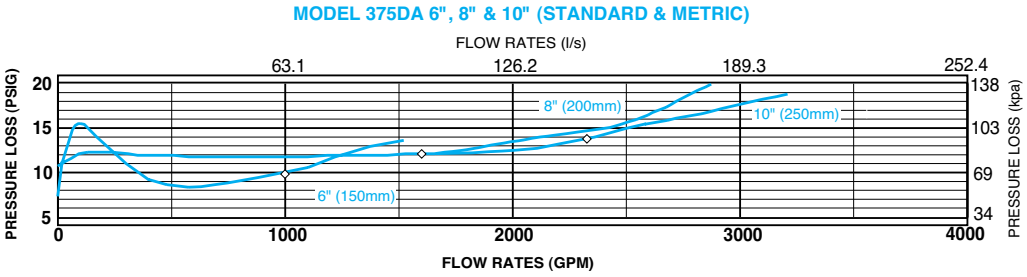
Testing: 1) The pressure differential relief valve must operate to maintain the "zone" between the two check valves at least 2 psi less than the supply pressure.

2) The No. 2 check valve shall be tight against reverse flow under all pressure differentials.

3) The static pressure drop across check valve No. 1 shall be greater than the relief valve opening point (test no. 1), and at least 5.0 psid.

How To Read Performance Curves

As mentioned earlier, many fittings in a plumbing system, such as pipes and gate valves, are considered fixed orifice items, whereby pressure loss can be identified as a constant value and is characteristic of each type and size of valve. In contrast, backflow preventers, by design, include check valves that are spring-loaded or force-loaded to the closed position. The orifice of a backflow preventer is constantly varying. As flow varies through, it pushes the spring-loaded check open and closed. It is not possible to have a fixed value representing the flow and pressure loss. The flow characteristics of a backflow preventer can only be defined by a "Performance Curve," depicting the relationship of pressure drop and flow rate throughout its full range of operation.



The full range of operation is referred to as the "usable range." Flow rates beyond the usable range will have destructive velocities to the piping system or excessive pressure loss. The basis for flow capacity and pressure loss in a backflow prevention assembly begins at zero GPM and goes up to the industry standard, American Water Works Association (AWWA) required maximum flow capacity. This maximum rate is known as "rated flow." For any flow rate from zero GPM up to the rated flow, there is an established maximum allowable pressure loss. Failure to meet the required flow rates or exceeding the maximum pressure drop at any point up to the rated flow would prevent the assembly from being approved.

NOTE:

To properly interpret the following Wilkins backflow performance curves, the flow rates on the top are indicated in "liters per second" and the bottom flow rates are in "gallons per minute."

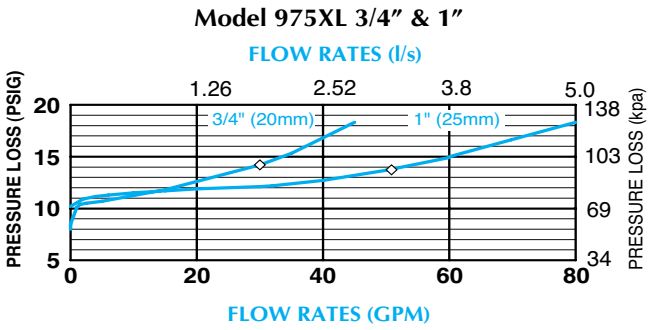
All Wilkins Backflow Prevention Assembly performance curves are constructed with the "flow rate" in gallons per minute (GPM) or liters per second (l/s) on the horizontal axis and the "pressure loss" in pounds per square inch (psi) or kilopascals (kpa) on the vertical axis. Additionally, a diamond will be placed on the curve to indicate the maximum rated flow for each given assembly, according to its pipe size.

Example:

Find the pressure loss exhibited by a 1" 975XL Reduced Pressure Principle Backflow Prevention Assembly while the valve is flowing at 40 GPM (see chart below).

Solution:

Follow the horizontal axis out to 40 GPM. Next, move upward until the 40 GPM axis intersects the 1" 975XL curve. At this juncture, moving to the left, read the pressure loss from the vertical axis that corresponds with the intersection of the 40GPM axis and the 1" 975XL curve. The pressure loss at 40 GPM is taken to be 12.6 psi. Also, from the curve, we see that the diamond is at the value of 50 GPM. Therefore, the maximum rated flow of a 1" Wilkins 975XL is 50 GPM.

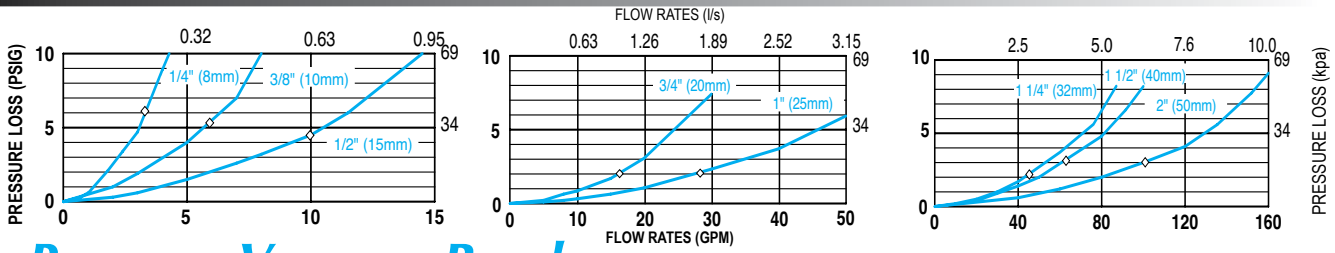


PERFORMANCE CURVES For Wilkins Backflow Preventers

Atmospheric Vacuum Breaker

MODEL 35

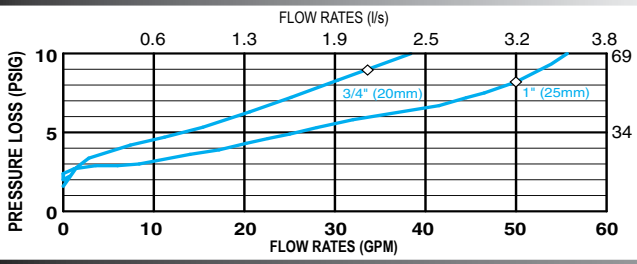
1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" & 2" Atmospheric Vacuum Breaker



Pressure Vacuum Breaker

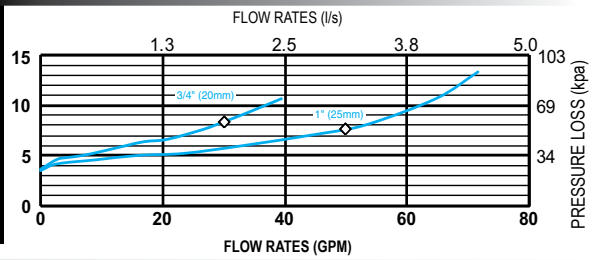
MODEL 420

3/4" & 1" Pressure Vacuum Breaker



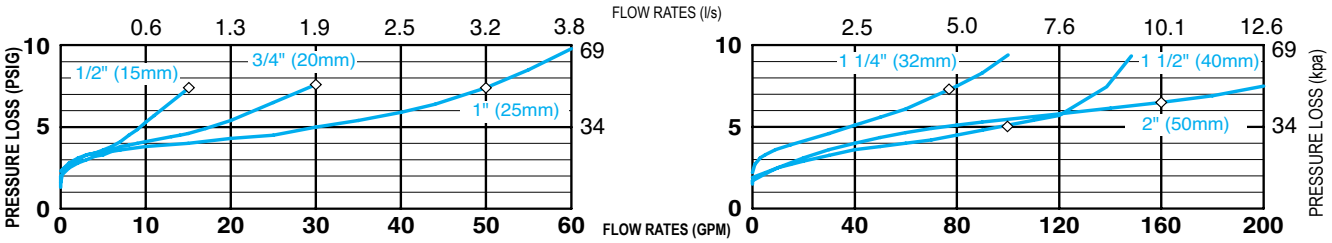
MODEL 460

3/4" & 1" Pressure Vacuum Breaker



MODEL 720A

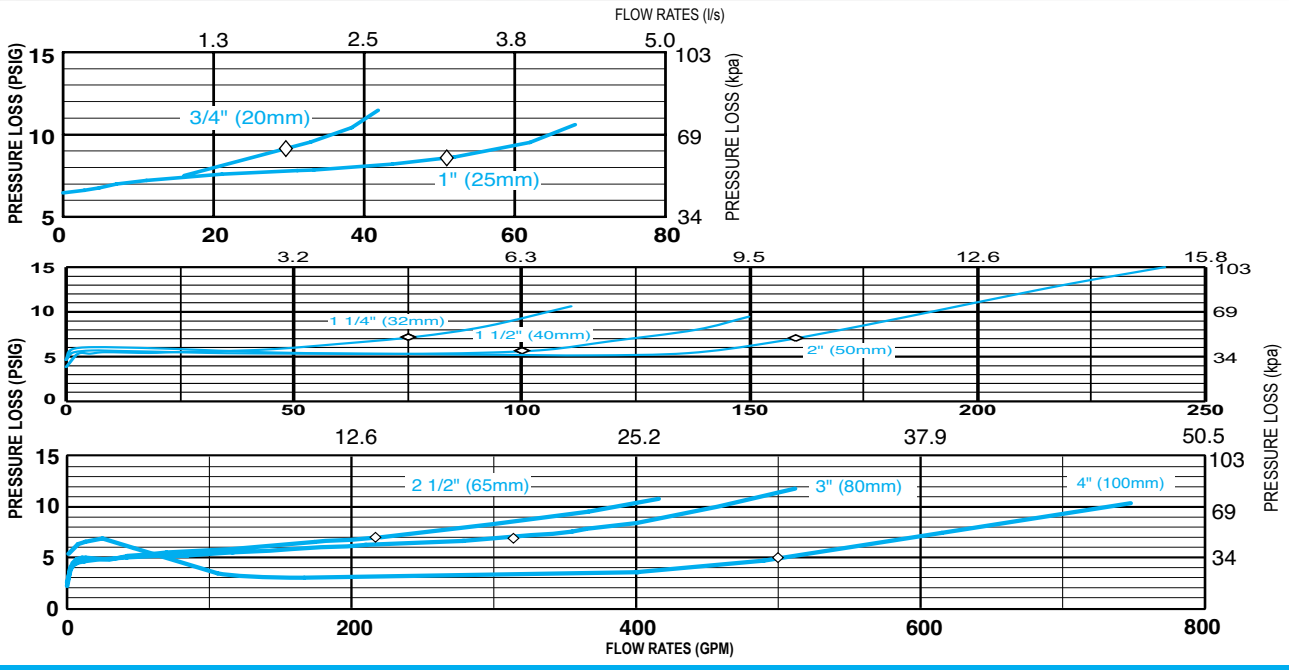
1/2", 3/4", 1", 1 1/4", 1 1/2" & 2" Pressure Vacuum Breaker



