PIWD Cross Connection Control

Customer Guidelines

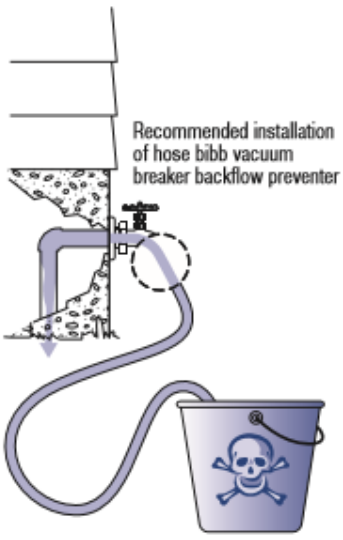
Help the Prudence Island Water District (PIWD) to protect your drinking water supply from accidental pollution. We encourage you to learn more about cross-connections, what you can do to prevent water backflow and keep your drinking water clean and safe.

The following guidance includes basic information that every home-owner should know and recommendations for the installation of back-flow prevention devices to protect Prudence Island's water supply.

The most common Cross-Connection is a garden hose.

KEY TERMS and DEFINITIONS

Air gap	The unobstructed vertical space between the water outlet and the flood level of a fixture.
Backflow	The flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source.
Backflow preventer	A backflow preventer is a “one-way” appurtenance (an assembly of check valves or a vacuum breaker), that only allows water to flow in the desired direction and physically impedes reverse flow.
Back pressure	Backflow that occurs when the pressure in an unprotected downstream piping system exceeds the pressure in the supply piping.
Back siphonage	Backflow resulting from negative pressures in the distributing pipes of a potable water supply.
Cross-connection	Any actual or potential connection between the public water supply and a source of contamination or pollution.
Hose bib vacuum breaker device	A specialized application of the atmospheric vacuum breaker. They are generally attached to sill cocks and in turn are connected to hose supplied outlets such as garden hoses, slop sink hoses, spray outlets, etc. They consist of a spring-loaded check valve that seals against an atmospheric outlet when water supply pressure is turned on. Used for back siphonage conditions only.

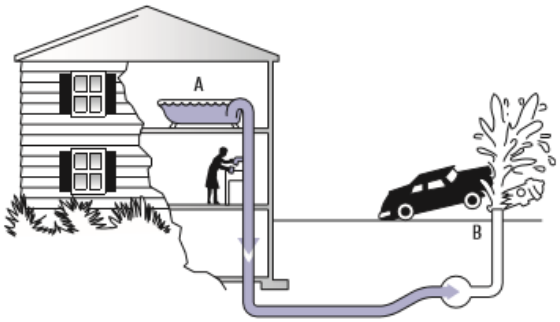


What is a Cross-Connection?

Cross-connections can be found in all plumbing systems. They are physical connections between a drinking water pipe and something that is not safe to drink – such as a garden hose, lawn sprinkler, or boiler.

"Backflow" can happen if there is a water main break, water line repair, fire, or during a period of high water usage. These events may lower the pressure in the main distribution line enough to reverse the flow of water from your house. Also, if a pipe breaks inside a building, water can flow backwards from one room to another.

Backflow happens often in a water system. Back-flowing water can suck bacteria, sewage, or chemicals from other parts of the plumbing system into your drinking water pipes or those of your neighbors. Unless you take steps to protect the cross-connections in your home, your drinking water may become contaminated.

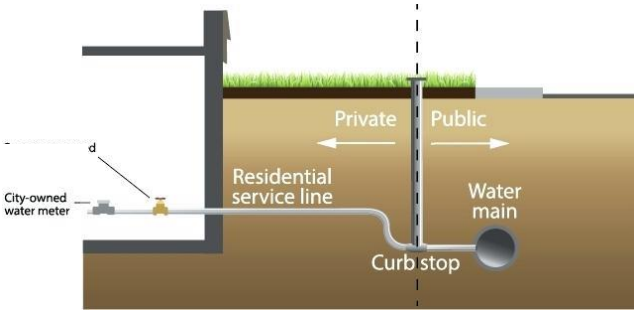


What is Your Water Supplier Doing?

Protecting the drinking water supply from contamination through cross-connection is a shared responsibility. Your public water supplier is responsible for the water that is delivered to your property. As the consumer, you are responsible for the water on your property and in your house.

