

ADDENDUM "C"

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TO WHOM IT MAY CONCERN:

On July 8, 1991, an ordinance, number 43-91, was passed by Council of the City of New Philadelphia, providing for an enlarged method of cross-connection control and quality protection of the public water system.

This ordinance requires the Water Department Superintendent to order the installation of backflow protection on any water service line that presents either an actual or potential hazard to the public water system.

Since the ordinance becomes a part of the rules and regulations governing the operation of the New Philadelphia Water Department, it shall be in effect in all areas served by the Water Department.

Our backflow prevention program will eventually effect ALL service liens that present a hazard; this means those which have been in existence for a good many years as well as new or proposed branches.

The purpose of this letter is two - fold. One, we want to notify you that the program is now fully and lawfully in effect; and two, we want you as an interested person to be fully aware of the program so that you will consider the need for the proper backflow protective device in the design and installation of the water service for any facility on which you may currently be working.

The type of protective device required will depend on the degree of hazard involved. It will be in agreement with the Ohio Environmental Protection Agency Regulations 3745-95-01 thru 08 and 3745-99-01. The protective device itself must be approved by the Water Department Superintendent and the Ohio E.P.A. The protective device itself must be installed in a location with clearances, available drainage, temperature limits, accessibility, etc., subject to the approval of the Water Department Superintendent.

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As a general guideline, an approved backflow prevention device shall be required on each water service branch serving premises where the following conditions exist.

1. Premises having an auxiliary water supply, unless such auxiliary supply is accepted as an additional source by the water purveyor and the source is approved by the Department of Health.
2. Premises on which any substance is handled in such a fashion as to create an actual or potential hazard to the public potable water system. This shall include premises having sources or systems containing process fluids or waters originating from the public potable water system which are no longer under the sanitary control of the water purveyor.
3. Premises having internal cross - connections that, in the judgment of the water purveyor, are not correctable or intricate to determine whether or not cross - connections exist.
4. Premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete cross - connection survey.
5. Premises having a repeated history of cross - connections being established or reestablished.

The following types of facilities shall normally require the designated backflow prevention devices. This list is also presented as a guideline, and should not be construed as being final or complete. Each case will be judged by its own merit.

Abbreviations used are as follows:

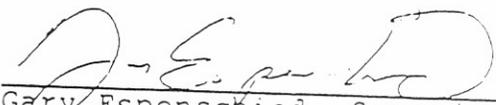
- A.G. - Air Gap Separation
- R.P. - Reduced Pressure Principle Backflow Prevention Device
- D.C. - Double Check Valve Assembly
- V.B. - Atmospheric Vacuum Breaker

Type of Facility	Type of Protection
Car Washes	A.G. or R.P.
Chemical Plants	A.G. or R.P.
Film Laboratories or Developing Facilities	A.G. or R.P.
Food or Beverage Processing Plants	D.C.
Hospitals, Clinics, Medical Buildings	A.G. or R.P.
Laboratories	A.G. or R.P.
Laundries and Dry Cleaners (Health Hazard)	A.G. or R.P.
Machine Tool Plants (Health Hazard)	A.G. or R.P.
Metal Processing or Production (Health Hazard)	A.G. or R.P.

Metal Plating Plants	A.G. or R.P.
Nursing Homes, Convalescent Homes, Extended Care Homes, Rest Homes	A.G. or R.P.
Packing Houses	A.G. or R.P.
Paper Products Plants	A.G. or R.P.
Petroleum Processing Plants	A.G. or R.P.
Petroleum Storage Plants or Yards (Health Hazard)	A.G. or R.P.
Petroleum Storage Plants or Yards (No Health Hazard)	D.C.
Pharmaceutical or Cosmetic Plants	A.G. or R.P.
Piers, Docks or Waterfront Facilities	A.G. or R.P.
Power Plants and Substations	A.G. or R.P.
Radioactive Material Plants	A.G. or R.P.
Rendering Plants	A.G. or R.P.
Schools with Laboratories	A.G. or R.P.
Sprinkling or Irrigation Systems	D.C. or V.B.
Swimming Pools with Direct Connection	D.C. or V.B.
Sewage Treatment Plants	A.G. or R.P.
Sewage Pumping Station (Health Hazard)	A.G. or R.P.
Sewage Pumping Station (No Health Hazard)	D.C.
Premises Having Water Recirculating Systems and Pumps (Health Hazard)	A.G. or R.P.
Premises Having Water Systems Filled With Antifreeze Solutions	A.G. or R.P.
Premises Having Boilers or Cooling Systems where Toxic Conditioners are used	A.G. or R.P.
Premises Having Water Storage Tanks, Reservoirs, Ponds or Wells, etc.	A.G. or R.P.
Veterinary Establishments	A.G. or R.P.
Others as Specified by the Water Department Superintendent	A.G. or R.P.