Double Check Assembly

MODEL 350

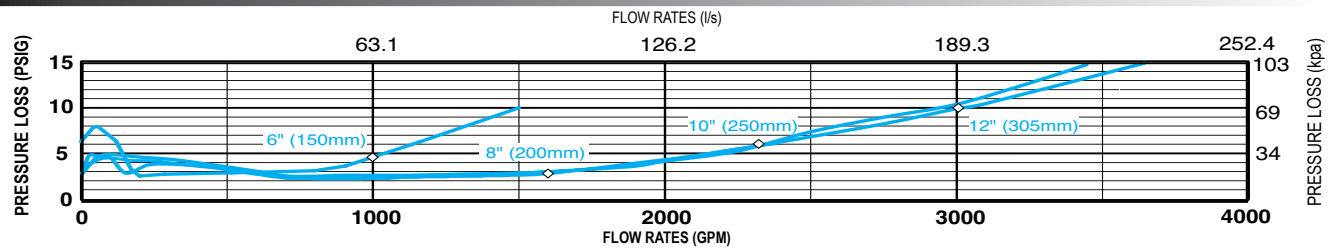
3/4", 1", 2 1/2", 3" & 4" (see page 10 for 6" - 12") Double Check Assembly



Double Check Assembly

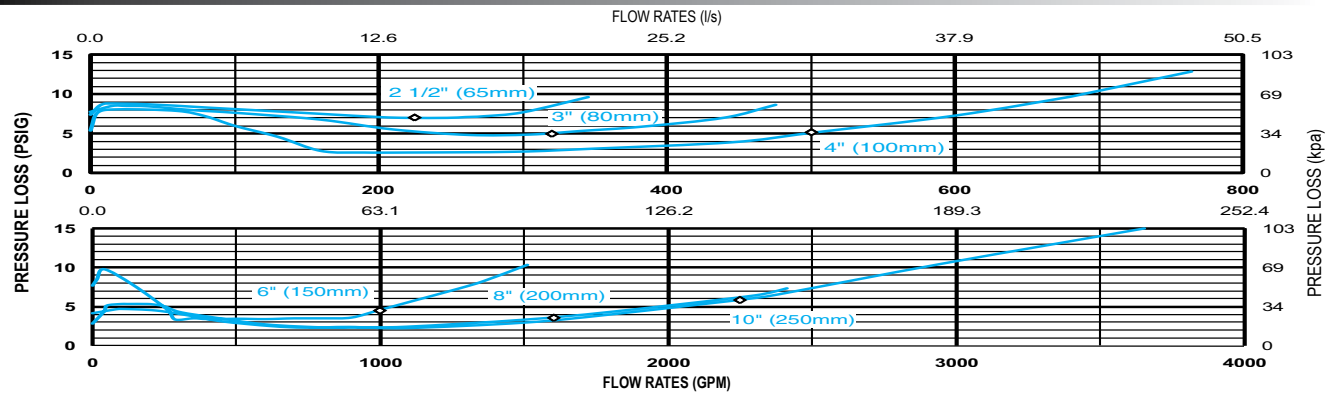
MODEL 350

6", 8", 10" & 12" Double Check Assembly



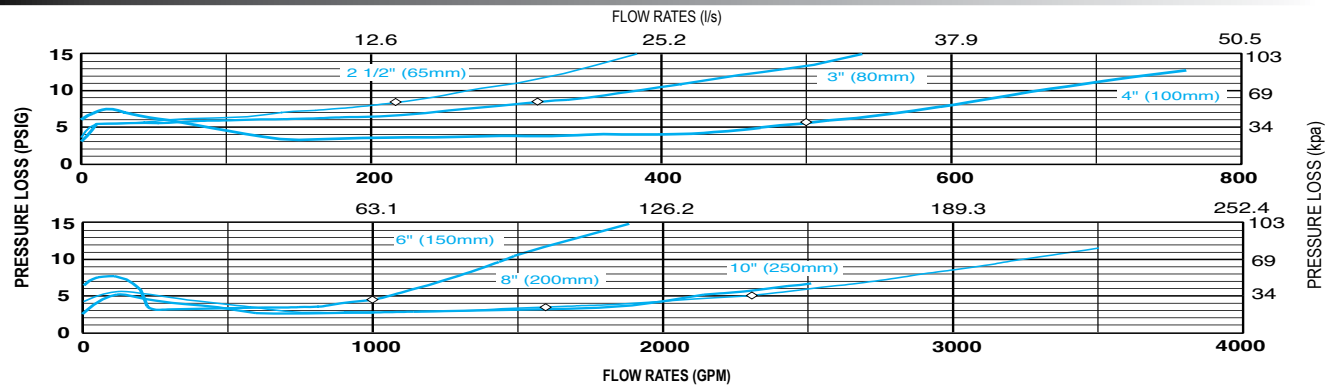
MODEL 350A

2 1/2", 3", 4", 6", 8" & 10" Double Check Assembly



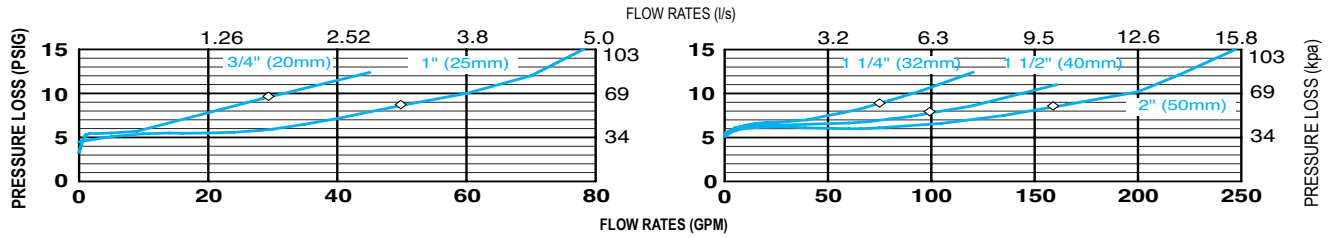
MODEL 450

2 1/2", 3", 4", 6", 8" & 10" Double Check Assembly



MODEL950XL

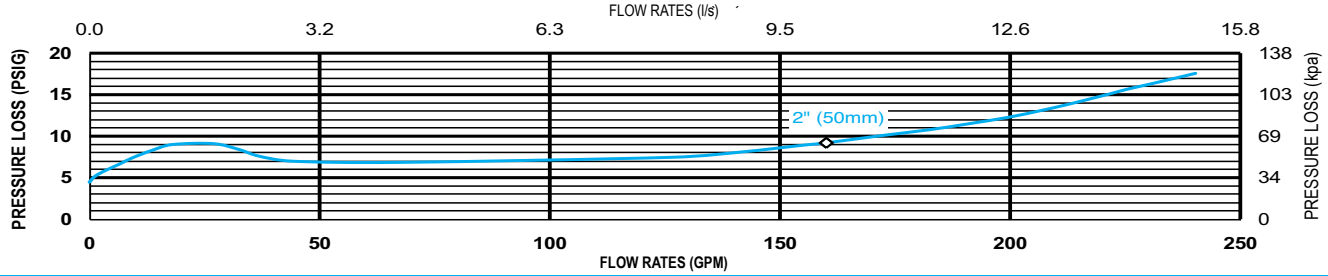
3/4", 1", 1 1/4", 1 1/2" & 2" Double Check Assembly