In recent years the PIWD has been addressing shortcomings of its operations and infrastructure that were identified in its 2012 Engineering Evaluation and Facility Capital Improvement Plan which was developed jointly by RIDOH and Northeast Water Solutions, Inc. in collaboration with the PIWD. Many improvements have been undertaken to minimize risks associated with potential contamination of the system including: the inspection and installation of a recirculation system in its water storage tank; automation of the well pump at Army Camp to maintain minimum pressure in the distribution system; implementation of a flush hydrant system and leak detection program; and, upgrades to improved pressure in the Broadway distribution area.

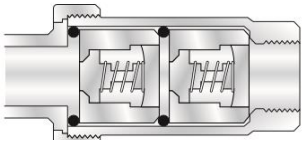
To prevent back siphonage and an unintentional contamination of the water supply, the PIWD is now requiring all property owners within the district to install a residential dual check valve if they have a connection to the public water supply.



The PIWD will also be performing inspections to ensure that no potential for cross-connection exists. On properties with private wells, the customer shall be responsible for installing a reduced pressure principle backflow assembly (RPZA).

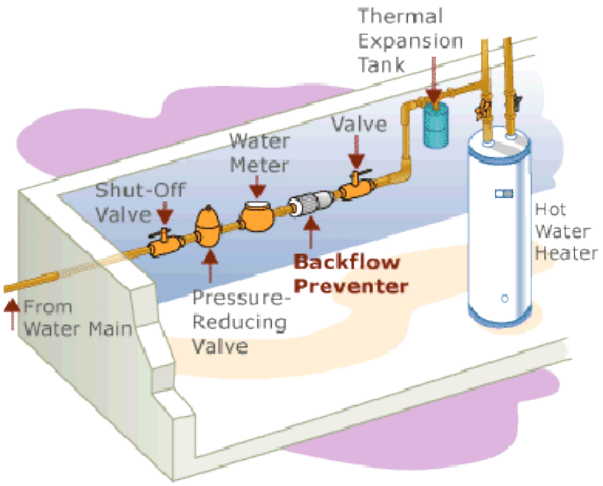
The customer shall be responsible for all costs of materials, installation and testing of backflow prevention devices.

How Can I Prevent Backflow from my house to the Public Water Supply?



Cutaway view of a Level I residential dual check valve (a type of backflow preventer device).

The installation of a backflow preventer device (i.e. a residential dual check valve) can prevent backflow from your house into the public water supply. Three general configurations for the installation of a Level I (low hazard) residential dual check valve are possible: within an enclosed heated or unheated space such as a basement or seasonal home, in an above-ground enclosure or in a below-ground access (or meter) pit. Installation configurations must be designed to prevent the backflow preventer device from freezing. All backflow preventers shall be installed in a way that allows future access for periodic replacement (according to manufacturer recommendations or every ten years, whichever comes first) and shall be fitted with PIWD seals when possible to: ensure the device remains in place and has not been removed or tampered with; and, to allow for periodic visual inspections. Ball valves placed adjacent to the backflow preventer would facilitate removal and replacement as needed. If a backflow preventer is replaced for any reason, a visual inspection and placement of new PIWD seals would be required. The PIWD will be coordinating a survey to determine the level of hazard and the type of installation configuration appropriate for each property within the District.



If installing in an enclosed *heated* space, the backflow preventer shall be installed in the main supply line upstream of all household piping and plumbing fixtures. If installing in an enclosed *unheated* space in the house, the residential dual check valve shall be installed as described above with one notable exception. Homeowners will have to provide for, in the installation design, the annual removal or replacement of the backflow preventer when the water is turned off for the season. These devices are designed in a way that would prevent drainage and, if left in place and allowed to freeze, would cause a break in the customers' supply line. This type of installation, as it would lack the requisite PIWD seals, would be subject to random periodic inspection by a PIWD representative. If a residential dual check valve is not found during an inspection, the customer will be required to relocate the residential dual check valve in an above-ground enclosure or below-ground meter pit within thirty (30) days (or their service shall be discontinued). This type of installation configuration shall only be allowed on a single service line (i.e. they are not appropriate if the supply line has been split to provide for multiple uses such as secondary residential structures or garages). A

Drain-back Valves

Seasonal use of island homes has resulted in most houses being equipped with a drain-back valve to facilitate customer water shut-off and drainage to prevent pipes from breaking during the winter months.

Although these drain-back valves generally work as intended, by allowing water from the houses' pipes to drain out into an access pit, they also provide an opportunity for backflow contamination as the opened valve is typically situated below the level of water drained or "blown out" from the pipes.