If you have any questions concerning this letter, please write to, or call:

Gary Espenschied
 Superintendent of Water Distribution
 339-2332
 339-2883


 Gary Espenschied, Superintendent
 New Philadelphia Water Dept.

Chapter 3745-95 of the Ohio Administrative Code replaces and is essentially the same as regulation HE-34 which was adopted by the Public Health Council of the Ohio Department of Health on April 15, 1972, and became effective on July 1, 1972.

CHAPTER 3745-95 BACKFLOW PREVENTION AND
CROSS-CONNECTION CONTROL

3745-95-01	Definitions
3745-95-02	Cross-connections
3745-95-03	Surveys and investigations
3745-95-04	Where protection is required
3745-95-05	Type of protection required
3745-95-06	Backflow prevention devices
3745-95-07	Booster pumps
3745-95-08	Violations
3745-95-01	Definitions

As used in this Chapter of the Administrative Code:

- (A) "Air gap separation" means the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood level rim of the receptacle.
- (B) "Approved" means that a backflow prevention device or method has been accepted by the supplier of water and the director as suitable for the proposed use.
- (C) "Auxiliary water system" means any water system on or available to the premises other than the public water system and includes the water supplied by the system. These auxiliary waters may include water from another supplier's public water system; or water from a source such as wells, lakes, or streams; or process fluids; or used water. They may be polluted or contaminated or objectionable or constitute a water source or system over which the supplier of water does not have control.
- (D) "Backflow" means the flow of water or other liquids, mixture or substances into the distributing pipes of a potable water supply from any source other than the intended source of the potable water supply.
- (E) "Backflow prevention device" means any device, method, or type of construction intended to prevent backflow into a potable water system.
- (F) "Consumer" means the owner or person in control of any premises supplied by or in any manner connected to a public water system.

- (G) "Consumer's water system" means any water system, located on the consumer's premises, supplied by or in any manner connected to a public water system. A household plumbing system is considered to be a consumer's water system.
- (H) "Contamination" means an impairment of the quality of the water by sewage or process fluid or waste to a degree which could create an actual hazard to the public health through poisoning or through spread of disease by exposure.
- (I) "Cross-connection" means any arrangement whereby backflow can occur.
- (J) "Degree of hazard" is a term derived from an evaluation of the potential risk to health and the adverse effect upon the potable water system.
- (K) "Director" means the director of environmental protection or his duly authorized representative.
- (L) "Double check valve assembly" means an assembly composed of two single, independently acting, check valves including tightly closing shutoff valves located at each end of the assembly and suitable connections for testing the water-tightness of each check valve.
- (M) "Health hazard" means any condition, device, or practice in a water system or its operation that creates, or may create, a danger to the health and well-being of users. The word "severe" as used to qualify "health hazard" means a hazard to the health of the user that could reasonably be expected to result in significant morbidity or death.
- (N) "Interchangeable connection" means an arrangement or device that will allow alternate but not simultaneous use of two sources of water.
- (O) "Non-potable water" means water not safe for drinking, personal, or culinary use.
- (P) "Person" means the state, any political subdivision, public or private corporation, individual, partnership, or other legal entity.
- (Q) "Pollution" means the presence in water of any foreign substance that tends to degrade its quality so as to constitute a hazard or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.
- (R) "Potable water" means water which is satisfactory for drinking, culinary, and domestic purposes and meets the requirements of the environmental protection agency.

- (S) "Process fluids" means any fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, pollutional, or system hazard if introduced into the public or a potable consumer's water system. This includes, but is not limited to:
- (1) Polluted or contaminated waters;
 - (2) Process waters;
 - (3) Used waters originating from the public water system which may have deteriorated in sanitary quality;
 - (4) Cooling waters;
 - (5) Contaminated natural waters taken from wells, lakes, streams, or irrigation systems;
 - (6) Chemicals in solution or suspension;
 - (7) Oils, gases, acids, alkalis, and other liquid and gaseous fluids used in industrial or other processes, or for fire fighting purposes.
- (T) "Public water system" has the meaning ascribed to such term in rule 3745-81-01 of the Administrative Code.
- (U) "Reduced pressure principle backflow prevention device" means a device containing a minimum of two independently acting check valves together with an automatically operated pressure differential relief valve located between two check valves. During normal flow and at the cessation of normal flow, the pressure between these two checks shall be less than the supply pressure. In case of leakage of either check valve, the differential relief valve, by discharging to the atmosphere, shall operate to maintain the pressure between the check valves at less than the supply pressure. The unit must include tightly closing shutoff valves located at each end of the device, and each device shall be fitted with properly located test cocks.
- (V) "Service connection" means the terminal end of a service line from the public water system. If a meter is installed at the end of the service, then the service connection means the downstream end of the meter.
- (W) "Supplier of water" means the owner or operator of a public water system.
- (X) "System hazard" means a condition posing an actual or potential threat of damage to the physical properties of the public water system or a potable consumer's water system.