Double Check Detector Assembly

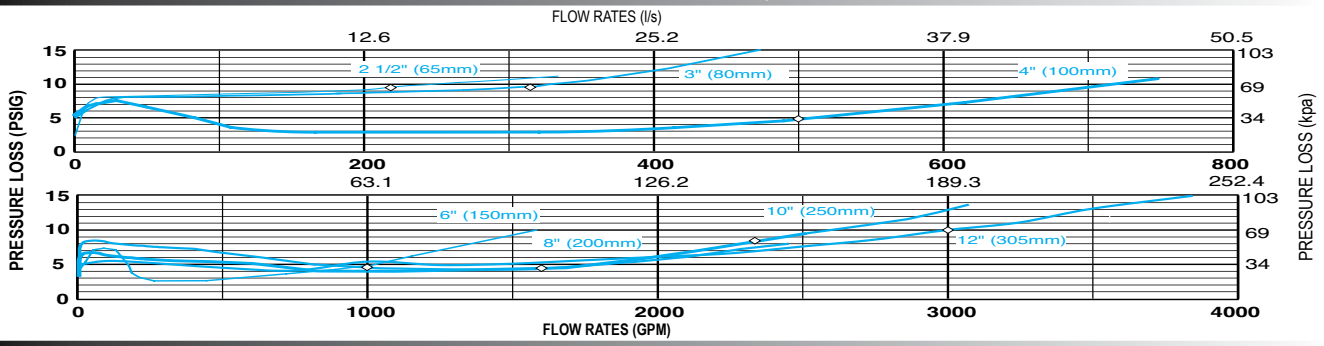
MODEL950XLTDA

2" Double Check Detector Assembly



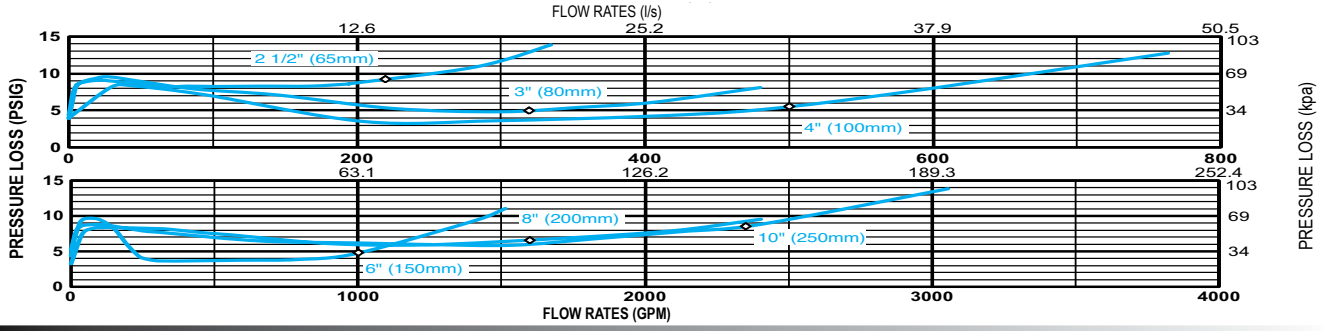
MODEL 350DA

2 1/2", 3", 4", 6", 8", 10" & 12" Double Check Detector Assembly



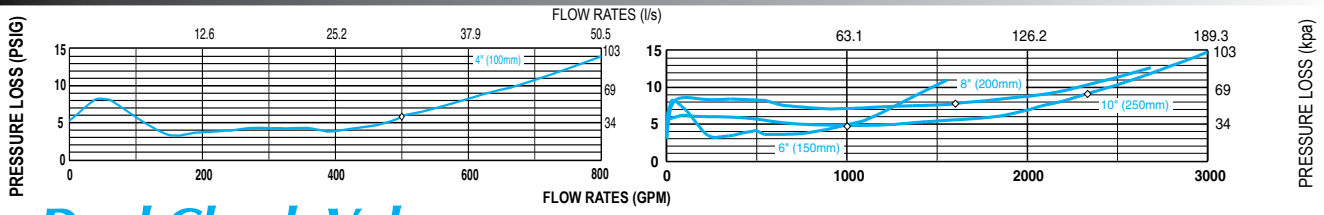
MODEL 350ADA

2 1/2", 3", 4", 6", 8" & 10" Double Check Detector Assembly



MODEL450DA

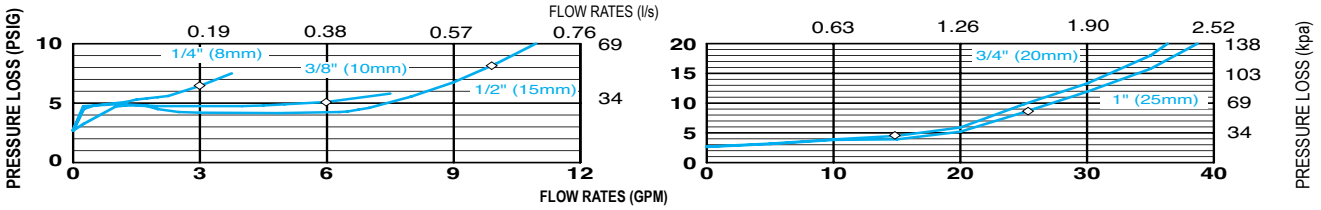
4", 6", 8", & 10" Double Check Detector Assembly



Dual Check Valve

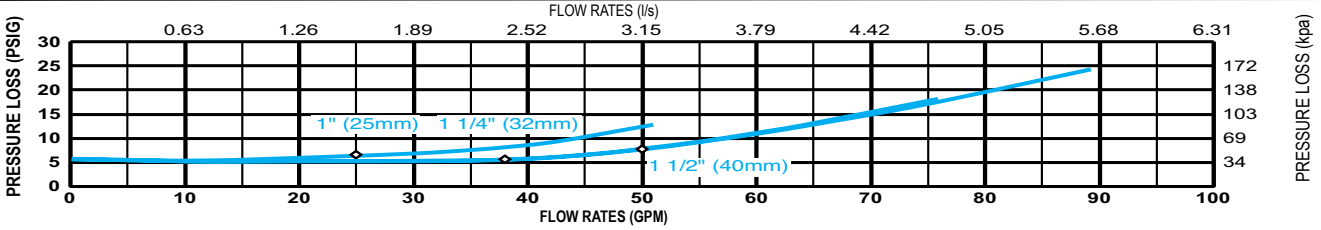
MODEL 700

1/4", 3/8", 1/2", 3/4" & 1" Dual Check Valve



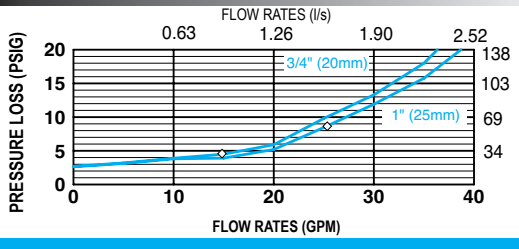
MODEL700FP

1", 1 1/4" & 1 1/2" Dual Check Valve



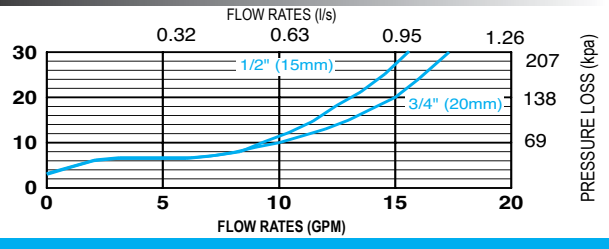
MODEL705

3/4" & 1" Dual Check Valve



MODEL760

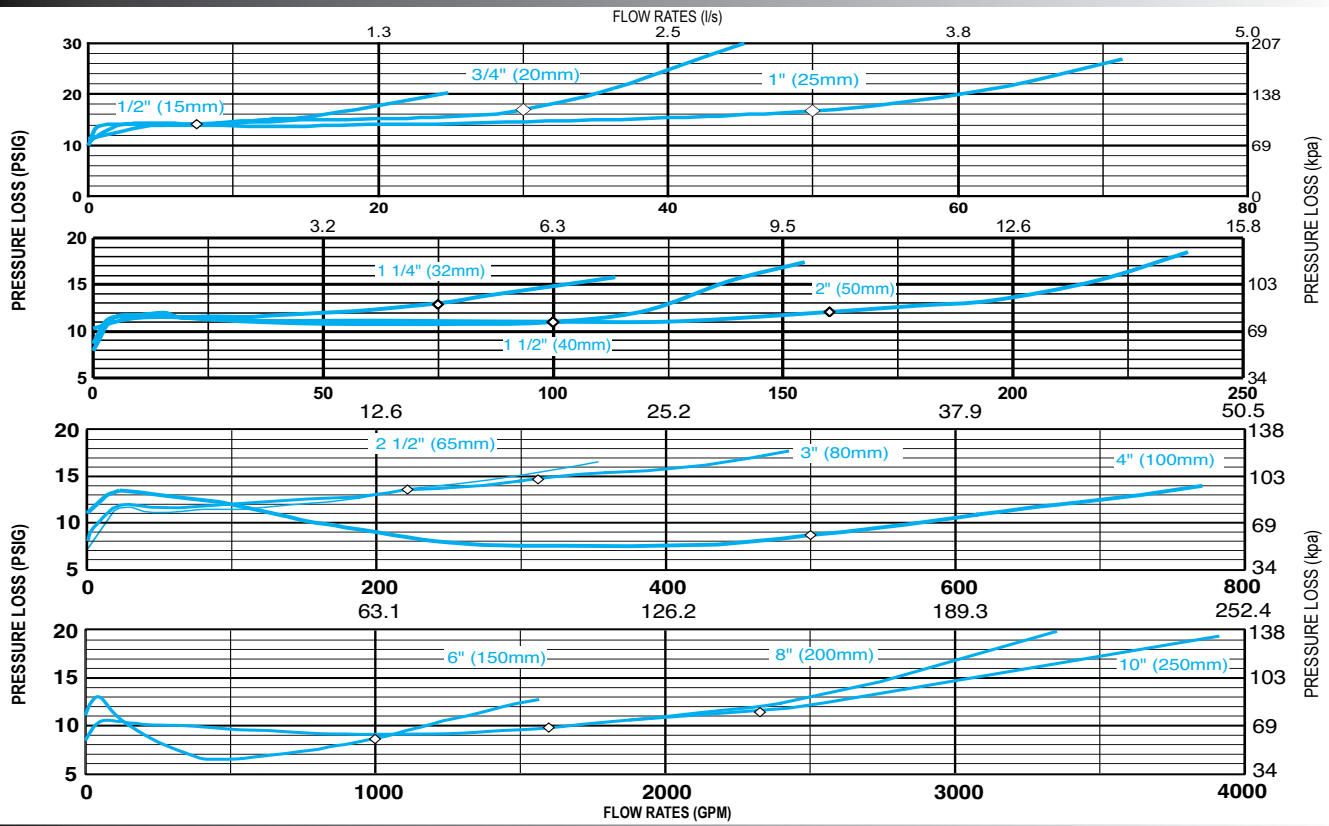
1/2" & 3/4" Dual Check w/ Atmospheric Port