This water can contain potential contaminates from a variety of sources such as back siphonage of "blue water" from toilet tanks as well as suspended materials such as dirt and leaf litter contained in the access pit itself.

Drain-back valves are designed to utilize an air gap to prevent cross-connection contamination. Depth to the bottom of the pit must be at least twice the diameter of the supply pipe (but not less than 1") greater than the current distance of the water line below ground level (which is usually at four feet to prevent freezing).

The added depth below the pipe ensures that the drain-back valve is situated above the water level occurring when the house is drained. This reduces the potential for inadvertent contamination of the homeowner's (and public) water supply. The access pit should be fitted with a cover to prevent debris and rainwater from entering the pit and should be periodically cleaned out to maintain the appropriate air gap spacing.

In instances where there is a high-water table or poor drainage, it may be necessary to install the drain-back valve in a water-proof vault to avoid compromising the water supply during the process of draining your home.

THERMAL EXPANSION

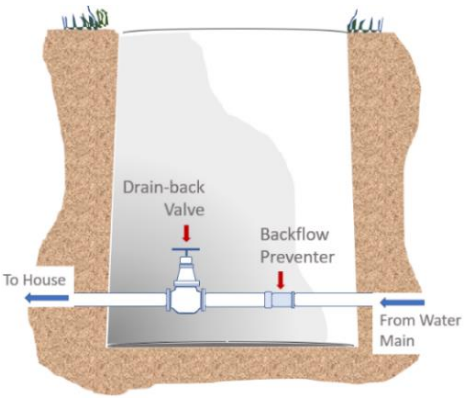
The installation of a backflow prevention device on the main water intake line will result in a closed plumbing system within the house. The owner will need to provide for thermal expansion within the closed system as thermal expansion can result in back pressure and cause backflow within the home. At a minimum, water heaters and boilers should be equipped with pressure release valves. A thermal expansion tank can also prevent pressure from building up in your pipes and causing damage to your piping or hot water heater.

representative of the PIWD will need to confirm the presence of a single service line during the pre- or post-installation inspection.

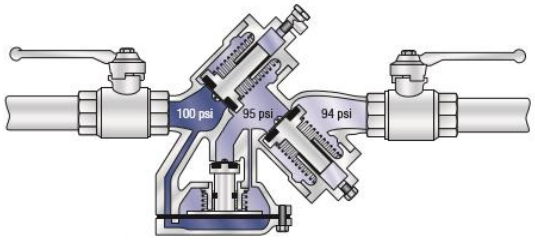
There are some houses for which access to the supply line as it enters the home is too restricted and/or splits to accommodate multiple uses. In those instances, the residential dual check valve must be installed outside in either an above- or below-ground enclosure. Installations of this type must be located within ten feet of the property boundary.

For above-ground installations, the backflow prevention device needs to be installed on the customer supply line between the PIWD curb stop and customer shut-off (i.e. drain-back valve) in an enclosed space which can either be heated or unheated, depending on the type of property use. Enclosures would include a residential dual check valve with a ball valve located on either side and may be prefabricated (e.g. Hotbox, Hydrocowl) or comprised of an alternate wood frame, fiberglass, steel, masonry or precast concrete structure. All enclosures should have a floor elevation that is at least six inches above grade on a cement or fiberglass pad and include full flow gravity drains. For customers that wish to have access to year-round water service, these enclosures must be heated to prevent freezing. For true seasonal use (i.e. water turn-on/shut-off only once each spring and fall), customers that do not wish to heat the enclosure through the winter would have to request that the PIWD shut-off/turn-on water at the curb stop (for which charges will be assessed) after the house has been shut down for the season (and before first use in the spring) to prevent freezing in the customer supply line.

For below-ground installations in a PIWD approved access (or meter) pit, the residential dual check valve shall be installed in-line and upstream (i.e. on the water main supply side) of the drain-back valve. To allow for this installation and periodic replacement, the original access hole for the drain-back valve (i.e. customer shut-off) must be enlarged to accommodate a PIWD approved access pit and cover (typically pre-fabricated) which is a minimum of 28 inches in diameter and of an appropriate depth (*see drain-back valve sidebar*). For the same reasons as indicated above for unheated spaces, if the supply line is located at a depth that is susceptible to freezing, it may be necessary to insulate this below-ground space to prevent a break in the supply line. Note that a reduced pressure principle backflow assembly will not be allowed below grade in a pit.