- (Y) "Pollutional hazard" means a condition through which an aesthetically objectionable or degrading material not dangerous to health may enter the public water system or a potable consumer's water system.
- (Z) "Used water" means any water supplied by a supplier of water from a public water system to a consumer's water system after it has passed through the service connection and is no longer under the control of the supplier.

(Adopted October 9, 1980; effective November 26, 1980.)

3745-95-02 Cross-connections

- (A) No person shall install or maintain a water service connection to any premises where actual or potential cross-connections to a public water system or a potable consumer's water system may exist unless such actual or potential cross-connections are abated or controlled to the satisfaction of the supplier of water.
- (B) No person shall install or maintain any connection whereby water from an auxiliary water system may enter a public water system or potable consumer's water system unless the auxiliary water system and the method of connection and use of such system shall have been approved by the supplier of water and by the director as required by section 6109.13 of the Revised Code.

(Adopted October 9, 1980; effective November 26, 1980.)

3745-05-03 Surveys and investigations

- (A) The supplier of water shall conduct or cause to be conducted periodic surveys and investigations, of frequency acceptable to the director, of water use practices within a consumer's premises to determine whether there are actual or potential cross-connections to the consumer's water system through which contaminants or pollutants could backflow into the public water system.
- (B) The supplier of water, or his authorized representative, shall have the right to enter premises served by the public water system at all reasonable times for the purpose of making surveys and investigations of water use practices within the premises.
- (C) On request by the supplier of water, or his authorized representative, the consumer shall furnish the supplier of water, or his authorized representative, information on water use practices within the consumer's premises.
- (D) Paragraph (A) of this rule does not relieve the consumer of the responsibility for conducting, or causing

to be conducted, periodic surveys of water use practices on his premises to determine whether there are actual or potential cross-connections in the consumer's water system through which contaminants or pollutants could backflow into a public water system or a potable consumer's water system.

(Adopted October 9, 1980; effective November 26, 1980.)

3745-95-04 Where protection is required

- (A) An approved backflow prevention device shall be installed on each service line to a consumer's water system serving premises, where in the judgment of the supplier of water or the director, a health, pollutional, or system hazard to the public water system exists.
- (B) An approved backflow prevention device shall be installed on each service line to a consumer's water system serving premises where the following conditions exist:
 - (1) Premises having an auxiliary water system, unless such auxiliary system is accepted as an additional source by the supplier of water and the source is approved by the director;
 - (2) Premises on which any substance is handled in such a fashion as to create an actual or potential hazard to a public water system. This shall include premises having sources or systems containing process fluids or waters originating from a public water system which are no longer under the control of the supplier of water;
 - (3) Premises having internal cross-connections that, in the judgment of the supplier of water, are not correctable, or intricate plumbing arrangements which make it impracticable to determine whether or not cross-connections exist;
 - (4) Premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete cross-connection survey;
 - (5) Premises having a repeated history of cross-connections being established or re-established
 - (6) Others specified by the director.

(C) An approved backflow prevention device shall be installed on each service line to a consumer's water system serving, but not necessarily limited to, the following types of facilities unless the director determines that no health, pollutional, or system hazard to the public water system exists:

- (1) Hospitals, mortuaries, clinics, nursing homes;
- (2) Laboratories;
- (3) Piers, docks, waterfront facilities;
- (4) Sewage treatment plants, sewage pumping stations, or storm water pumping stations;
- (5) Food or beverage processing plants;
- (6) Chemical plants;
- (7) Metal plating industries;
- (8) Petroleum processing or storage plants;
- (9) Radioactive material processing plants or nuclear reactors;
- (10) Car washes;
- (11) Others specified by the director.

(D) An approved backflow prevention device shall be installed at any point of connection between a public water system or a potable consumer's water system and an auxiliary water system, unless such auxiliary system is acceptable as an additional source by the supplier of water and the source is approved by the director.

(Adopted October 9, 1980, effective November 26, 1980.)

3745-95-05 Type of protection required

(A) The type of protection required under paragraphs (A), (B), and (C) of Rule 3745-95-04 of the Administrative Code shall depend on the degree of hazard which exists as follows:

- (1) An approved air gap separation shall be installed where a public water system may be contaminated with substances that could cause a severe health hazard;
- (2) An approved air gap separation or an approved reduced pressure principle backflow prevention device shall be installed where a public water system may be contaminated with any substance that could cause a system or health hazard;
- (3) An approved air gap separation or an approved reduced pressure principle backflow prevention device or an approved double check valve assembly shall be installed where a public water system may be polluted with any substance that could cause a pollutional hazard.

