

Safe drinking water is everybody's business.

Where can I get more information?

Your public water supplier is responsible for providing potable water to its customers. As part of this responsibility, the water utility, in conjunction with other entities such as city and local health and plumbing officials, has implemented an ongoing backflow prevention and cross-connection control program. Its goal is to protect public water systems from the hazards originating on the premises of its customers and from temporary connections that may result in threatening the safety of the public water supply. The program includes the installation, testing, and maintenance of backflow preventers at service connections where a potential threat to the public water supply is identified. Your cooperation and assistance in this program will help ensure the city can provide clean, safe water for everyone to drink.

To learn more about cross-connection control and backflow prevention programs and devices, see the American Water Works Association Manual of Water Supply Practices M14, *Recommended Practice for Backflow Prevention and Cross-Connection Control*, available at www.awwa.org/store.

The US Environmental Protection Agency has several guidance documents available online; search "Backflow prevention" on the National Service Center for Environmental Publications site: www.epa.gov/nseep/index.html.

For an account of real cross-connection incidents, see the University of Florida's TREEO website: www.treeo.ufl.edu/backflow/casehist.aspx.



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Association

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**Make Safe Drinking
Water Your Business**

Backflow Prevention and
Cross-Connection Control
Tips for Commerce and Industry



Our business is safe water. Make it your business, too!

Connections between our water supply and sources of possible contamination are potentially dangerous, and connections between drinking water lines and commercial and industrial plumbing systems can be deadly. Connections that allow dangerous and objectionable material to enter water supply lines are called *cross connections*. Because the Water Department is responsible for ensuring the water is safe for everyone to drink, it has established a cross-connection control program to protect the water system from *backflow*. Backflow is the reverse flow of undesirable and dangerous material into water mains.

As a business owner or manager, your cooperation and involvement are needed to make this program work. Cross connections are generally unintentional. No one deliberately makes plumbing connections to the potable water system that could cause injury or damage. However, sometimes in the course of providing water to industrial or commercial operations or installing new plumbing fixtures, cross connections are inadvertently built into the plumbing system. Cross connections can be controlled with proper *backflow-prevention* techniques.

How does backflow occur in some businesses to threaten our drinking water?

Backflow events occur because of back-siphonage or backpressure. Backsiphonage happens when the upstream water pressure to a piping system drops to a subatmospheric pressure. This may occur because of high demand from firefighting or a water main break, customer demand during a heat wave, or a power outage to a pump. Backpressure is when the pressure on the downstream side of a piping system is greater than the pressure on the upstream side. Common causes and sources of backpressure include pumps, elevated piping, thermal expansion, and pressurized containers.

- Some commercial and industrial operations use hazardous materials in their facilities. They may have dangerous connections to the water system that could allow these potential contaminants to enter the public water supply. Some hazardous materials regularly used by business establishments include:
 - Chromates—used to prevent corrosion in boilers, piping and air conditioning units
 - Ethylene glycol—highly toxic antifreeze intended for use in automobile radiators and sometimes misused in solar heating systems, hot water systems and fire lines
 - Heavy metals: arsenic, chromium, lead—used in metal plating processes and manufacturing systems
 - Pesticides and herbicides—used to control weeds, rodents and insects
 - Soaps, detergents, cleaners, bleaches, degreasers, and disinfectants—used in car washes, commercial laundries, hospital laundries, dry cleaners and carpet cleaning businesses
 - Gasoline, propane, oil, tar and kerosene—used in a variety of applications, from automobile repair to street maintenance and heating systems
 - Chemicals such as formaldehyde, sulfuric acid and hydrochloric acid—used as preservatives and cleaning agents and in various manufacturing processes

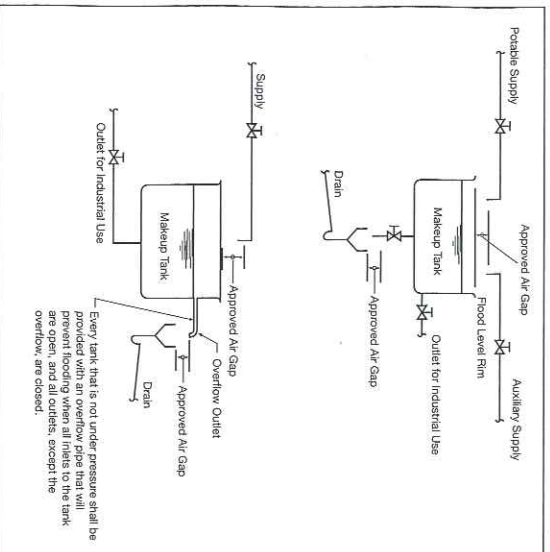
What about contaminated waste?