In addition, although the PIWD is not requiring general pipeline upgrades, homeowners may wish to replace substandard piping when installing the backflow preventer in the supply line as older, degraded supply line (if present) may be further compromised by the manipulations necessary for backflow preventer installation. It is more efficient and less costly to replace substandard supply line at the same time as the backflow preventer installation than to wait for a break to occur; requiring emergency repairs. As with all other repairs to pipeline located on private property, any supply line upgrades would have to be performed at the owner's expense.



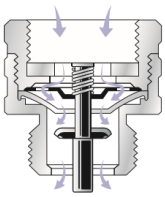
Cutaway view of a Reduced Pressure Principle (or Zone) Backflow Assembly (RPZA)

Higher Hazard Conditions

Although most property owners within the water district can address potential low hazard cross-connections through the proper installation of a residential dual check valve, there is also the potential for some higher hazard conditions within the district that would necessitate additional protection from cross-connection contamination. Examples of higher hazard conditions include the presence of a private well on the property, in-ground irrigation systems, pools and ponds. These conditions, once identified, shall require the installation of a reduced pressure principle backflow assembly (*shown above*) and inspection by a certified backflow inspector/tester. This type of backflow preventer requires annual inspections to ensure it is functioning as designed. Note that the PIWD reserves the right to terminate water service with short notice when a backflow device has failed, and the degree of hazard poses an immediate risk to public health. A reduced pressure principle backflow preventer, if installed indoors, should be located to avoid electrical panels, areas of excessive heat, etc. Appropriate drainage (sized for catastrophic failure of the relief valve) must be available in indoor installations. Reduced pressure principle backflow preventers may also be installed in an outdoor above-ground enclosure, but they cannot be installed below-ground in a meter pit. All higher hazard conditions, to include non-residential connections, will be assessed and addressed by the PIWD on a case-by-case basis.

How Can I Prevent Backflow inside my house?

The best way to protect yourself, your family, and your neighbors from polluted water is to either remove the cross-connections in your pipes or protect them against backflow. Many plumbing fixtures have built-in backflow protection. Others require installation of a separate backflow preventer. Generally, the installation of plumbing in compliance with the plumbing code will protect you from contamination.



Cutaway view of a hose bibb vacuum breaker

The most common cross-connection in a home is the outside garden hose. If the end of the hose is submerged in a bucket of cleaning fluid, puddle of standing water or other container during a low pressure event, this water could get sucked back into your water pipes. You can prevent this by installing a “hose bib vacuum breaker”. These devices screw directly on the faucet. They are inexpensive and available at hardware and home improvement stores. You do NOT need a plumber to install these devices. Hose bibb vacuum breakers should be removed in the winter when the hose is disconnected and drained for storage.

Built-in Protection

Modern plumbing fixtures generally have built-in backflow protection. For instance, a faucet spout terminates above the flood rim level of the sink or tub. So, if the sink or tub is full of dirty water or worse, backed-up sewage, there is no possible way for backflow because of the air gap created by the elevated spout. Toilet fill valves, clothes washers, dishwashers, and refrigerator/ice makers also employ some type of built-in air gap as their method of protection.

For the most part, standard plumbing fixtures around the home, do not present a hazardous condition. However, additional protections are needed for household items such as: hand held shower heads; hose bibbs; lawn irrigation; and boilers.

Note that built-in protection generally works only if the fixture is installed as intended. Similarly, if during the installation of a new fixture you note manufacturer recommendations for protective measures, they should not be ignored. Bypassing protective measures and ignoring manufacturer recommendations can provide increased opportunity for contamination and put you, your loved ones, and your neighbors at greater risk.

When filling a pool, pond or container, never leave the end of the hose submerged in the water. Also, always remember to leave the hose nozzle "open" when not in use, so that the water drains out of the hose. Otherwise, pressure in the hose could ruin the hose bib vacuum breaker.

General Installation: Clearances

- All backflow preventers shall be installed with a centerline height of 12 to 36 inches above the floor.
- All reduced pressure principle backflow assemblies (RPZA) must have an 18 inch minimum clearance between the bottom of the relief valve and the floor to prevent submersion and provide access for servicing.
- A minimum of 12 inches of clear space shall be maintained above the RPZA to allow for servicing check valves and for operating shut-off valves.
- A minimum of 30 inches of clear space shall be maintained between the front side of the backflow prevention device and the nearest wall or obstruction.
- At least 8 inches clearance shall be maintained from the backside of the backflow preventer device to the nearest wall or obstruction.