Reduced Pressure Principle Assembly

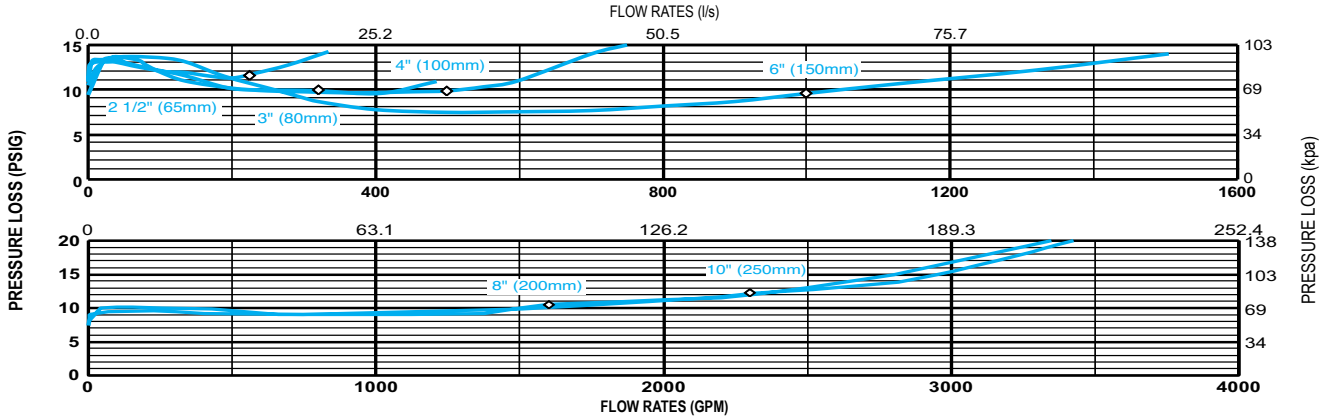
MODEL 375

1/2", 3/4", 1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 6", 8" & 10" Reduced Pressure Principle Assembly



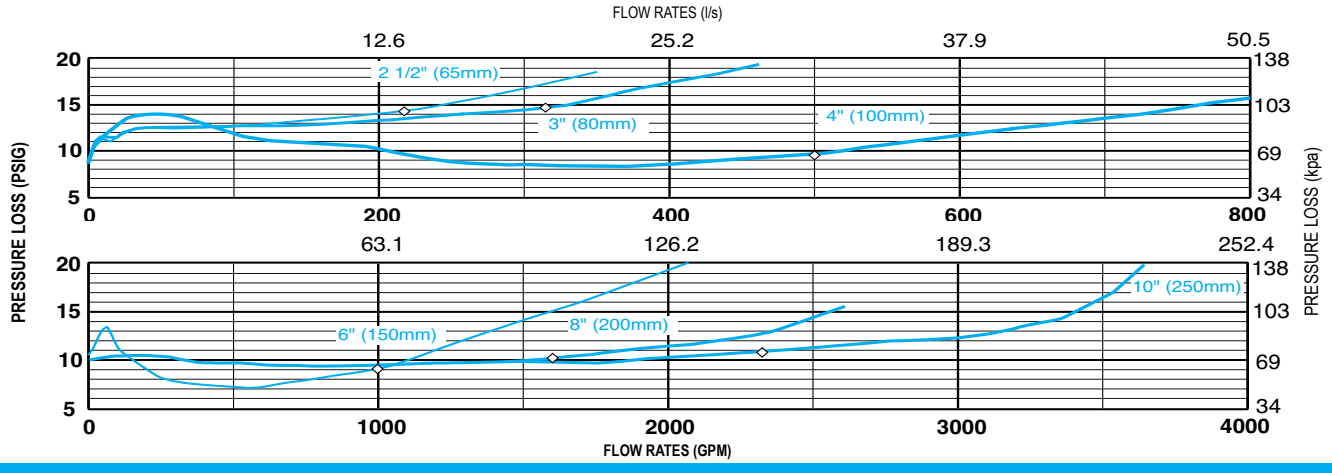
MODEL375A

2 1/2", 3", 4", 6", 8" & 10" Reduced Pressure Principle Assembly



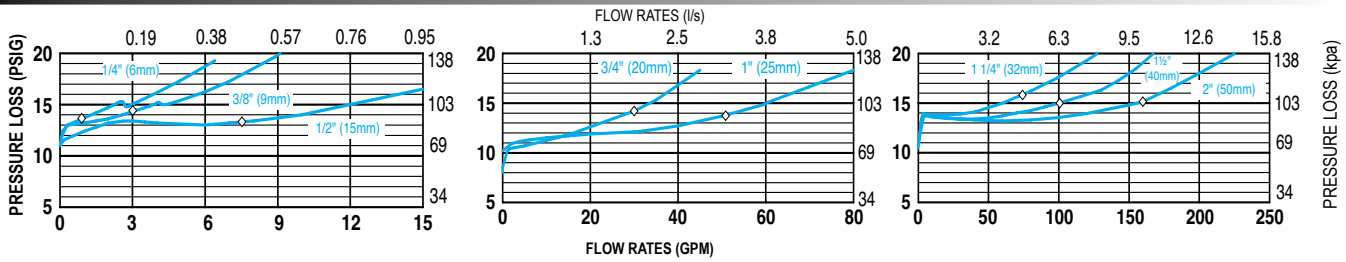
MODEL475 & V

2 1/2" 3", 4", 6", 8" & 10" Reduced Pressure Principle Assembly



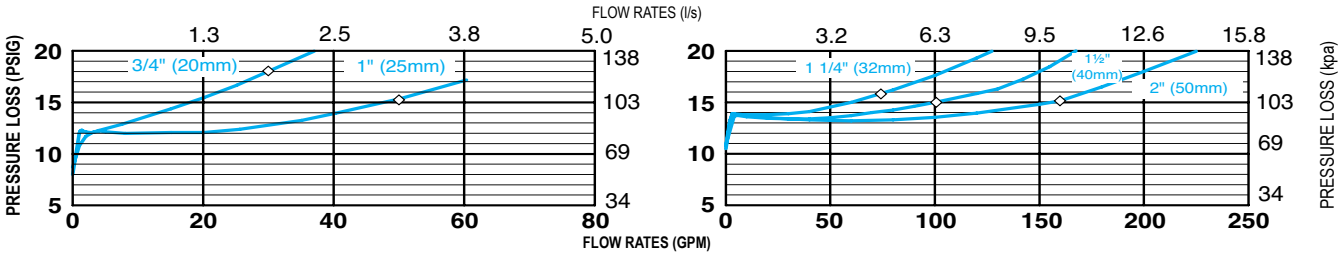
MODEL975XL

1/4", 3/8", 1/2", 3/4", 1", 1 1/4", 1 1/2" & 2" Reduced Pressure Principle Assembly