- (B) The type of protection required under paragraph (D) of rule 3745-95-04 of the Administrative Code shall be an approved air gap separation or an approved interchangeable connection.
- (C) Where an auxiliary water system is used as a secondary source of water for a fire protection system, the provisions of paragraph (B) of this rule for an approved air gap separation or an approved interchangeable connection may be waived by the director, provided:
 - (1) At premises where the auxiliary water system may be contaminated with substances that could cause a system or health hazard, a public water system or a potable consumer's water system shall be protected against backflow by installation of an approved reduced pressure principle backflow prevention device;
 - (2) At all other premises, a public water system or a potable consumer's water system shall be protected against backflow by installation of either an approved reduced pressure principle backflow prevention device or an approved double check valve assembly;
 - (3) A public water system or a potable consumer's water system shall be the primary source of water for the fire protection system;
 - (4) The fire protection system shall be normally filled with water from a public water system or a potable consumer's water system;
 - (5) The water in the fire protection system shall be used for fire protection only, with no other use of water from the fire protection system downstream from the approved backflow prevention device.

(Adopted October 9, 1980; effective November 26, 1980.)

3745-95-06 Backflow prevention devices

- (A) Any backflow prevention device required by rules 3745-95-04 and 3745-95-05 of the Administrative Code shall be of a model or construction approved by the supplier of water and the director.
- (B) Any backflow prevention device required by rules 3745-95-04 and 3745-95-05 of the Administrative Code shall

be installed at a location and in a manner approved by the supplier of water and shall be installed by and at the expense of the water consumer. In addition, any backflow prevention device required by paragraphs (B) and (C) of rule 3745-95-05 of the Administrative Code shall be installed at a location and in a manner approved by the director as required by section 6109.13 of the Revised Code.

- (C) It shall be the duty of the consumer, on any premises on which backflow prevention devices required by rules 3745-95-04 and 3745-95-05 of the Administrative Code are installed, to have thorough inspections and operational tests made of the devices at such intervals and in such manner as may be reasonably required by the supplier of water or the director. ~~These inspections and tests shall be at the expense of the water consumer and shall be performed by the supplier of water~~ or a person approved by the supplier as qualified to inspect and test backflow prevention devices. It shall be the duty of the supplier of water to see that these tests and inspections are made. ~~These devices shall be repaired, overhauled or replaced at the expense of the consumer whenever they are found to be defective.~~ Records of such inspections, tests, repairs and overhaul shall be kept by the consumer and made available to the supplier of water.
- (D) Existing backflow prevention devices approved by the supplier of water or the director prior to the effective date of this rule and which are properly maintained shall, except for inspection, testing, and maintenance requirements, be excluded from the requirements of paragraphs (A) and (B) of this rule if the supplier of water and the director are assured that the devices will satisfactorily protect the public water system.

(Adopted October 9, 1980; effective November 26, 1980.)

3745-95-07 Booster pumps

- (A) No person shall install or maintain a water service connection to any premises where a booster pump has been installed on the service line to or within such premises, unless such booster pump is equipped with a low pressure cut-off designed to shut-off the booster pump when the pressure in the service line on the suction side of the pump drops to ten pounds per square inch gauge or less.
- (B) It shall be the duty of the water consumer to maintain the low pressure cut-off device in proper working order and to certify to the supplier of water, at least once a year, that the device is operable.

(Adopted October 9, 1980; effective November 26, 1980.)

- (A) The supplier of water shall deny or discontinue, after reasonable notice to the occupant thereof, the water service to any premises wherein any backflow prevention device required by this chapter is not installed, tested and maintained in a manner acceptable to the supplier of water, or if it is found that the backflow prevention device has been removed or by-passed, or if an unprotected cross-connection exists on the premises or if a low pressure cut-off required by rule 3745-95-07 of the Administrative Code is not installed and maintained in working order, or if the supplier of water or the director, or the authorized representative of either, is denied entry to determine compliance with this chapter of the Administrative Code.
- (B) Water service to such premises shall not be restored until the consumer has corrected or eliminated such conditions or defects in conformance with this chapter of the Administrative Code, and to the satisfaction of the supplier of water.

(Adopted October 9, 1980; effective November 26, 1980.)

