

Backflow Prevention in Food Establishments

Why is Backflow Important?

State and local regulations require that food establishments meet backflow requirements to protect the potable water supply for the community. This handout is intended to provide food establishment operators with the regulatory basis for backflow prevention requirements and information on the types of backflow devices commonly found in food facilities.



Figure 1: Diagram depicting several causes of backflow in a potable water supply.

What Backflow Terminology is Important to Know?

Air Gap is the unobstructed vertical air space between the end of a drain line and the topmost part of the receiving vessel (e.g. floor sink or mop sink) that goes to the sewer system, and/or the end of a freshwater supply line and the point at which it connects to food service equipment. An air gap prevents dirty water from entering the potable water system.

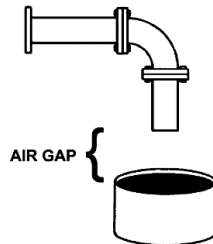


Figure 2: Example of an air gap.

Atmospheric Vacuum Breaker (AVB) is a non-testable backflow prevention device designed to be used in non-continuous pressure applications that automatically vents air to prevent back siphonage into the upstream piping. AVBs must be installed at least 6 inches above the highest point of downstream piping.

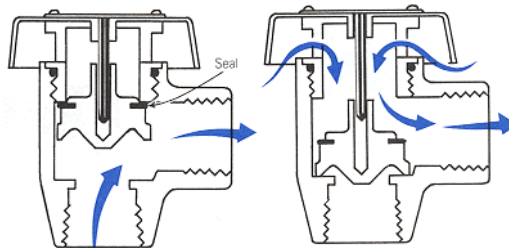


Figure 3: (Left) AVB valve open allowing water out of faucet. (Right) AVB valve closed blocking flow of water upstream of device.

Backflow, also known as **Backpressure** or **Back-Siphonage**, is the unwanted flow of contaminated water in the reverse direction that can cause contamination of clean water lines.

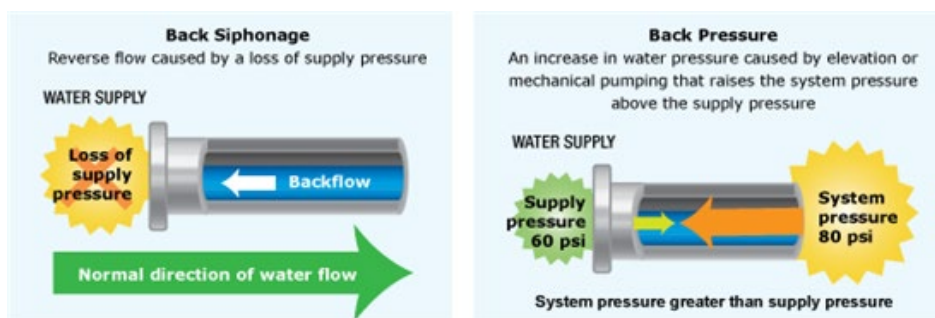


Figure 4: Examples of back siphonage and back pressure.

Backflow Prevention Device is a device that ensures that water can only flow in one direction. There are many types of backflow prevention devices and each one works best under specific circumstances. The official University of Southern California (USC) List of Approved Backflow Prevention Assemblies can be found by visiting the USC, Foundation for Cross-Connection Control and Hydraulic Research webpage at <https://fccchr.usc.edu/list.html>.

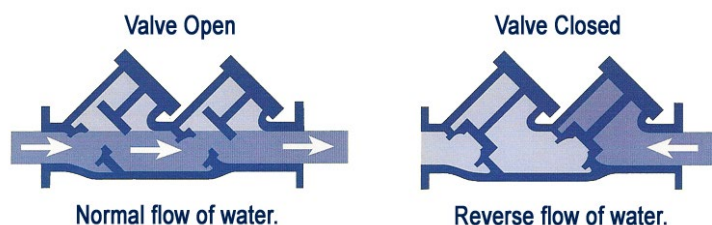


Figure 5: (Left) Normal flow of water in the intended direction through a backflow prevention device. (Right) Flow of water in the reverse direction blocked by closed valves in backflow prevention device, preventing contamination of upstream water.

Certified Backflow Prevention Assembly Tester is a person who is certified to test assemblies for the prevention of backflow by the California/Nevada section of the American Water Works Association, the American Backflow Prevention Association or an equivalent organization approved by the State of Nevada. A list of Approved Backflow Testers in the area can be found on the Truckee Meadows Water Authority webpage at <https://tmwa.com/approved-backflow-testers/>.

