

Frequently Asked Questions

1. What is back-siphonage?

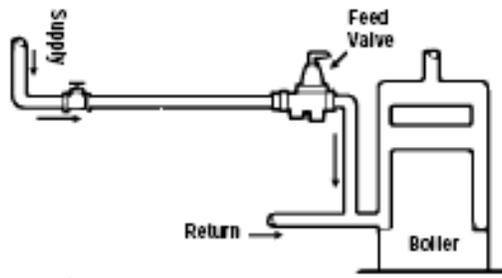
Back-siphonage is the reversal of normal flow in a system caused by a negative pressure (vacuum or partial vacuum) in the supply piping.

2. What factors can cause back-siphonage?

Back-siphonage can be created when there is stoppage of the water supply due to nearby fire fighting, repairs or breaks in city main, etc. The effect is similar to the sipping of an ice cream soda by inhaling through a straw, which induces a flow in the opposite direction.

3. What is backpressure?

Backpressure is the reversal of normal flow in a system due to an increase in the downstream or customer's pressure above that of the supply pressure.



4. What factors can cause a backpressure condition?

Backpressure is created whenever the downstream pressure exceeds the supply pressure, which is possible in installations such as heating systems, elevated tanks, and pressure-producing systems. An example would be a hot water space-heating boiler operating less than 15-20 lbs. Pressure coincidental with a reduction of the city water supply below such pressure (or higher in most commercial boilers). As water tends to flow in the direction of least resistance, a backpressure condition would be created and the contaminated boiler water would flow into the potable water supply.



5. What is a cross-connection?

A cross-connection is a direct arrangement of a piping line which allows the potable water supply to be connected to a line which contains a contaminant. An example is the common garden hose attached to a sill cock with the end of the hose lying in a cesspool. Other examples are a garden hose attached to a service sink with the end of the hose submerged in a tub full of detergent, supply lines connected to bottom-fed tanks, supply lines to boilers.

6. What is the most common form of a cross-connection?

Ironically, the ordinary garden hose is the most common offender as it can be easily connected to the potable water supply and used for a variety of potentially dangerous applications.

7. What is potentially dangerous about an unprotected outside spigot or sill cock?

The purpose of a sill cock is to permit easy attachment of a hose for outside watering purposes. However, a garden hose can be extremely hazardous because they are left submerged in swimming pools, lay in elevated locations (above the sill cock) watering shrubs, chemical sprayers are attached to hoses for weed-killing, etc.; and hoses are often left lying on the ground which may be contaminated with fertilizer, cesspools, and garden chemicals.



8. What protection is required for sill cocks?

A hose bibb vacuum breaker should be installed on every sill cock to isolate garden hose applications thus protecting the potable water supply from contamination. Should a hose bibb vacuum breaker be used on frost-free hydrants? Definitely, providing the device is equipped with means to permit the line to drain after the hydrant is shut-off. A “removable” type hose bibb vacuum breaker could allow the hydrant to be drained, but the possibility exists that users might fail to remove it for draining purposes, thus defeating the benefit of the frost-proof hydrant feature. If the device is of the “non-removable” type, be sure it is equipped with means to drain the line to prevent winter freezing.



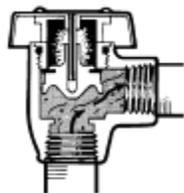
Hose Bibb Vacuum Breaker

9. Can an atmospheric, anti-siphon vacuum breaker be installed on a hose bibb?

Theoretically yes, but practically no. An anti-siphon vacuum breaker must be elevated above the sill cock to operate properly. This would require elevated piping up to the vacuum breaker and down to the sill cock and is normally not a feasible installation. On the other hand, a hose bibb vacuum breaker can be attached directly to the sill cock, without plumbing changes and at minor cost.