Resources

The estimated cost of installing a backflow preventer is expected to range from $40 to $2,100 depending on the type of installation possible (e.g. in-house, above- or below-ground). In some instances, particularly for below-ground installations, the cost may be significantly higher than this estimate if issues associated with access (e.g. presence of fencing, proximity to structures, bedrock, etc.) are encountered.

The following resources are being provided to help PIWD customers identify and locate the appropriate component equipment and contractor support to perform this work. This list does not represent an exhaustive list of sources for either equipment or contractors nor is it intended to imply PIWD endorsement. However, all installed equipment must be approved by the PIWD for the level of hazard identified for the property.

PIWD Approved Equipment

Item	Manufacturer	Model	Sources	Est. Cost
Residential dual check	Watts	0072204 (3/4") / 0072204 (1")	M & G Correia's Plumbing & Heating (592 Metacom Ave, Warren, RI)	$38-$45
Residential dual check	Zurn Wilkins	700XL (3/4") / 700XL (1")	https://www.supplyhouse.com/Dual-Checks-1621000	$38-$45
*Note: Sizing up is generally appropriate (e.g. if 1/2" pipe, use 3/4" valve) to reduce potential for 'head loss'. However, customers may use 1/2" Watts or Zurn Wilkins if it is suitable for their particular situation.				
Reduced pressure principle backflow assembly			*Pending (soliciting info now; check back for updates soon)*	
Above-ground enclosure			*Pending (soliciting info now; check back for updates soon)*	
(Pad for above)				
*Note: Protective enclosures can be home-made but are required to meet certain minimum specifications (see ***Specifications for Protective Enclosures*** on website).				
Meter pit			*Pending (soliciting info now; check back for updates soon)*	
(Cover for above)				

Note: Hose bibb vacuum breakers are widely available, generally cost less than $10, and can be installed by the homeowner. No specific manufacturer, model or source will be provided.

Contractors

Type	Name	Contact
Installer	Jimmy Folco	401.230.0632
Installer	Richard Burns	401.662.3666
Installer	Independent Plumbing & Heating	401.253.6741
Installer	Remy's Plumbing & Heating	401.245.1177
Excavator	Carl Bearse	401.484.2716

Why Your Action Matters.

The effort of installing a backflow preventer on your pipes is far outweighed by its ability to protect you, your loved ones, and your neighbors from contaminated water.

Protect Your Drinking Water!

DON'T!

- ✗ Submerge hoses in buckets, swimming pools, tubs, sinks, ponds, or any standing water
- ✗ Use hose spray attachments without a backflow prevention device
- ✗ Leave the hose nozzle closed when not in use
- ✗ Use a hose to unplug blocked toilets or sinks

DO!

- √ Keep the ends of hoses off the ground and clear of all possible contaminants
- √ Install hose bib vacuum breakers on all faucets in and around your home
- √ Install an approved backflow prevention device on your supply line
- √ Contact your water supplier if you see any suspicious or unauthorized use of a flush hydrant

More information…

The PIWD has a Cross-Connection Control plan that is incorporated within its by-laws (see http://pih2o.org/pdfs/PIWD_Bylaws). This program is mandated by state law (RIGL 46-13-22) and Department of Health regulations. Additional information is available from the Department of Health. Call the HEALTH Information Line at: 401-222-5960 / RI Relay 711 or visit www.health.ri.gov/water

*Content in this guidance document was generated from a variety of sources, including:

Cross-Connection Control: A Best Practices Guide, U.S. EPA (EPA 816-F-06-035) Available: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000ZZB8.PDF?Dockey=2000ZZB8.PDF

Cross-connection Control Manual, U.S. EPA (EPA 816-R-03-002) Available: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000262T.PDF?Dockey=2000262T.PDF

Explaining Cross-Connections, Backflow Prevention, & Safe Drinking Water, available at: https://www.wsscwater.com/customer-service/customer-regulations/cross-connection-control/explaining-cross-connections-bac.html

Portsmouth Water and Fire District: Cross-connection control plan, available upon request

Residential Cross-Connection Control (DOH for Town of South Kingstown), available at: https://www.southkingstownri.com/DocumentCenter/View/467/Cross-Connection-Control-Information-PDF?bidId=