Cross-Connections are physical connections between separate piping systems in which one system contains potable water and the other contains liquid of unknown origin or questionable safety.

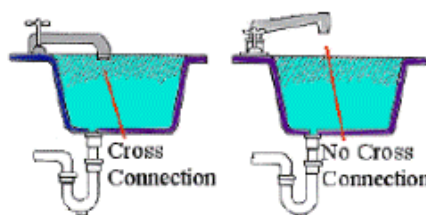


Figure 6: (Left) End of faucet is installed below rim of sink causing a direct cross-connection with the sewer system. (Right) End of faucet is installed above rim of sink; no cross connection is present with sewer system.

Cross-Connection Control Specialist is a person who is certified by the California/Nevada section of the American Water Works Association, the American Backflow Prevention Association or an equivalent organization approved by the State of Nevada to assure that cross-connection control programs continue to protect drinking water.

Dual Check with Intermediate Atmospheric Vent is a non-testable backflow device that has a vent, or atmospheric port, located between two independently acting check valves. The device is intended for use in non-health hazard cross-connection and continuous pressure applications like beverage machines.



Figure 7: Examples of ASSE 1022 Dual Check Valves with Intermediate Atmospheric Vent

Hose Connection Vacuum Breaker is a non-testable threaded backflow device that can be attached to a faucet or hose bib and is designed to be used in non-continuous pressure applications. The device automatically vents air to prevent back siphonage into the upstream piping.



Figure 8: Typical Hose Connection Vacuum Breaker.

Hot Box is a weatherproof and vandalism resistant enclosure for backflow devices that are installed outside.



Figure 9: (Left) Hot box disguised as a rock. (Right) Typical lockable hot box.

Pressure Vacuum Breaker (PVB) is a non-testable backflow prevention device designed to be used in continuous pressure applications that automatically vents air to prevent back siphonage into the upstream piping. PVBs must be installed at least 12 inches above the highest point of downstream piping.



Figure 10: Typical pressure vacuum breaker.

Reduced Pressure Principle Assembly (RPPA), also known as a *Reduced Pressure Zone Assembly (RPZ)* is a testable backflow prevention device that is designed to be used in continuous pressure applications or where a significant hazard to human health is possible. An RPPA must be installed on the domestic water supply line for food facilities.

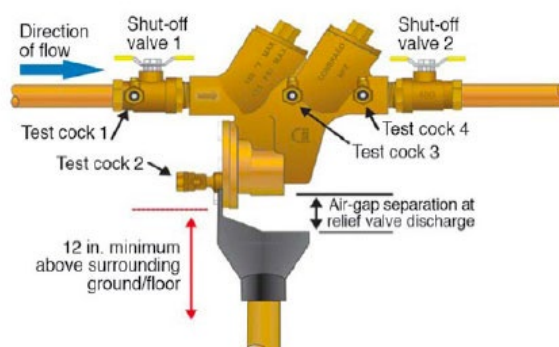


Figure 11: Diagram of a typical RPPA/RPZ backflow device.

Uniform Plumbing Code (UPC) is a model code developed by the International Association of Plumbing and Mechanical Officials (IAPMO) to govern the installation and inspection of plumbing systems as a means of promoting the public's health, safety and welfare.

Who Requires Backflow Prevention in Food Establishments?

Backflow prevention in food establishments is required per State and local regulations and the Uniform Plumbing Code.

[Nevada Administrative Code \(NAC\) 445A.67185 to 445.67255:](#)

NAC 445A.67195 Cross-connections and backflow: Minimum types of protection for particular service connections. (NRS 445A.860) Except as otherwise provided in NAC 445A.67185 to 445A.67255, inclusive, or authorized by the Division or the appropriate district board of health, the minimum type of protection from cross-connection required for a service connection to... [12] A restaurant or other facility in which food is served consists of a Reduced Pressure Principle Assembly (RPPA).

[Washoe County District Board of Health Governing Food Establishments §070.020 to 070.059](#)

§070.020 Plumbing system

Except as otherwise provided in these regulations, all plumbing systems including individual sewage disposal system piping, must be sized, constructed, installed, located and maintained according to the requirements in the most recent edition of the Uniform Plumbing Code or pursuant to the authority having jurisdiction.

§ 070.032 Backflow prevention, air gap

An air gap between the water supply inlet and the flood level rim of the plumbing fixture, equipment, or nonfood equipment shall be at least twice the diameter of the water supply inlet and may not be less than 25 mm (1 inch).