10. What is an atmospheric vacuum breaker?

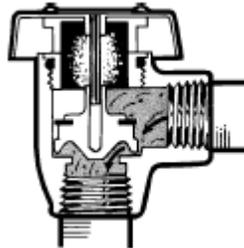
The most commonly used atmospheric anti-siphon vacuum breakers incorporate an atmospheric vent in combination with a check valve. Its operation depends on a supply of potable water to seal off the atmospheric vent, admitting the water to downstream equipment. If a negative pressure develops in the supply line, the loss of pressure permits the check valve to drop sealing the orifice while at the same time the vent opens admitting air to the system to break the vacuum.



Atmospheric Vacuum Breaker

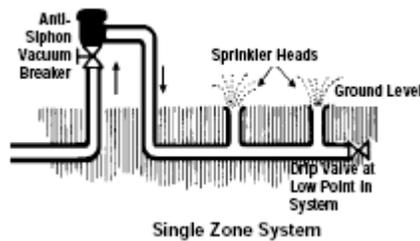
11. Will an anti-siphon vacuum breaker protect against a backpressure condition?

Absolutely not! If there were an increase in the downstream pressure over that of the supply pressure, the check valve would tend to “modulate” thus permitting the backflow of contaminated water to pass through the orifice into the potable water supply line.



12. Can an atmospheric vacuum breaker be used on lawn sprinkler systems?

Yes, if these are properly installed, they will protect the potable water supply. The device shall be installed 6" above the highest sprinkler head and shall have no control valves located downstream from the device.

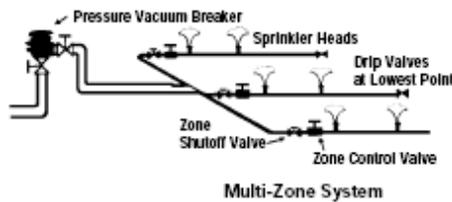


13. Can an atmospheric vacuum breaker be used under continuous pressure?

No! Codes do not permit this as the device could become “frozen”, and not function under an emergency condition.

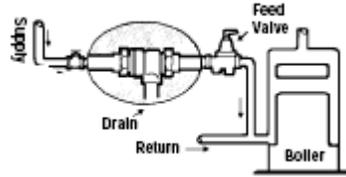
14. Can a pressure vacuum breaker be used on a multi-zone lawn sprinkler system?

Yes. This type of vacuum breaker can be used under continuous pressure. Therefore, if properly installed, it will protect the potable water supply. The assembly shall be installed 12" above the highest sprinkler head.



15. What is continuous pressure?

This is a term applied to an installation in which the pressure is being supplied continuously to a backflow preventer for periods of over 12 hours at a time. Laboratory faucet equipment, for example, is entirely suitable for a non-pressure, atmospheric anti-siphon vacuum breaker because the supply is periodically being turned on and shut off. A vacuum breaker should never be subjected to continuous pressure unless it is of the continuous pressure type and clearly identified for this service.



16. Are check valves approved for use on boiler feed lines?

Most jurisdictions require backflow protection on all boiler feed lines. Some will allow a backflow preventer with intermediate vent as minimum protection for residential boilers. A reduced pressure backflow preventer is generally required on commercial and compound boilers. However, low cost, continuous pressure backflow preventers are now available which will perform with maximum protection; thus check valves are not recommended.

17. What is the difference between pollution and contamination?

Pollution of the water supply does not constitute an actual health hazard, although the quality of the water is impaired with respect to taste, odor or utility. Contamination of the water supply, however, does constitute an actual health hazard; the consumer being subjected to potentially lethal water borne disease or illness.

18. What does “Degree of Hazard” mean?

The degree of hazard is a commonly used phrase utilized in cross-connection programs and is simply a determination on whether the substance in the non-potable system is toxic (health hazard) or non-toxic (non-health hazard).

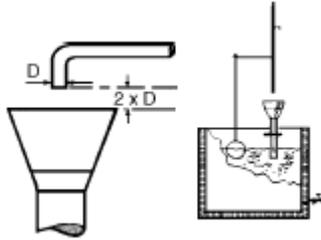
19. What is the difference between a toxic and a non-toxic substance?

