



Cross Connections in Household Plumbing

The City of Rochester is hard at work to provide and deliver the purest water possible to your home. However, once the water enters your property, there are common problems that may occur due to improper changes in or misuse of your plumbing system. This information is intended to give the reader a basic understanding of what backflow is all about and why backflow of water combined with the presence of cross-connections can be a source of contamination to the public water systems.

The City of Rochester has a Backflow program and licensed device inspectors/testers on staff at the Water Treatment Plant. These trained individual are out surveying local businesses to make sure they are in compliance with the City Ordinance and State Regulations.

What is a cross connection?

Plumbing cross-connections, are defined as actual or potential connections between a potable and non-potable water supply that may contribute to the degradation of the quality of water inside your home or business. This poses a serious public health hazard. There are numerous, well-documented cases where cross-connections have been responsible for contamination of drinking water, and have resulted in the spread of disease. The problem is a dynamic one, because piping systems are continually being installed, altered, or extended.

An unprotected or inadequately protected cross connection in the home could contaminate the drinking water supply not only in your building but also in neighboring homes or businesses. Backflows due to cross-connections are serious plumbing problems; and can cause sickness and even death. However, they can be avoided by the use of proper protection devices.

How does a cross connection occur?

Backflow occurs when water flows under positive pressure in the opposite direction, causing water or other liquids or substances to flow or move in a direction opposite to what is intended.

Whenever the City of Rochester connects a customer to its water distribution system, the intention is for the water to flow from the distribution system to the customer. However, it is possible, the flow can be reversed and flow from the customer's plumbing system back into the public water distribution system. This is backflow. If cross-connections exist within the user's plumbing system when backflow occurs then it is possible to contaminate the public water system. Backflows usually are caused by a backpressure or back siphonage.

- **Back-siphonage** is the reversal of normal flow in a system caused by negative pressure, vacuum or partial vacuum in the supply piping. This can be created when there is a stoppage of the water supply due to fire fighting, main repairs or main breaks or leaks.
- **Back Pressure** is the backflow of normal flows in a system due to an increase in the downstream pressure above that of the supply pressure. Which is possible in installations such as heating systems, elevated tanks and pressure producing systems. Water tends to flow in the direction of least resistance.

Here is an example:

A lawn sprinkler system is irrigating a lawn when all of a sudden a back-siphonage occurs due to a fire truck pumping water or from a broken water main. The resulting backflow from the lawn sprinkler system will flow into the plumbing system and then into the water distribution system. As the water backflows it can suck the contamination into the lines through the sprinkler heads, such as insects, pesticides, herbicides, fungicides, fertilizer, worms, and other contaminants. Once in the distribution lines the contamination could go anywhere in the public water system.

Have you ever considered all of the places that you use water in your home? You may be surprised how many different ways that water can be used and possibly misused. Here are some things you can be aware of to protect the purity of water you drink, cook with or bath in.

➤ Outside Faucets

The garden hose is the most common cross connection in the home. It acts like an extension of the water line. The hose is attached to the outdoor faucet and the other end is connected to an aspirator that contains insecticides, fertilizer or other chemicals used with the aspirator. Another common cross connection is to leave the other end of the hose submerged in a bucket of soapy water or just by laying down on the ground. You can install a hose bibb vacuum breaker. This will isolate the faucet and protect the water supply from contamination. Each spigot at your home should have a hose-bib vacuum breaker installed. This is a simple, inexpensive device, which can be purchased at any plumbing or hardware store. Installation is as easy as attaching your garden hose to a spigot.

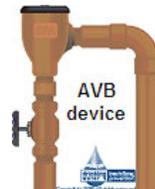


➤ Irrigation

Sprinkler systems make watering your lawn and garden easier, however, if not properly installed and maintained contaminants can enter your drinking water. Water that pools around the sprinkler heads may



contain contamination from chemical, fertilizer or animal waste. To help protect your water install an Atmospheric Vacuum Breaker (AVB), Pressure Vacuum Breaker (PVB), or a Reduced Pressure Principal Assembly (RP). You should consult with a professional lawn irrigation contractor or a licensed plumber.

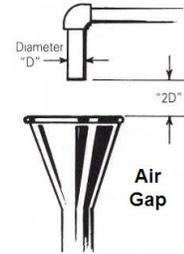


➤ Toilets

Toilets need water to flush the waste material to the sewer system. The water that flushes the toilet enters the tank at the bottom through a small hose. The float valve (or anti-siphon ballcock) inside the tank should be the correct type so that the contents of the tank does not get back into the drinking water in your home. Proper installation for the refill tube and float valve is above the water level in the tank.

➤ **Sinks, Tubs**

Make sure all faucets and spray hoses are above the flood rim for your sinks in the bathroom and kitchen. Make sure when filling sinks and tubs an air gap is between the end of the faucet and the water line. Without an air gap the contents may be back-siphoned into the line during a loss of pressure. Be sure to return kitchen sink sprayer to its resting place after use.



➤ **Boilers**

Pressure may build up inside the boiler. The water pressure in the boiler may exceed the pressure of the water feeding the boiler. This could cause a back-pressure situation and push the water into the water supply. Installing a backflow preventer with an intermediate vent will protect against back- pressure and back-siphonage and can be used under continuous pressure.



➤ **Washing machine**

The washing machine has a built in air gap from the factory. However you can install a single lever shutoff valve that shuts off both the hot and cold water to prevent flooding if one of the hoses breaks.

➤ **Water heater**

Thermal expansion occurs whenever water is heated. The backflow preventer stops the expanded water from returning to the water supply. Since the water cannot be compressed, the expanded water volume can cause a rapid increase in pressure in the piping and will often exceed the temperature setting and pressure relief valve. Installing an atmospheric vacuum breaker and a thermal expansion tank will help absorb the thermal expansion and maintain a balanced system pressure. Your system should be checked at least once every three years to ensure safe operation.

This combined cooperative effort between the City of Rochester and customers will help ensure your water supply is protected in the distribution system and ultimately in residential homes and businesses. Remember you should contact a licensed plumber for installation of the devices.

For more information on cross connection backflow prevention contact the Water Treatment Plant at 335-4291. You can also visit the following web:

- <http://www.epa.gov/safewater/crossconnection.html>
- <http://www.awwa.org>
- <http://www.usc.edu/dept/fccchr/beta/foundation.html>
- <http://www.des.state.nh.us>