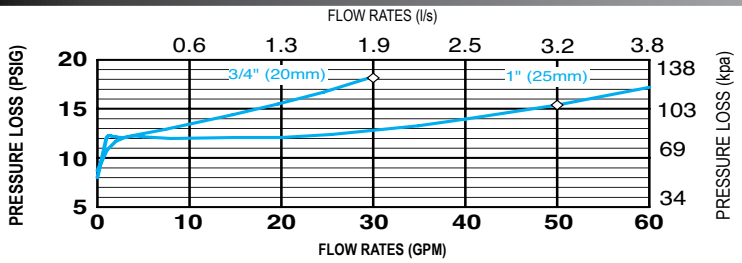
MODEL975XLSE

3/4", 1", 1 1/4", 1 1/2" & 2" Reduced Pressure Principle Assembly



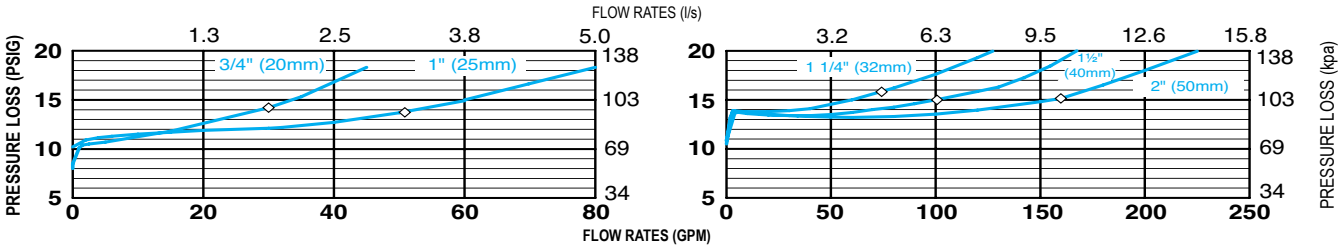
MODEL975XLV

3/4" & 1" Reduced Pressure Principle Assembly



MODEL975XL MS & BMS

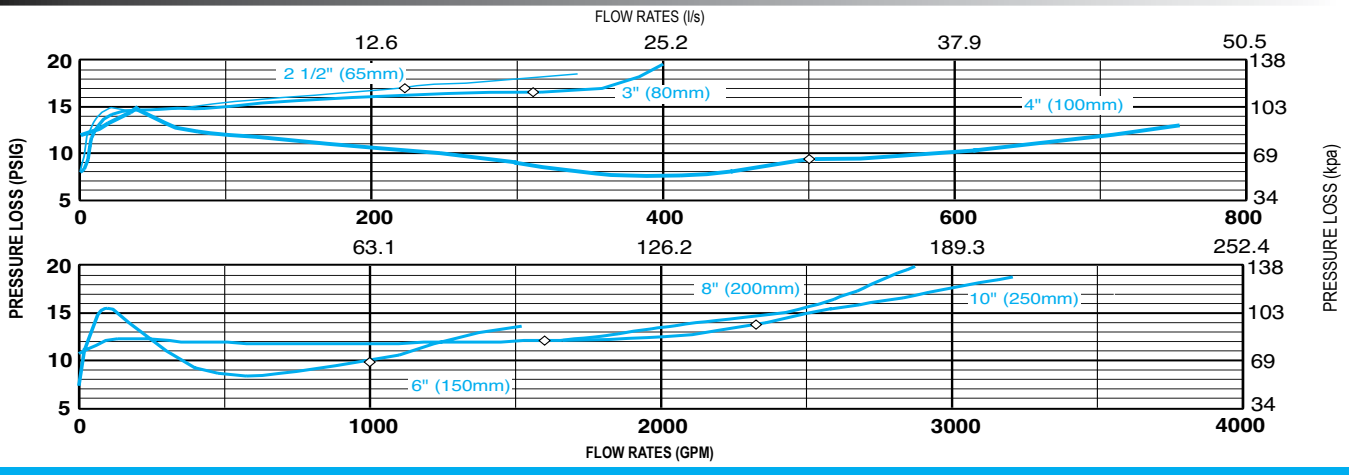
3/4", 1", 1 1/4", 1 1/2" & 2" Reduced Pressure Principle Assembly w/relief monitor switch



Reduced Pressure Detector Assembly

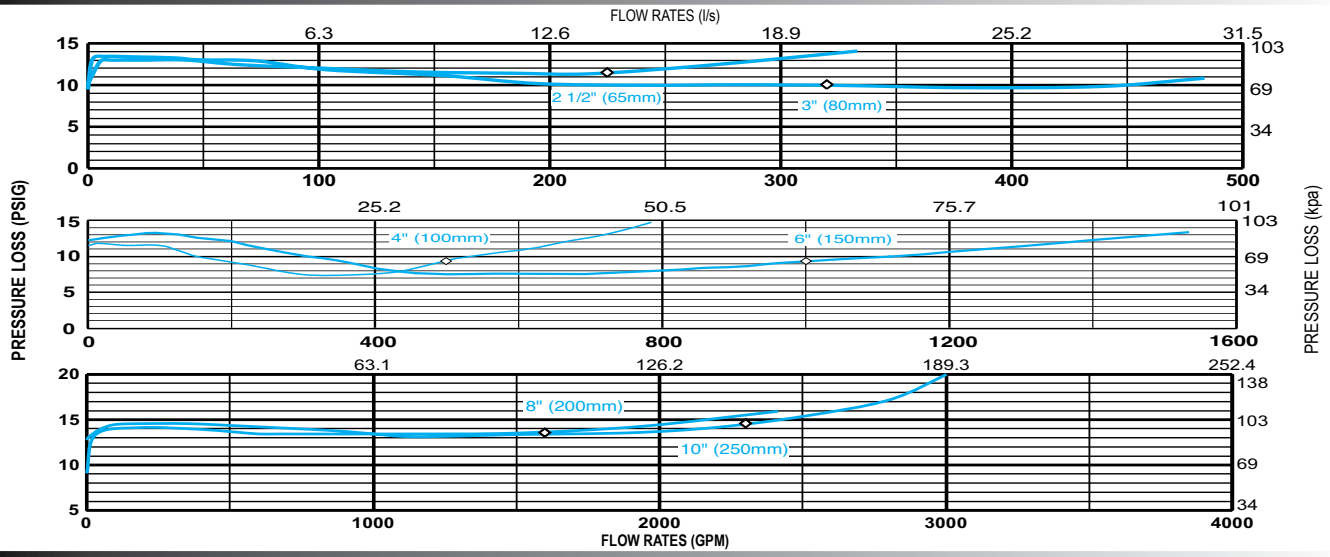
MODEL375DA

2 1/2", 3", 4", 6", 8" & 10" Reduced Pressure Principle Detector Assembly



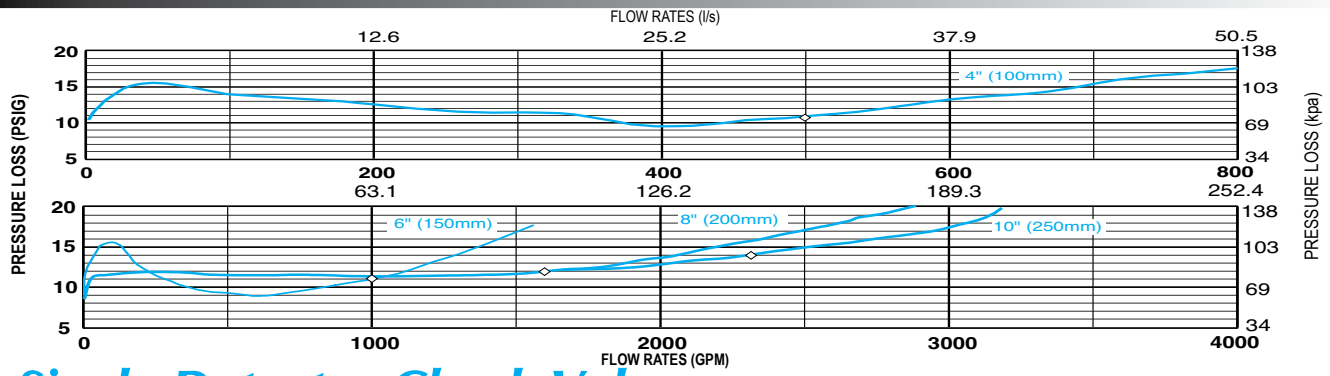
MODEL 375ADA

2 1/2", 3", 4", 6", 8" & 10" Reduced Pressure Principle Detector Assembly



MODEL 475DA & DAV

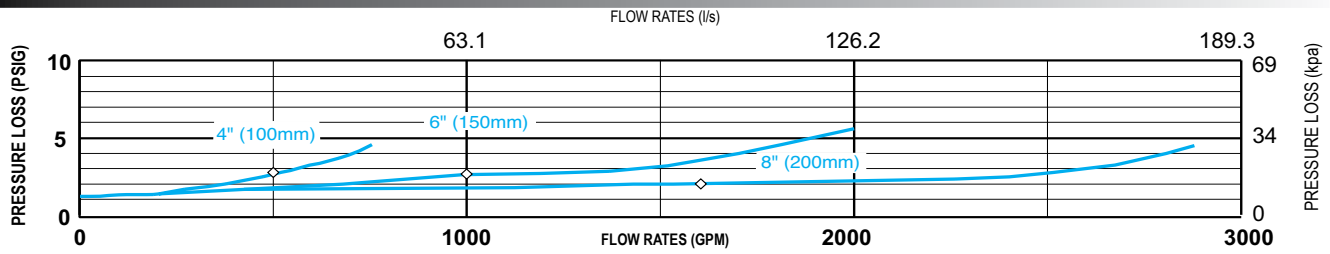
4", 6", 8" & 10" Reduced Pressure Principle Detector Assembly



Single Detector Check Valve

MODEL 310

4", 6" & 8" Reduced Pressure Principle Detector Assembly



TROUBLESHOOTING GUIDE

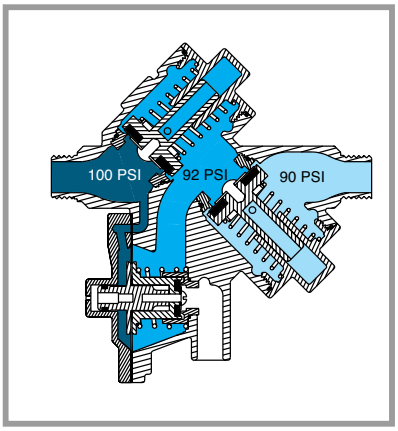
Before calling about a Reduced Pressure Backflow Assembly, refer to this simple procedure to identify the cause of discharge from the relief valve port.

After observing water discharge from relief valve port:

1. Close #2 shut off valve.
   If discharge stops, the problem is a fouled second check.
2. If discharge continues, open #4 testcock.
   If discharge stops or is reduced, the problem is a fouled first check.
3. If discharge continues, the problem is most likely in the relief valve.