§ 070.033 Backflow prevention device, design standard

A backflow or back-siphonage prevention device installed on a water supply system shall meet American Society of Sanitary Engineering (A.S.S.E) standards for construction, installation, maintenance, inspection, and testing for that specific application and type of device.

§ 070.056 Backflow prevention device, when required

A plumbing system shall be installed to preclude backflow of a solid, liquid, or gas contaminant into the water supply system at each point of use at the food establishment, including on a hose bib if a hose is attached or on a hose bib if a hose is not attached and backflow prevention is required by law by:

- A. Providing an air gap as specified in Section 070.032 of these regulations, or
- B. Installing an approved backflow prevention device as specified under Section 070.033 of these regulations.

§ 070.057 Backflow prevention device, carbonator

- A. If not provided with an air gap as specific in Section 070.032 of these regulations, a dual check valve with an intermediate vent preceded by a screen of not less than 100 mesh to 25.4 mm (100 mesh to 1 inch) shall be installed upstream from a carbonating device and downstream from any copper in the water supply line.
- B. A dual check valve attached to the carbonator need not be of the vented type if an air gap or vented backflow prevention device has been otherwise provided as specified under Subsection A.

§ 070.059 Backflow prevention device, location

A backflow prevention device shall be located so that it may be serviced and maintained.

§ 070.070 Backflow prevention

- A. Except as provided in Subsection B of this section, a direct connection may not exist between the sewage system and a drain originating from equipment in which food, portable equipment, or utensils are placed except when floor drains originating in refrigerated spaces are constructed as an integral part of the building.
- B. A warewashing machine may have a direct connection to the sewage system provided that it conforms to applicable codes adopted in these regulations.

How do I Protect the Domestic Water Supply with an RPPA?

Per the NAC, all food facilities are required to have an RPPA installed to prevent cross-connections. RPPA devices are often found installed in a hot box located near the water meter or inside the building before the first connection or “T”. If installed inside a food facility, RPPA devices and all associated plumbing must be installed at least 1” off the wall using clear acrylic block or copper bells; unistruts may not be used for this purpose inside a food facility. *****Submission of building plans to the Building Department in your jurisdiction may be required for any new RPPA installations.**



Figure 12: (Left) Typical installation of RPPA inside a food facility where piping is held 1" off wall using clear acrylic block and device has an air gap fitting installed on the drain line to ensure device is indirectly drained. (Right) RPPA installed in an outdoor hot box.

Stand-Alone Building Backflow Requirements:

If the food facility encompasses an entire stand-alone building, an RPPA must be installed on the incoming water supply line for the building prior to the first connection or “T”. The RPPA must be installed between 12 inches and 36 inches from the ground and be indirectly drained to an approved location (e.g. floor sink, mop sink, hot box, etc.). *****The RPPA backflow device must be tested annually by a Certified Backflow Prevention Assembly Tester and test results must be made available to NNPH during all inspections.**

Multi-Unit Building Backflow Requirements:

If a food facility is a single unit within a multi-unit building, the following options are available for complying with the RPPA backflow requirements:

- **Option 1 (RPPA Install)**

An RPPA must be installed so that the individual unit cannot create a potential cross-connection and affect other units in the building. It must be installed on the incoming water supply line for the unit prior to the first connection or "T" in the building. The RPPA must be installed between 12 inches and 36 inches from the ground and be indirectly drained to an approved location (e.g. floor sink, mop sink, hot box, etc.). *****This backflow device must be tested annually by a Certified Backflow Prevention Assembly Tester and test results must be made available to NNPH during all inspections.**

- **Option 2 (Cross-Connection Control Survey) ***This Option Does Not Apply to Stand-Alone Buildings**

If an RPPA is installed on the domestic water supply line for the building before the first connection or “T” in the building, but an RPPA is not installed for the individual unit containing a food facility, NNPH may allow the facility to obtain a Cross-

Connection Control Survey for the unit. If this option is chosen, the operator must ensure the following items are obtained annually:

- A. A letter signed by a certified Cross-Connection Control Specialist stating that they have inspected the facility, that the facility currently meets all backflow requirements, and that the facility does not currently present a potential cross-connection hazard; therefore, the facility is not required to have an additional testable RPPA installed inside the unit. The letter must include their Cross-Connection Control Specialist certification number, and
- B. Passing test results for the building RPPA backflow device. This backflow device must be tested annually by a certified Backflow Prevention Assembly Tester, and test results must be made available to NNPH during all inspections. *****Test results are only valid for one year from the test date.**

What Other Backflow Requirements Apply to my Food Establishment?