Wastewater can also backflow into the potable water system. Industrial and commercial operations frequently have complex waste systems that handle large volumes of contaminated and toxic waste. Industrial and commercial operations that typically handle toxic materials include:

- Food producing and processing facilities—poultry farms, dairies, feedlots, meat packing plants, bottling plants and canneries
- Medical facilities—hospitals, clinics, veterinary clinics, chiropractic clinics, nursing homes and laboratories
- Food service facilities—restaurants, fast food establishments and hotels
- Education and recreation facilities—schools, day care centers, churches, health clubs, parks, swimming pools, fairgrounds, campgrounds and golf courses
- Specialized facilities—beauty and barber shops, florists, print shops, photo-processing operations, kennels, coin-operated laundromats, car washes, gas stations and propane-storage operations
- Mortuaries, morgues and cemeteries
- Shopping centers and high-rise buildings
- Manufacturing, processing and fabrication operations

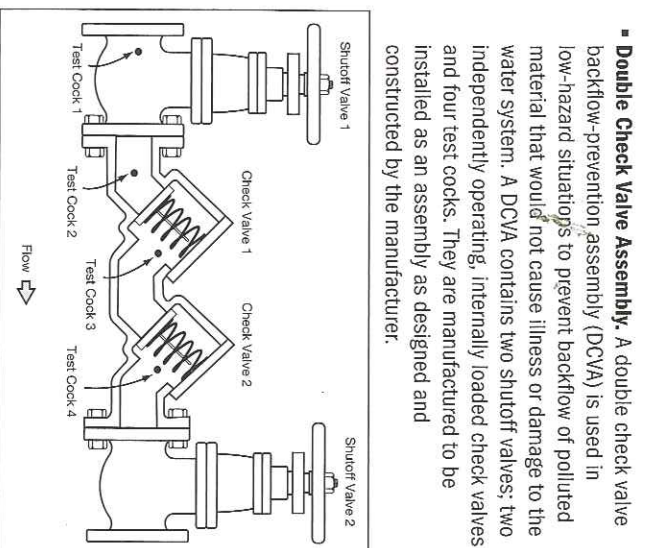


How can backflow be prevented?



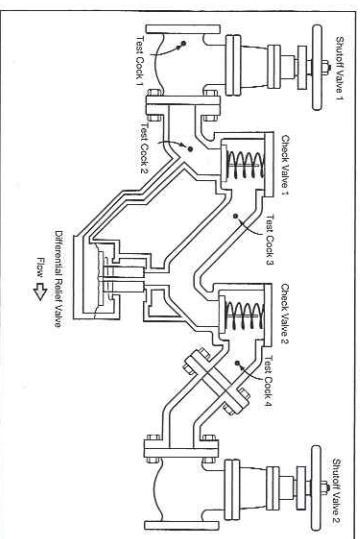
Some potential backflow situations can be prevented by altering the plumbing to create an *air gap*. An air gap is an unobstructed vertical space through the free atmosphere between the lowest point of the water supply outlet and the overflow rim of the receptacle. An air gap must be at least two times the inside diameter of the supply line but never less than one inch (25 mm). Contaminated water cannot be siphoned or forced under pressure through this physical separation. Air gaps should not be used in situations where the atmosphere around the gap could be contaminated.

Where dangerous materials may be connected to the water supply, special valves that only allow the water to flow in one direction must be installed near the water meter. These valves are called *backflow preventers*. They must be installed carefully so they will work properly to protect the water system, and they must be tested regularly to be sure they have not become worn or damaged. Two types of backflow preventers are commonly used to separate the water supply from facilities where there are potentially dangerous sources of contamination.



■ **Double Check Valve Assembly.** A double check valve backflow-prevention assembly (DCVA) is used in low-hazard situations to prevent backflow of polluted material that would not cause illness or damage to the water system. A DCVA contains two shut-off valves; two independently operating, internally loaded check valves and four test cocks. They are manufactured to be installed as an assembly as designed and constructed by the manufacturer.

■ **Reduced-Pressure Principle Device.** A reduced-pressure principle device (RP) is used in low- and high-hazard situations, where it can protect the water system from dangerous contaminants that could cause illness or damage. An RP contains two shut-off valves; two independently operating, internally loaded check valves, four test cocks and a relief valve that opens to the atmosphere. The relief valve ensures that the RP pressure after the first check is always lower than the inlet pressure. These devices are manufactured to meet established operating and design specifications.



- Chemical plants
- Wastewater from these establishments would pose a serious health threat if it entered the public water system.

Several other types of devices can also be used to isolate cross connections inside a facility. These devices are not intended to protect the public water system, but they do protect employees or residents from contamination that may arise within the plumbing system inside the building. Atmospheric vacuum breakers and hose bibb vacuum breakers can be installed to prevent backsiphonage on interior plumbing and faucets. Pressure vacuum breakers are frequently installed to prevent backsiphonage from irrigation systems.

What other precautions should be taken?

Hoses can be particularly dangerous in industrial and commercial operations, so use extreme caution when mixing chemicals or filling tanks, vats and containers. To avoid backsiphonage, install hose bibb vacuum breakers on faucets and do not submerge the end of the hose in the mixing vessel.

Special care should be taken when emergency repairs are necessary. Some of the most disastrous cross-connection accidents have been the result of temporary hose connections to pumps, waste systems and tanks while repairs were being made. One such case in an urban area allowed dirty water from a car wash to be pumped into one hundred square blocks of city water mains. A temporary hose connection had been made to supply water to the wash system when a pump broke down. When the pump was repaired and put back into service, the hose connection was left in place, allowing the newly repaired pump to fill the water mains with wastewater.

In addition to contaminating the public water supply, backflow can lead to liability claims and damage to equipment and production materials. For commercial users, installing and maintaining backflow-prevention devices can help ensure against cross-connection problems.