***SOLUTION:** Disassemble and clean affected components and remove debris from the backflow preventer.*

Operating Principles of the Wilkins Model 975XL Reduced Pressure Principal Backflow Preventer

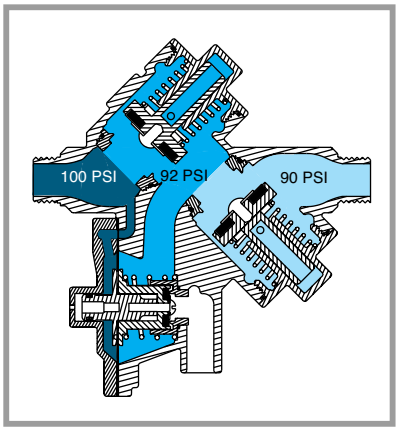


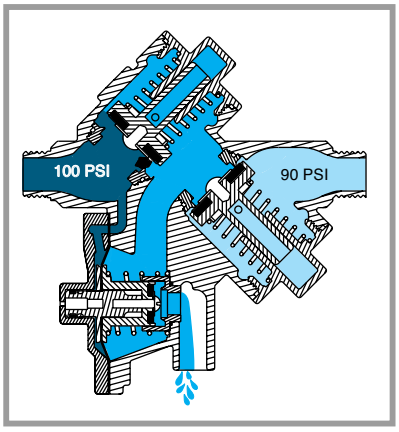
Static Condition:

Both check valves are closed in a static (no flow) condition. Pressure on the supply side of the valve is approximately 8 psi higher than the pressure in the reduced pressure zone, therefore the relief valve is held in a closed position.

Normal Flow:

Both check valves are open in a normal flow condition. The relief valve is held in a closed position because of the higher pressure on the supply side of the valve. Pressure in the reduced pressure zone is approximately 8 psi lower than the supply side of the valve.



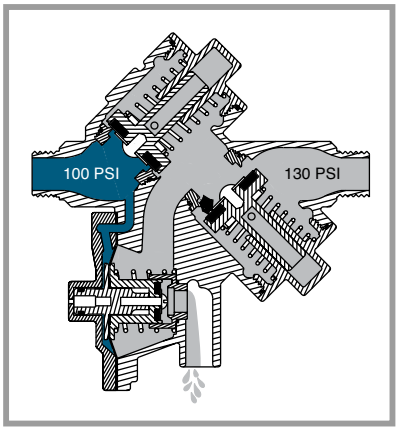


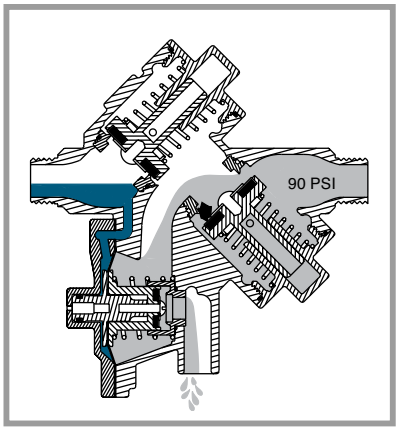
Static Condition with 1st Check Fouled:

In a static (no flow) condition with the 1st check fouled, fluid will leak from the inlet into the reduced pressure zone. As the zone pressure increases to within 2 psi of the inlet pressure, the relief valve begins to open and discharges to the atmosphere. The amount of fluid discharging from the relief valve is proportional to the extent of the foul across the 1st check.

Backpressure with 2nd Check Fouled:

In a backpressure condition with the 2nd check fouled, potentially contaminated liquid will flow into the reduced pressure zone of the valve. As the zone pressure increases to within 2 psi of the inlet pressure, the relief valve begins to open and discharges to the atmosphere.





Backsiphonage with 2nd Check Fouled:

In a backsiphonage condition with the 2nd check fouled, the inlet pressure becomes negative or subatmospheric. Because the pressure on the supply side is lower than the zone pressure, the relief valve goes to a full open position and discharges to the atmosphere.

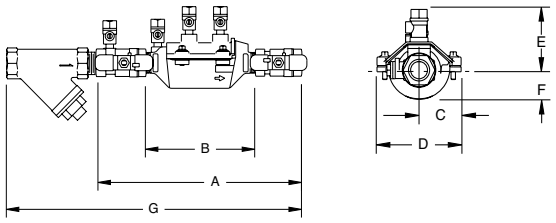
➢ FLOW DIRECTION ➢

- INLET PRESSURE
- ZONE PRESSURE
- OUTLET PRESSURE
- POSSIBLE CONTAMINANTS

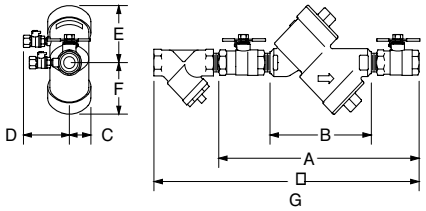
Typical Dimensions & Weights

Small 350 Series

MODEL 350 SIZE	DIMENSIONS (approximate)																WEIGHT			
	A		B LESS BALL VALVES		C		D		E		F		G		LESS BALL VALVES		WITH BALL VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
3/4	20	11	279	6 5/8	168	1 7/8	48	3 3/4	95	3	76	1 1/4	32	15 1/8	384	2.3	1.0	4.3	2.0
1	25	12 1/4	311	7	178	2 1/16	52	4 1/8	105	3 1/4	83	1 3/4	45	17	431	3.0	1.4	6.0	2.7
1-1/4	32	14 7/8	378	14 3/8	367	3 3/8	86	6 3/4	171	3 3/4	95	2 1/4	57	20 1/2	521	17.2	7.8	19	18.6
1-1/2	40	15 1/4	387	14 3/8	367	3 3/8	86	6 3/4	171	3 3/4	95	2 1/4	57	22	559	17	7.7	20	9.1
2	50	16	406	14 3/8	367	3 3/8	86	6 3/4	171	3 3/4	95	2 1/4	57	24	609	18	8.2	22	10



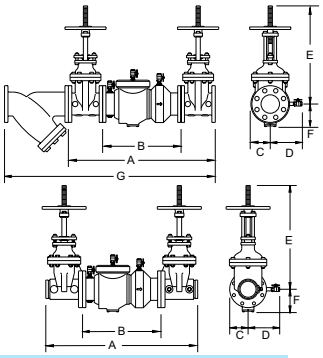
950XL Series

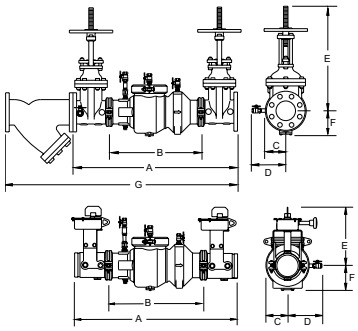


MODEL SIZE	DIMENSIONS (approximate)																		WEIGHT			
	A		A UNION BALL VALVES		B LESS BALL VALVES		C		D		E		F		G		LESS BALL VALVES		WITH BALL VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs	kg	lbs.	kg
3/4	20	11 1/4	286	12 1/2	318	7	178	1 1/2	38	3	76	3 1/2	89	3	76	15	381	5	2.3	7	3.2
1	25	12 1/4	311	13 7/8	353	7	178	1 1/2	38	3	76	3 1/2	89	3	76	17 3/4	451	8	3.6	12	5.4
1 1/4	32	15 1/2	419	18 1/2	470	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	21 1/2	546	16	7.3	22	10
1 1/2	40	17 1/8	435	19 1/8	486	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	22 3/4	578	16	7.3	22	10
2	50	18 1/4	460	20	508	10 9/16	268	2	51	3 1/2	89	4 1/2	114	4 1/2	114	25 1/8	638	16	7.3	28	12.7

350 Series

SIZE	DIMENSION (approximate)																		WEIGHT					
	A		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E NRS GATE		F		G		WITHOUT GATES VALVES		WITH NRS GATE VALVES		WITH OS&Y GATE VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	31	791	15 7/8	403	3 3/4	95	7 1/4	184	16 3/8	416	13 7/8	352	11 3/8	289	3 1/2	89	41 1/4	1048	53	24.1	155	70.4	163	74
3	80	32	816	15 7/8	403	3 3/4	95	7 1/4	184	18 7/8	479	15 5/8	397	12 3/8	314	3 1/2	89	42 3/4	1086	53	24.1	177	80.4	183	83
4	100	37 5/8	956	19 1/2	495	4 1/2	114	8	203	22 3/4	578	18 1/4	464	14 3/4	375	6	152	52 3/4	1340	91	41.3	271	123	281	127.6
6	150	44 3/4	1137	23 1/2	597	6	152	10	254	30 1/8	765	23 3/4	603	19	483	7	178	62 3/4	1594	165	74.9	449	203.8	465	211
8	200	60 3/4	1543	37 3/4	959	10	254	11	279	37 3/4	959	29 1/4	743	22 1/2	572	8 1/2	216	85	2159	358	162.5	810	367.7	834	378.6
10	250	63 3/4	1619	37 3/4	959	10	254	11	279	45 3/4	1162	35 3/8	899	26 1/2	673	8 1/2	216	93 1/4	2369	388	176.2	1148	521.2	1206	547.5
12	300	66 1/4	1683	38	965	10	254	12	305	53 1/8	1349	40 5/8	1032	30	762	9	229	n/a	n/a	447	202.8	1493	677.2	1607	729