Toxic substance is any liquid, solid or gas, which when introduced into the water supply creates, or may create a danger to health and well being of the consumer. An example is treated boiler water. A non-toxic substance is any substance that may create a non-health hazard, is a nuisance or is aesthetically objectionable, i.e., foodstuff, such as sugar, soda pop, etc. Therefore, you must select the proper device or assembly according to the type of connection and degree of hazard. There are five basic products that can be used to correct cross-connection.

20. What are the five basic products used for protection of cross-connections?

The five basic products are:

- 1. Air Gap
- 2. Atmospheric Vacuum Breakers -which also includes hose connection vacuum breakers
- 3. Pressure Vacuum Breakers
- 4. Double Check Valve Assembly
- 5. Reduced Pressure Principle Backflow Preventers



21. What is an Air Gap and where is it used?

Air Gap is the physical separation of the potable and non-potable system by an air space. The vertical distance between the supply pipe and the flood level rim should be two times the diameter of the supply pipe, but never less than 1". The air gap can be used on a direct or inlet connection and for all toxic substances.

Because today's complex plumbing systems normally require continuous pressure, air gap applications are actually in the minority. It should be remembered, however, that whenever a piping terminates a suitable distance above a contaminant, this itself is actually an air gap. Air Gaps are frequently used on industrial processing applications, but care should be taken that subsequent alterations are not made to the piping, which would result in a direct connection.



22. Where is an Atmospheric Vacuum Breaker used?

Atmospheric Vacuum Breakers may be used only on connections to a non-potable system where the vacuum breaker is never subjected to backpressure and is installed on the discharge side of the last control valve. It must be installed above the usage point. It cannot be used under continuous pressure.



23. Where is a Hose Bibb Vacuum Breaker used?

Hose Bibb Vacuum Breakers are small inexpensive devices with hose connections, which are simply attached to sill cocks and threaded faucets or wherever there is a possibility of a hose being attached which could be introduced to a contaminant. However, like the Atmospheric Vacuum Breaker they should not be used under continuous pressure. Remember, no shut-off valves are permitted downstream!



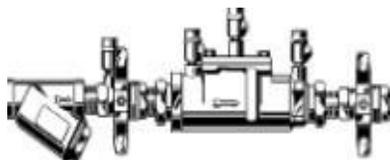
24. Where is a Pressure Vacuum Breaker used?

Pressure Vacuum Breakers may be used as protection for connections to all types of non-potable systems where the vacuum breakers are not subject to backpressure. These units may be used under continuous supply pressure. They must be installed above the usage point. (Spill resistant models for indoor use are also available).



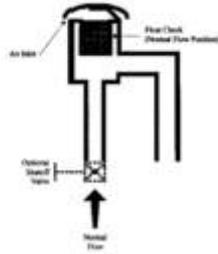
25. Where is a Backflow Preventer with Intermediate Atmospheric vent used?

These devices are made for 1/2" and 3/4" lines feeding residential boilers. In addition, they provide the added advantage of providing protection against backpressure in low hazard applications.



26. Where is a Double Check Valve Assembly used?

A double check valve assembly may be used as protection of all direct connections through which foreign material might enter the potable system in concentration, which would constitute a nuisance, or be aesthetically objectionable, such as air, steam, food, or other material which does not constitute a health hazard.



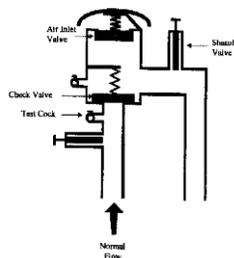
27. What are typical applications for Atmospheric Vacuum Breakers?

Atmospheric Vacuum Breakers can be used on most inlet type water connections which are not subject to backpressure such as low inlet feeds to receptacles containing toxic and non-toxic substances, valve outlet or fixture with hose attachments, lawn sprinkler systems and commercial dishwashers.



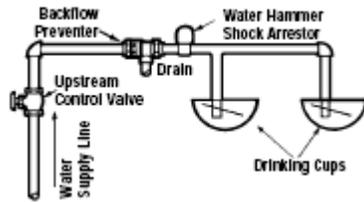
28. What are typical applications for Hose Bibb Vacuum Breakers?