CHAPTER 3745-99 MISCELLANEOUS WATER SUPPLY RULES

3745-99-01 Yard Hydrants

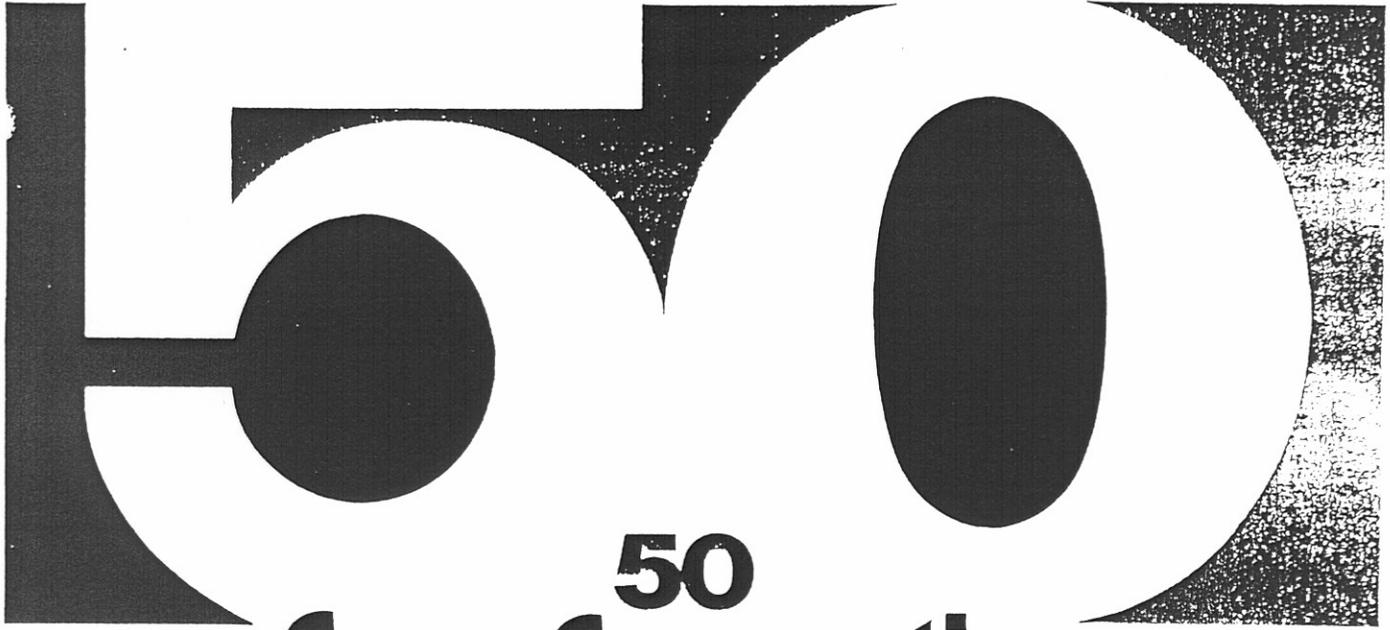
The installation of yard hydrants where water is available or accessible for drinking or culinary purposes and having drip openings below ground surface is prohibited unless such hydrants are equipped with approved devices to prevent entrance of ground water into chambers connected with the water supply.

(Adopted October 9, 1980; effective November 26, 1980.)

OHIO BUILDING CODE

Chapter 4101:2-51 (the Ohio Plumbing Code) of the Ohio Administrative Code, entitled Plumbing, is part of the Ohio Basic Building Code and contains the following rules that are directly concerned with backflow prevention and cross-connection control:

- 4101:2-51-33 Water supply
- 4101:2-51-36 Water storage tanks
- 4101:2-51-38 Backflow
- 4101:2-51-76 Test of water supply system



**50
Cross-Connection
Questions,
Answers,
& Illustrations**

Relating To
Backflow Prevention Products
and
Protection of
Safe Drinking Water Supply

Prepared by



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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.

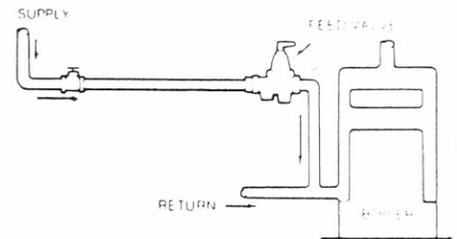


3 What is backpressure backflow?

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

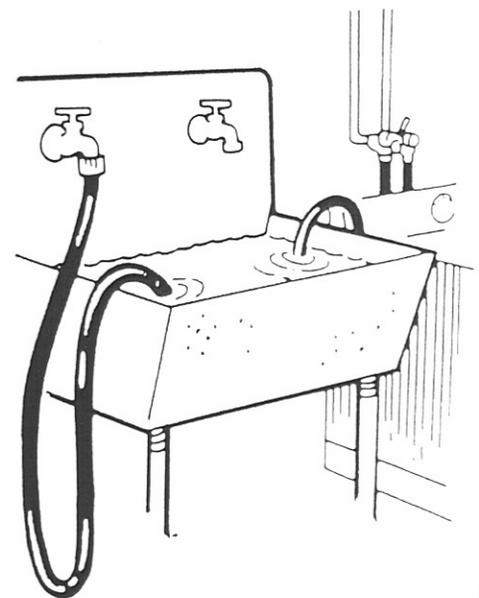
4 What factors can cause a backpressure-backflow condition?

Back pressure-backflow 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 under 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 back-pressure-backflow 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.