Post-Mix Carbonated Beverage System:

If a food facility installs a post-mix carbonated beverage system (e.g. soda machine) and an air gap is not provided on the supply line, an RPPA or an ASSE 1022 dual check valve with an intermediate atmospheric vent must be installed upstream from the carbonator and downstream from any copper to prevent carbonic acid (H_2CO_3) from coming into contact with copper, copper alloy pipes and copper fittings which can cause copper poisoning in people consuming beverages. If an air gap is not installed with this equipment, the operator must ensure that:

- A. RPPA devices are tested annually, and test results are made available to NNPH during all inspections.
- B. Since dual check valve devices are non-testable, the device must be inspected annually by a commercial beverage system installer, a licensed plumber, or certified backflow tester. The inspection report must declare that the device is operable and properly functioning, or that the device was nonfunctional and replaced. The report must be made available to NNPH during all inspections.



Figure 13: Dual check valve with intermediate atmospheric vent installed at beverage dispensing station.

Vacuum Breakers:

Food facilities are also required to protect potable water connections from back siphonage conditions by using vacuum breakers.

- A. Atmospheric Vacuum Breakers (AVBs) are commonly installed at mop sink faucets and as part of dishwasher piping systems. *****Please note that a y-valve connector/hose splitter may not be installed downstream of the AVB as only a single connection is allowed on a faucet.**



Figure 14: (Left) Properly installed atmospheric vacuum breaker on mop sink faucet. (Right) Prohibited y-valve connector installed on mop sink faucet that must be removed.

- B. When an AVB cannot be reasonably installed at a threaded hose faucet connection (e.g. utility sink, hose bib, etc.), a Hose Connection Vacuum Breaker may be installed to protect potable water supply from cross-connections.

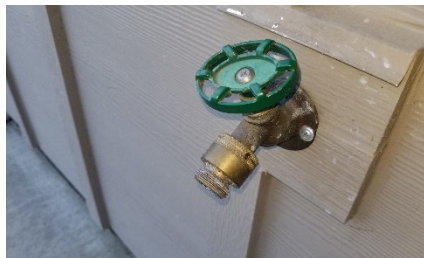


Figure 15: Hose connection vacuum breaker installed at hose bib.

- C. Pressure Vacuum Breakers (PVBs) are commonly found as part of irrigation systems at food facilities.



Figure 16: Pressure vacuum breaker installed on irrigation system.

Air Gaps:

Any piece of food service equipment in which dishware, utensils, and consumable food and beverages are placed cannot have a direct line to the sewage system. Installation of an air gap is the only way to prevent direct connections in piping systems; however, it is not required or reasonable in all situations.

- A. In a food facility, sink faucets, ice machines, and other equipment where otherwise required must have an air gap of at least two times the diameter of the water supply line opening, but not less than 1 inch.



Figure 17: Prep sink faucet with an air gap of at least twice the diameter of the water supply line opening.

- B. In a food facility, 3-compartment sinks, prep sinks, dump sinks, walk in condenser systems, and other food service equipment that drains directly to a grease trap or floor sink must have an air gap of at least 1-inch between the end of the discharge pipe and the topmost rim of the receiving vessel.



Figure 18: (Left) 3-compartment sink drain line properly air gapped to floor sink. (Right) Prep sink incorrectly plumbed with drain line below rim of floor sink.

- C. As an RPPA represents a direct connection with the potable water supply, the associated relief valve drain line must be indirectly drained to an appropriate location (e.g. floor sink, mop sink, etc.).

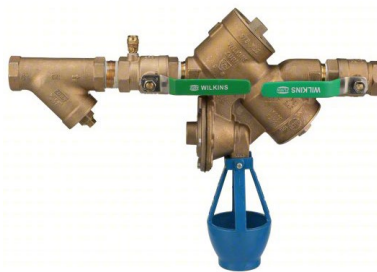


Figure 19: RPPA installed with a blue air gap adapter fitting to ensure device is indirectly draining.

Who do I Contact if I Have More Questions About Backflow?

For additional information, please contact the Northern Nevada Public Health (NNPH) Environmental Health Services Food Plan Review and Construction Program at 775-328-2434 (option 8), or by email at healthes@nnph.org.