Hose Bibb Vacuum Breakers are popularly used on sill cocks, service sinks and any threaded pipe to which a hose may potentially be attached.



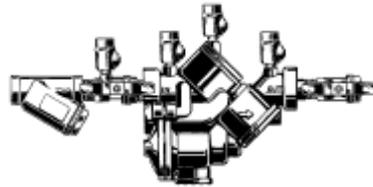
29. What are typical applications for Pressure Vacuum Breakers?

These applications should be similar to the Atmospheric Vacuum Breaker with the exception that these may be used under continuous pressure. However, they should not be subject to backpressure.



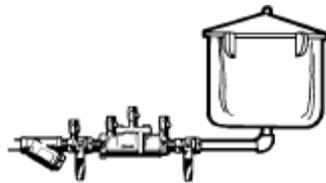
30. What are typical applications of Backflow Preventer with Intermediate Vent?

For 1/2" and 3/4" lines these devices are popularly used on low hazard boiler feed water supply lines, cattle drinking fountains, trailer park water supply connections and other similar low-flow applications. They will protect against both back-siphonage and backpressure and can be used under continuous pressure.



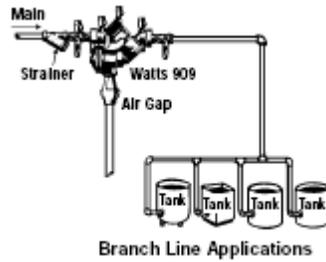
31. Where is a Reduced Pressure Zone Backflow Preventer used?

Reduced Pressure Principle Assemblies may be used on all direct connections which may be subject to backpressure or back-siphonage, and where there is the possibility of contamination by the material that does constitute a potential health hazard.



32. What are typical applications for Double Check Valve Assemblies?

Double Check Valve Assemblies may be used where the degree of hazard is non-health, or low hazard meaning that the non-potable source is polluted rather than contaminated. The degree of hazard is oftentimes determined by local Inspection Departments and, therefore, such departments should be questioned in order to comply with local regulations.



33. What are typical applications for Reduced Pressure Zone Backflow Preventers?

This type should be used whenever the non-potable source is more of a contaminant than a pollutant. Basically, they are applied as main line protection to protect the municipal water supply, but should also be used on branch line applications where non-potable fluid would constitute a health hazard, such as boiler feed lines, commercial garbage disposal systems, industrial boilers, etc.

34. Are there any regulations in OSHA regarding cross-connections?

Yes, OSHA requires that no cross-connection be allowed in an installation unless it is properly protected with an approved backflow preventer. These requirements are also covered in B.O.C.A., Southern Standard Building Code, Uniform Plumbing Code, IOC, UPC, and City, State and Federal Regulations.

35. What Standards are available governing the manufacture of backflow prevention assemblies?

Reduced Pressure Backflow Prevention Assemblies, Double Check Valve Assemblies, Pressure Vacuum Breakers and Atmospheric Breakers are specified by USC Foundation for Cross-connection Control, ANSI/AWWA and ASSE. Dual Check Valves and Hose Bibbs are specified by the ASSE Standards. Various manufactures carry backflow prevention devices meeting these standards, including Cla-Val, Febco, Hersey, Watts and Ames.

36. What is the benefit of a strainer preceding a backflow preventer?

A strainer will protect the check valves of a backflow preventer from fouling due to foreign matter and debris, which may be flowing through the line. This not only protects the valve but also eliminates nuisance fouling and subsequent maintenance and shutdown. The use of a strainer with a water pressure reducing valve has been an accepted practice for years. The amount of pressure drop attributed to the strainer is negligible and is far outweighed by the advantages provided by the strainer.

37. What would cause a reduced pressure backflow preventer to leak?

Leakage from a backflow preventer is normally attributed to foreign matter lodging on the seating area of either the first or second check valve. Most times this can be corrected by simply flushing

the valve, which will dislodge any loose particles. It is, therefore, most important on new installations that the piping be thoroughly flushed before installing the unit. It should be remembered, however, that spillage does provide a “warning signal” that the valve is in need of maintenance.