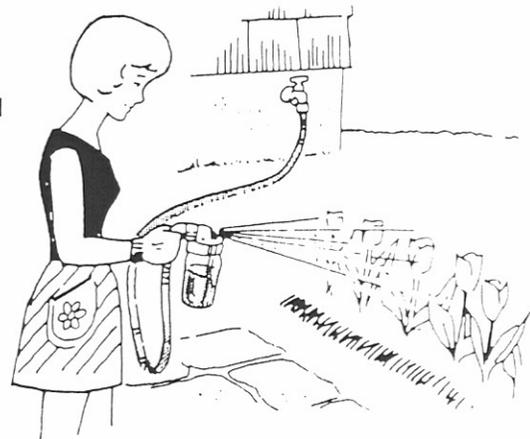


6 What is the most common form of a cross connection?

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 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 laying on the ground which may be contaminated with fertilizer, cess-pools, 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.

9 Should a hose bibb vacuum breaker be used on frost-free hydrants?

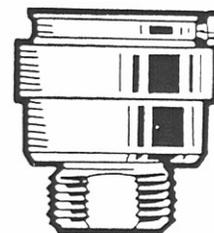
Definitely, providing the device is equipped with means to permit the line to drain after the hydrant is shut-off. A "removable" type hose bibb vacuum breaker could allow the hydrant to be drained, but the possibility exists that users might fail to remove it for draining purposes, thus defeating the 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
No. 8

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

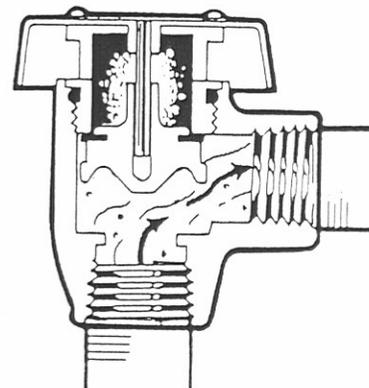
Theoretically yes, but practically no. An anti-siphon vacuum breaker must be elevated above the sill cock to operate properly. This would require elevated piping up to the vacuum breaker and down to the sill cock and is normally not a feasible installation. On the other hand, a hose bibb vacuum breaker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



HOSE BIBB VACUUM BREAKER
FOR FROST-PROOF HYDRANTS
No. NF8

11 What is an atmospheric vacuum breaker?

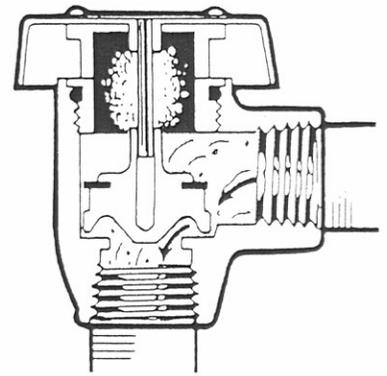
The most commonly used atmospheric anti-siphon vacuum breakers incorporate an atmospheric vent in combination with a check valve. Its operation depends on a supply of potable water to seal off the atmospheric vent, admitting the water to downstream equipment. If a negative pressure develops in the supply 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
No. 288A

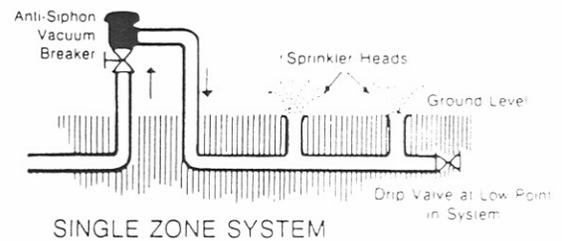
12 Will an anti-siphon vacuum breaker protect against a backpressure backflow condition?

Absolutely not! If there is 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.



13 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.

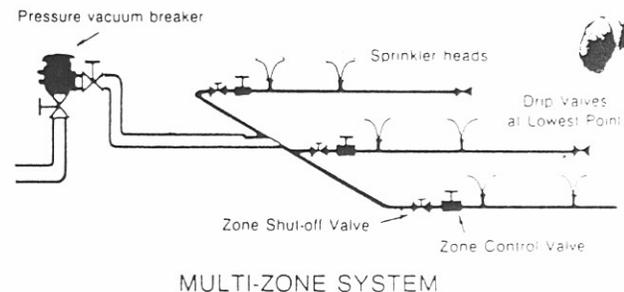


14 Can an atmospheric vacuum breaker be used under continuous pressure?

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

15 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 device shall be installed 12" above the highest sprinkler head.

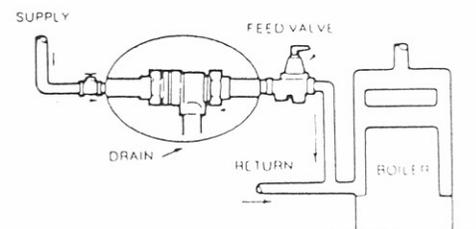


16 What is continuous pressure?

This is a term applied to an installation in which the pressure is being supplied continuously to a backflow preventer for periods 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.