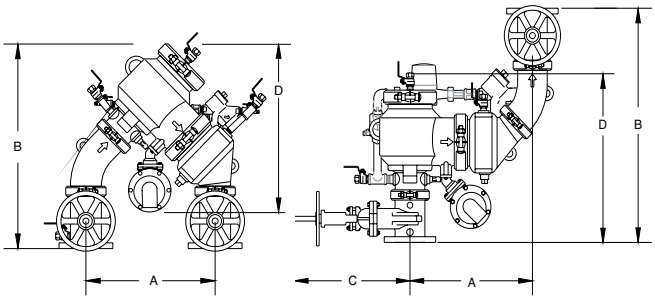


350A Grooved Series

MODEL 350 ADA SIZE	DIMENSION (approximate)																				WEIGHT							
	A		A WITH BUTTERFLY VALVES		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E WITH BUTTERFLY VALVES		F		G		WITHOUT GATES		WITH OS&Y GATES (GXF)		WITH OS&Y GATES (GXG)		WITH BUTTERFLY VALVES (GXG)	
in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	35 1/8	892	32 1/8	816	20 1/8	511	4 1/2	114	9	229	16 3/8	416	13 7/8	352	8	203	6	152	7 1/4	184	105	47.5	207	94	199	90.3	123.8	56.2
3	80	36 1/8	918	33	838	20 1/8	511	4 1/2	114	9	229	18 7/8	479	15 5/8	397	8	203	6	152	7 1/4	184	104	47	224	101.5	214	97	124.4	56.5
4	100	38 1/4	972	33 1/4	845	19 7/8	505	4 1/2	114	9	229	22 3/4	578	18 1/4	464	9 1/8	232	6	152	8	203	91	41.3	245	111	219	99.4	123	55.8
6	150	47 1/4	1200	40 1/4	1022	25 7/8	657	5 1/2	140	10 1/2	267	30 1/8	765	23 3/4	603	10 1/8	257	7	178	10	254	141	64	377	171	347	158	193	87.6
8	200	62	1575	55	1397	38 1/2	978	10	254	12	305	37 3/4	959	29 1/4	743	11 15/16	303	8 1/2	216	11	279	302	137	778	353.2	754	342.3	410	186
10	250	64 5/8	1642	58 1/2	1485	38 1/2	978	10	254	12	305	45 3/4	1162	35 3/8	899	13 5/16	338	81/2	216	12	305	355	161	1040	472.7	918	416.5	527	239.3

475 Series

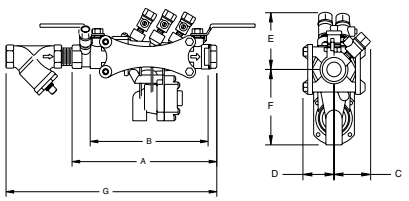
MODEL SIZE	DIMENSIONS (approximate)												WEIGHT			
	A		B WITH GATE VALVES		B LESS GATE VALVES		C OS&Y OPEN		C OS&Y CLOSED		D		LESS GATE VALVES		OS&Y GATE VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
4" 475DA	18 5/16	465	30	762	21	533	22 3/4	578	18 1/4	464	23 3/16	589	113	51.3	303	137.6
4" 475DAV	18 7/8	479	36 1/2	907	18 1/2	470	22 3/4	578	18 1/4	464	21	533	113	51.3	303	167.6
6" 475DA	18 11/16	475	35 1/2	902	25	635	30 1/8	765	23 3/4	603	26	660	187	84.9	487	221
6" 475DAV	21	533	42	1067	21	533	30 1/8	765	23 3/4	603	22	559	187	84.9	487	221
8" 475DA	29	737	46	1168	34 7/16	875	37 3/4	959	29 1/4	743	33 1/4	845	421	191.1	897	407.2
8" 475DAV	30 5/16	770	53 1/2	1359	30 5/16	770	37 3/4	959	29 1/4	743	37 7/8	962	421	191.1	897	407.2
10" 475DA	29	737	47 1/2	1207	34 7/16	875	45 3/4	1162	35 3/8	899	33 1/4	845	439	199.3	1113	505.3
10" 475DAV	30 5/16	770	56 1/2	1435	30 5/16	770	45 3/4	1162	35 3/8	899	39 3/8	1000	439	199.3	1113	505.3



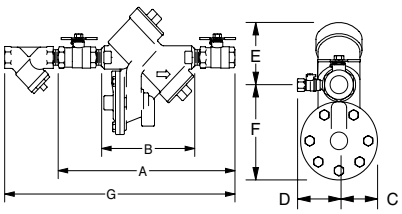
Dimensions and weights are shown for 475DA and 475DAV to give most extreme information. Please check specification sheets to verify actuals.

Small 375 Series

MODEL 375 SIZE		DIMENSIONS (approximate)														WEIGHT			
		A		B		C		D		E		F		G		LESS BALL VALVES		WITH BALL VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
1/2	20	8 7/8	225	1 15/16	49	1 5/8	41	2 15/16	75	3 7/8	98	12 1/4	311	3	76	4.7	2.1	5.7	2.6
3/4	20	8 7/8	225	1 15/16	49	1 5/8	41	2 15/16	75	3 7/8	98	12 5/8	321	3	76	4.7	2.1	5.7	2.6
1	25	11 3/16	284	2 1/4	57	2 1/4	57	3 7/16	87	4	102	14 9/16	370	4	102	8.2	3.7	9.7	4.4
1-1/4	32	14 7/8	378	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	20 1/2	521	3 3/4	95	18.7	8.5	20.5	9.3
1-1/2	40	15 1/4	387	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	22	559	4 1/2	114	18.3	8.0	21.5	9.8
2	50	16	406	3 3/8	86	3 3/8	86	3 3/4	95	5 3/4	146	24	610	4 3/4	120.7	19.4	8.8	23.5	10.7



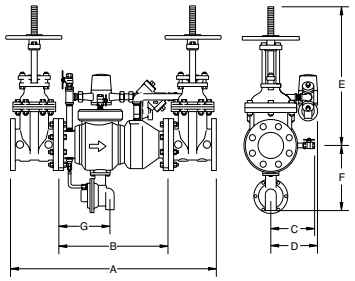
975XL Series



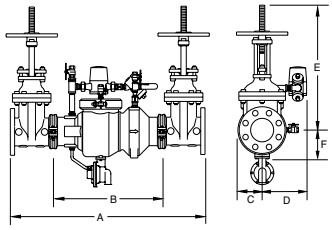
MODEL SIZE		DIMENSIONS (approximate)																WEIGHT			
		A		A UNION BALL VALVES		B LESS BALL VALVES		C		D		E		F		G		LESS BALL VALVES		WITH BALL VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs	kg	lbs.	kg
3/4	20	12	305	13 3/4	349	7 3/4	197	2 1/8	54	3	76	3 1/2	89	5	127	16 1/8	410	10	4.5	12	5.5
1	25	13	330	14 1/2	368	7 3/4	197	2 1/8	54	3	76	3 1/2	89	5	127	17 3/8	441	10	4.5	14	6.4
1 1/4	32	17	432	18 13/16	478	10 15/16	278	2 3/4	70	3 1/2	89	5	127	6 3/4	171	22 9/16	573	22	10	28	12.7
1 1/2	40	17 3/8	441	19 3/8	492	10 15/16	278	2 3/4	70	3 1/2	89	5	127	6 3/4	171	24 1/16	611	22	10	28	12.7
2	50	18 1/2	470	20 1/2	521	10 15/16	278	2 3/4	70	3 1/2	89	5	127	6 3/4	171	26 1/2	673	22	10	34	15.4

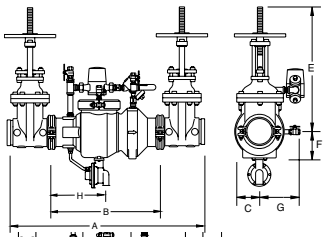
375 Series

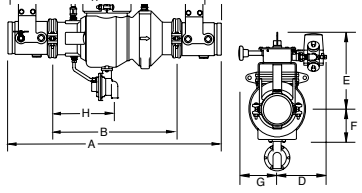
MODEL 375 SIZE		DIMENSIONS (approximate)																		WEIGHT					
		A		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		E NRS GATE		F		G		H		WITHOUT GATE VALVES		WITH NRS VALVES		WITH OS&Y GATE VALVES	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg	lbs.	kg
2 1/2	65	31	787	15 7/8	403	7 1/4	184	3 3/4	95	16 3/8	416	13 7/8	352	11 3/8	289	9 1/2	241	8 3/8	213	41 1/4	1048	60	27.2	162	73.5	170	77.2
3	80	32	813	15 7/8	403	7 1/4	184	3 3/4	95	18 7/8	479	15 5/8	397	12 3/8	314	9 1/2	241	8 3/8	213	42 3/4	1086	60	27.2	184	83.5	190	86.3
4	100	37 5/8	956	19 1/2	495	8	203	4 1/2	114	22 3/4	578	18 1/4	464	14 3/4	375	11	279	7 1/4	184	52 3/4	1340	98	44.5	278	126.2	288	130.8
6	150	44 3/4	1137	23 1/2	597	10	254	6	152	30 1/8	765	23 3/4	603	19	483	12 3/8	314	9 1/4	235	62 3/4	1594	175	79.5	459	208.4	475	215.6
8	200	60 3/4	1543	37 3/4	959	11	279	10	254	37 3/4	959	29 1/4	743	22 1/2	572	15 3/8	391	16 3/4	426	85	2159	377	171	829	376.4	853	387.3
10	250	63 3/4	1619	37 3/4	959	11	279	10	254	45 3/4	1162	35 3/8	899	26 1/2	673	15 3/8	391	16 3/4	426	93 1/4	2369	407	185	1167	530	1225	556



Dimensions and weights are shown for 375DA to give most extreme information. Please check specification sheets to verify actuals.