38. Is periodic testing required for reduced pressure backflow preventers?

Yes, and this is to ensure that the valve is working properly and is a requirement of many states and cross-connection control programs. Test cocks are provided on the valve for this purpose and manufacturers are required to furnish field testing information.

39. Should a backflow preventer be installed in the water supply line to each residence?

Because of the growing number of serious residential backflow cases, many water purveyors are now requiring the installation of approved dual check valve backflow preventers at residential water meters. They are also educating the public concerning cross-connections and the danger of backflow into the local water supply. Since water purveyors cannot possibly be responsible for or monitor the use of water within a residence, the requirements for these cross-connection control programs are increasing throughout the country.

40. What is a cross-connection control program?

This is a combined cooperative effort between plumbing and health officials, waterworks companies, property owners and certified testers to establish and administer guidelines for controlling cross-connections and implementing means to ensure their enforcement so that the public potable water supply will be protected both in the city main and within buildings. The elements of a program define the type of protection required and responsibility for the administration and enforcement. Other elements ensure continuing education programs.

41. What are the concerns with thermal expansion and backflow prevention?

Since backflow prevention devices prevent the exchange of water between the customer and the public water provider that prevents thermal expansion, a pressure blow-off valve must be provided at the hot water tank. Blow-off water should be directed to a proper drain. Gas fired hot water tanks have a tendency to build pressures quickly and these pressures can rupture internal plumbing. Customers are advised to contact a local plumber to correct these situations.

42. What are the concerns with freezing and backflow prevention?

When temperatures are expected to fall below 32° F for several hours, standing water in unprotected backflow prevention devices can freeze and cause the device to rupture. Above ground non-protected backflow prevention devices should be wrapped in insulating material and/or covered to prevent freezing. Water that is kept in motion (by running the water continuously) will not freeze but this solution can be costly.

Cross-Connection Educational Brochure for Homeowners

Cross-Connection Prevention for Homeowners

Contamination of your water can be caused by how you use water in your home. You may be surprised how many different ways that water can become contaminated by inadvertent misuse.

This brochure discusses a few of the uses of water that may cause the water that you use to become contaminated if simple back flow procedures are not followed.

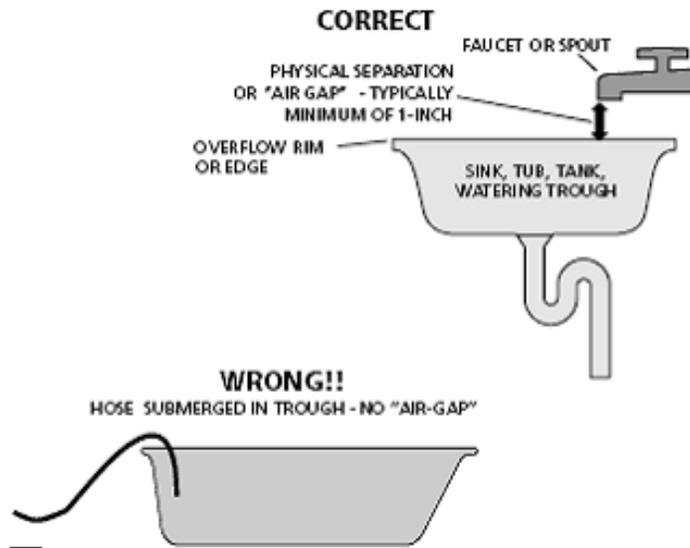
Sinks, Tubs, Tanks

The faucets in your bathroom or kitchen must be located so that the end of the faucet is above the overflow level of the sink or tub.

Fill lines to water troughs or tanks must also be physically separated or "air-gapped."

If there is no air-gap, then the contents of the sink, tub, or tank may be sucked or "backsiphoned" into the water line during a loss of water pressure.

Backflow Caused by a Submerged Drain Hose with no Air Gap.