17 Are check valves approved for use on boiler feed lines?

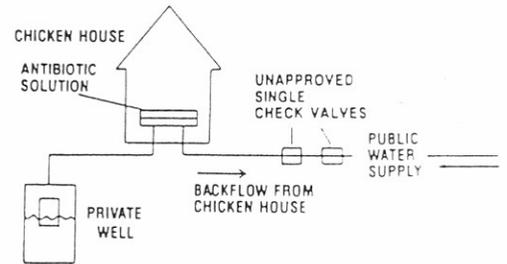
Most jurisdictions require backflow protection on all boiler feed lines. Some will allow a backflow preventer with intermediate vent as minimum protection for residential boilers. A reduced pressure backflow preventer is generally required on commercial and compound boilers.



However, low cost, continuous pressure backflow preventers are now available which will perform with maximum protection; thus check valves are not recommended.

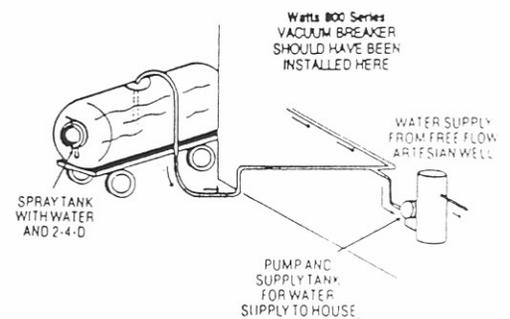
18 What is the difference between pollution and contamination?

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.



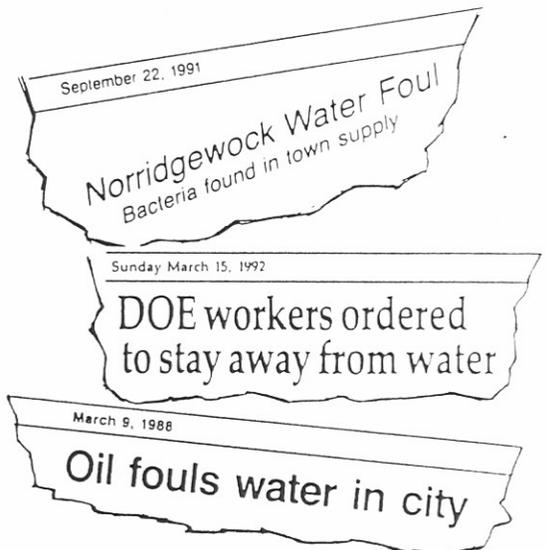
19 What recent case would reflect users being exposed to contamination of the water supply?

Chicken House Cross-Connection, Spring 1991. In response to a complaint from a customer on the Casa Water System (Perry County), a staff member of the Division of Engineering found that the water systems had been contaminated by backflow from chicken houses. The water system connected to the chicken houses included two single check valves in series for backflow prevention purposes. The water was being used to administer an antibiotic solution to the chickens.



20 What other case reflects users being exposed to "contamination" of the water supply?

On or about the week of the 14th of May, 1991, a back-siphonage problem occurred. A local farmer reported the problem on his farm. He was filling a spray tank on his farm with water and 2-4-D. The wind kept blowing the fill hose away from the fill spout so he extended the hose down into the tank. As the tank filled, he went onto other duties. He went to the house for some reason and his wife told him that the water had become salty tasting. He immediately thought of the 2-4-D and went to the tank and it had began siphoning water from the tank. He told his wife not to use any more water. An artesian well, (free flow) which was filling the tank. The artesian well also supplied water to the home through a storage tank and pump system. As the spray tank was filling, the pump in the house came on and created a pull on the well greater than the pressure at the well head. Consequently, as the pump was on, it was also pulling the 2-4-D and water from the spray tank.

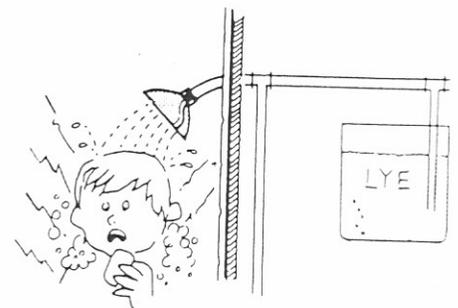


21 Are there any other records of recent cases involving unprotected cross connections?

The startling fact is that cross connections continue to occur and there are documented cases involving reverse flow. For other cases, request folder F-SBN.

22 What recently reported cases occurred in a plant?

In addition to the case described in "No. 19", there are other reports but because of the possibility of litigation for pending cases, information can be difficult to obtain. However, in San Francisco, an industrial plant had a submerged water inlet supplying a lye vat. Immediately adjacent to this installation was the employee's shower room. Officials fortunately discovered the cross connection, but were alarmed that employees could potentially be bathing in water contaminated with lye from the vats.