375A Grooved Series

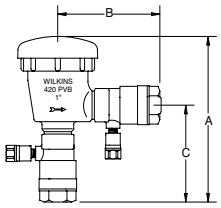
MODEL 375ADA SIZE		DIMENSION (approximate)																WEIGHT					
		A		B LESS GATE VALVES		C		D		E OS&Y OPEN		E OS&Y CLOSED		F		G		H		WITHOUT GATES		WITH OS&Y GATES (GXF)		WITH OS&Y GATES (GXG)	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg	lbs.	kg
4	100	38	965	19 7/8	505	4 1/2	114	9	229	22 3/4	578	18 1/4	464	6	152	8	203	7 1/4	184	98	45	252	114	226	103
6	150	47	1194	25 7/8	657	5 1/2	140	10 1/2	267	30 1/8	765	23 3/4	603	7	178	10	254	9 1/4	235	151	69	387	176	357	162
8	200	61 5/8	1565	38 1/2	978	10	254	12	305	37 3/4	959	29 1/4	743	8 1/2	216	11	279	13 7/8	333	321	146	797	362	773	351

MODEL 375ADABGVIC SIZE		DIMENSION (approximate)																WEIGHT			
		A		B LESS BUTTERFLY VALVES		C		D		E		F		G		H		WITHOUT BUTTERFLY		WITH BUTTERFLY VALVE	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
4	100	33 3/8	848	19 7/8	505	34 1/4	870	9	229	10 3/4	273	6	152	5 1/4	133	7 1/4	184	98	45	136	62
6	150	40 1/8	1019	25 7/8	657	41 1/4	1048	10 1/2	267	12 1/8	308	7	178	7 1/2	178	9 1/4	235	151	69	207	94
8	200	54 3/4	1391	38 1/2	978	55	1397	12	305	13	330	8 1/2	216	9	191	13 7/8	333	321	146	443	201

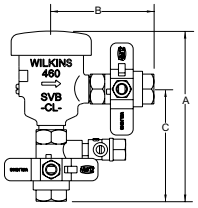
Dimensions and weights are shown for 375ADA to give most extreme information. Please check specification sheets to verify actuals.

Model 420

MODEL SIZE		DIMENSIONS (approximate)							
		A		B		C		WEIGHT	
in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
1/2	15	6 3/8	162	4	102	3 5/8	92	3	1.4
3/4	20	6 3/4	172	4 1/4	108	3 13/16	97	4	1.8
1	25	7 15/16	202	4 15/16	125	4 1/2	114	5	2.3



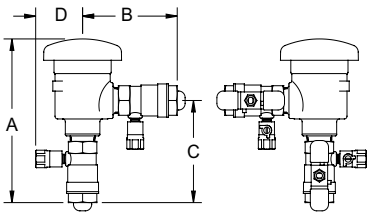
Model 460



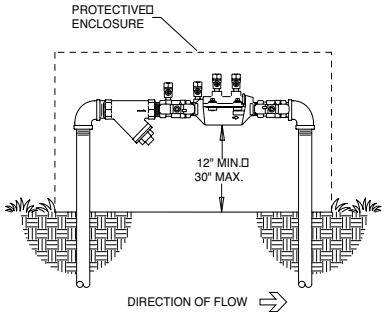
MODEL SIZE		DIMENSIONS (approximate)						WEIGHT	
		A		B		C			
in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg
3/8	9	5 5/16	135	3 1/8	79	3 3/8	86	2.0	0.91
1/2	15	5 11/16	144	3 3/8	86	3 3/4	95	2.1	0.95
3/4	20	7 1/2	190	4 1/4	108	4 1/2	114	3.8	1.72
1	25	7 15/16	200	5	127	5	127	5.0	2.27

Model 720A

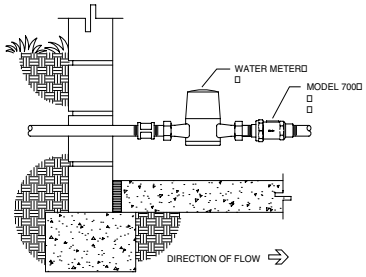
MODEL SIZE		DIMENSIONS (approximate)								WEIGHT			
		A		B		C		D		LESS BV		WITH BV	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg	lbs.	kg
1/2	15	7 1/8	181	4 1/16	103	4 1/4	108	2 1/4	57	4	1.8	6	2.7
3/4	20	7 3/16	183	4 5/16	110	4 5/16	110	2 3/8	60	4	1.8	6	2.7
1	25	7 3/4	197	4 5/8	117	4 3/4	121	2 5/8	67	4	1.8	8	3.6
1 1/4	32	11	279	7 7/16	189	7 7/16	189	3 1/8	79	14	6.4	20	9
1 1/2	40	10 1/2	267	7	178	7	178	3 1/8	79	14	6.4	20	9
2	50	11 1/16	281	7 9/16	192	7 11/16	195	3 1/8	79	14	6.4	26	10.4



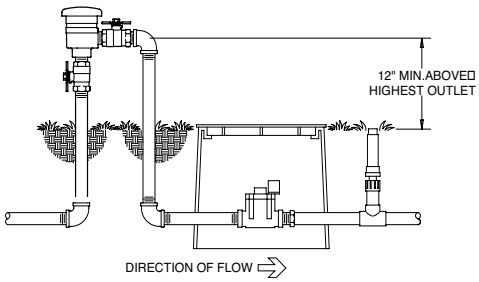
TYPICAL BACKFLOW PREVENTER INSTALLATIONS



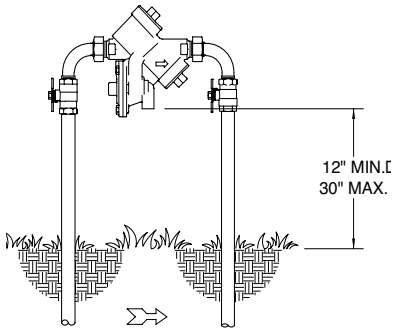
Model 350
Double Check Valve Assembly



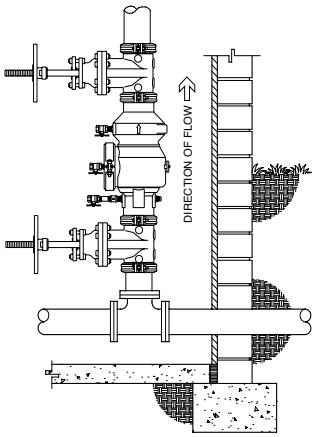
Model 700
Dual Check Valve



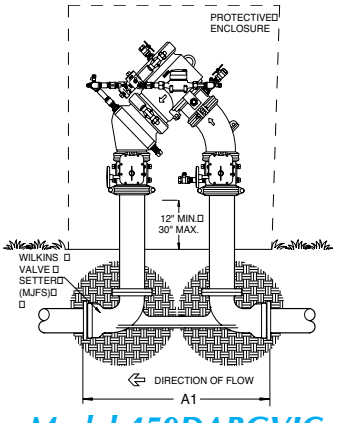
Model 720A
Pressure Vacuum Breaker



Model 975XLV
Reduced Pressure Principle with Elbows



Model 350AOSYG
Double Check Valve



Model 450DABGVIC
Double Check Detector Assembly

DETERMINING WHICH TYPE OF BACKFLOW PREVENTER TO USE

Selection Guide For All Wilkins Backflow Assemblies

MODEL	TYPE	APPLICATION					EXAMPLES OF INSTALLATION
		BACK SIPHONAGE	BACK PRESSURE	CONTINUOUS PRESSURE	LOW HAZARD	HIGH HAZARD	
375 375A 475 975	Reduced Pressure Principle	●	●	●	●	●	Irrigation, Plumbing, Waterworks, Industrial, Medical, Fire
975XL 975XLV 975XLSE		●	●	●	●	●	
975BMS/MS 975XLBMS/MS EST SYSTEM	RP with Integral Monitor Switch	●	●	●	●	●	Indoor applications where undetected discharge could cause water damage
375DA 375ADA 475DA 975DA	Reduced Pressure Principle Detector Assembly	●	●	●	●	●	Fire Protection System Supply Main. Detects Leaks and Unauthorized Use of Water
350 350A 450	Double Check Assembly	●	●	●	●		Irrigation, Plumbing, Waterworks, Industrial, Medical, Fire
950XL 950XLT 950XLV		●	●	●	●		
350DA 350ADA 450DA 950XLTDA(BF)	Double Check Detector Assembly	●	●	●	●		Fire Protection, System Supply Main. Detects Leaks and Unauthorized Use of Water
700 700FP 705	Dual Check	●	●	●	●		Residential Supply Lines and Fire Sprinkler Systems
760	Dual Check with Atmospheric Vent	●	●	●	●		Boiler Feed Lines, Laboratory Equipment, Residential
40XL	In-Line Spring-Loaded Check Valve	●	●	●	●		Irrigation, Pump and Water Hammer Applications
310L	Single Check	●	●	●	●		
310DA	Single Check Detector Assembly	●	●	●	●		Fire Protection System Supply Main. Detects Leaks and Unauthorized Use of Water
420 460 720A	Pressure Vacuum Breaker	●		●	●	●	Irrigation and Lawn Sprinkler Systems
35	Atmospheric Vacuum Breaker	●			●	●	Laboratory Sinks, Lawn Sprinklers, Commercial Laundry
BFP-8F BFP-9	Hose Connection Vacuum Breaker	●			●		Hose Bibbs, Service Sinks, Hydrants

SERVICE CENTERS

West
263 East Gardena Blvd.
Gardena, CA 90247
Phone: 310•719•1926
Fax: 310•719•7062

2875 South Elm Ave. Ste. 108
Fresno, CA 93706
Phone: 559•485•1400
Fax: 559•485•5345

Southwest
12847 Valley Branch Lane
Dallas, TX 75234
Phone: 972•241•4898
Fax: 972•241•0671

Midwest
2569 Tracy Court
Northwood, OH 43619
Phone: 419•661•8582
Fax: 419•661•8630

Northeast
37 Runway Rd.
Levittown, PA 19057
Phone: 215•604•3090
Fax: 215•604•0126

Southeast
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Norcross, GA 30071
Phone: 770•448•8990
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