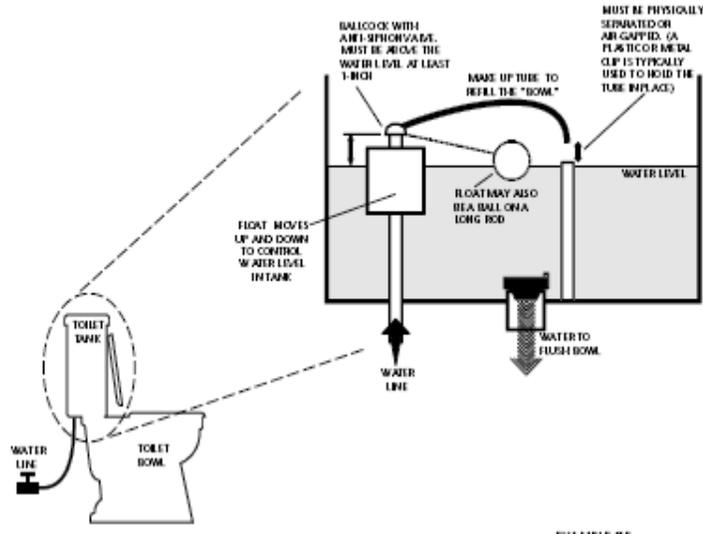
Never submerge the end of a hose in a sink or a drain!

Bathroom and Kitchen Plumbing Fixtures

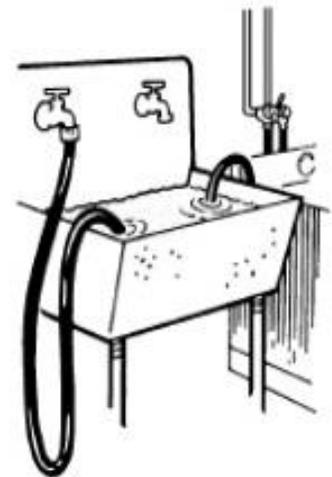
Toilet Showing Water Inlet above Water Surface

Toilets

Toilets need water to flush the waste material into the sewer system. The water that flushes the toilet enters into the toilet tank from the small hose or pipe connected to the bottom of the toilet tank. It is essential that the float-valve (or anti-siphon ballcock) inside of the toilet tank is the correct type so that the contents of the toilet tank don't get back into the drinking water system in your house. As shown in the illustration, the anti-siphon ballcock and refill tube must be above the water level in the tank.



Submerged Drain From Washing Machine with no Air Gap



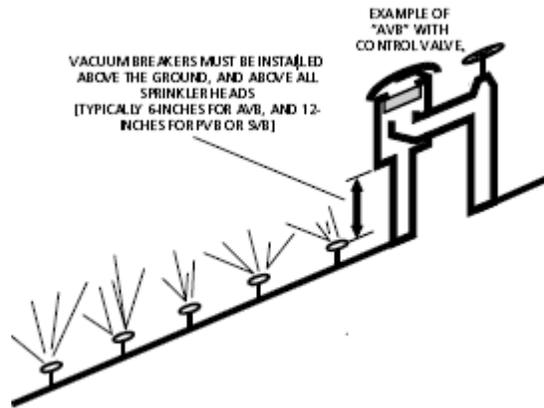
Washing Machines and Dishwashers

In addition, no appliance drains such as a dishwasher or a washing machine should ever be drained directly to a sanitary drain without an air gap. The air gap prevents any type of siphoning effect.

Lawn and Flower Irrigation

Irrigation systems make watering of your lawn or garden much easier, but if not properly constructed, contaminants may backflow into your drinking water. Backflow from hoses can be prevented by the use of some simple cross-connection control devices.

Water pooling around sprinkler heads may be contaminated by chemicals, fertilizers, or animal waste. For permanent installations a atmospheric vacuum breaker must be installed to prevent backflow from occurring.



Hose bibbs

Hose bibbs are part of our everyday life. They allow us to hook up a garden hose to water the plants, wash the car, clean out the gutters, fill the swimming pool, etc.

However, every time you connect a garden hose to a hose bibb, you are extending the end of the water line.

To make sure that no harmful materials are drawn back into the garden hose, a vacuum breaker should be installed on each hose bibb.



Hose Bibb Vacuum Breaker