23. What case was reported involving a school?

Most people are familiar with the details of the Holy Cross Football Teams' "hepatitis" incident, which was later determined to be caused by a backflow of contaminated water. It took close to nine months for officials to determine that a severe fire in nearby Worcester lowered the pressure in the football field area to the point where a back pressure backflow condition was created allowing contaminants from a sunken hose bibb pit to backflow into the field house drinking bubbler.



24. What case was reported involving a commercial building?

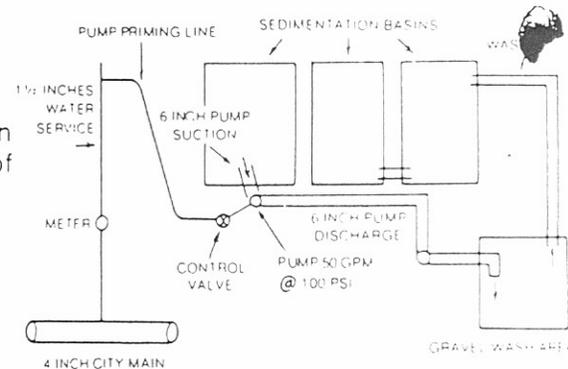
Much to the surprise of the customers of a bank in Atlanta, Georgia they saw yellow water flowing from drinking fountains and green ice rolling out of cafeteria dispensing machines.

It was later reported that a pump, used for the air conditioning system, burned out; and a maintenance man, unaware of the danger, connected the system to another pump used for potable water. The result caused large doses of bichromate of soda to be forced into the potable water supply, causing the dramatic appearance of yellow water and colored ice cubes.



25. Are there any cases involving outside processing activities?

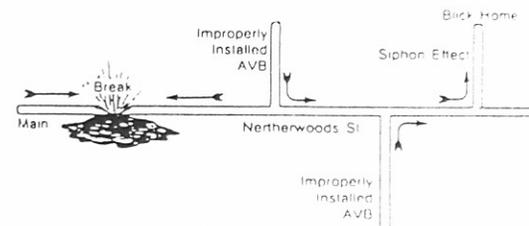
Yes, a case occurred in a gravel pit operation in Illinois. A pump was used in the processing operation supplying 100 lbs. pressure. Contaminated water was forced back through an unprotected "prime line" overcoming the city water pressure of 45 lbs. The contaminated water entered the city main and was channeled into a nearby bottling plant. This probably would have gone undetected except that personnel in the bottling plant noticed that the water was not only dirty but was warm. City officials were immediately called which led to the discovery of the reverse flow from the gravel pit operation.



26. What other typical cases have been reported?

Unwanted Guests (Residents find parasites in tap water) Oct. 1991. Parasitological worms were found in the water at two homes after a malfunctioning lawn sprinkler coupled with a water main break sucked the nematodes into the water system.

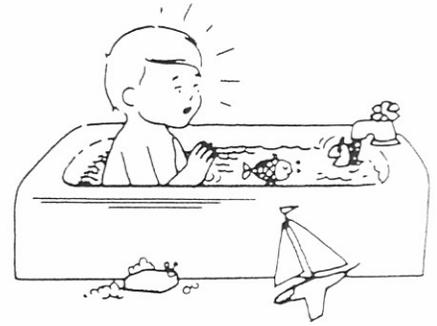
The nematodes first showed up the evening of Oct. 1 after the backflow prevention system on the privately owned underground sprinkler malfunctioned. When the water pressure dropped, the vacuum in the system sucked some water from the sprinkler into the city water. A homeowner found the worms swimming around in his bathtub when he started filling the tub for his child. He said he was appalled to find the critters, as well as rust and other debris in his water. "The only reason I noticed it is because I have children and was giving my kid a bath. If you have a screen on your faucet or you were taking a shower, you wouldn't see it."



The contractor who installed the sprinkler system didn't pull a city permit and used a "cheap" atmospheric vacuum breaker. When it malfunctioned, which was at the time of the water main break, the nematodes were pulled right in.

In Utah, a doctor reported two gold fish flowing into his bath tub. Earlier in the day he had been filling his gold fish pool with a garden hose when a back-siphonage condition developed resulting in the late emergence of the gold fish into the bath tub.

What is significant, however, is the number of recent cases that are not reported. The number of unprotected cross connections in existence are potential disasters which can occur any time unless adequate protective devices are installed.



27 What is meant by "Degree of Hazard"?

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).



Health Hazard



Non-Health Hazard

28 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. For example, food stuff, such as sugar, soda pop, etc. Therefore, you must select the proper device according to the type of connection and degree of hazard. There are five basic products that can be used to correct cross connection.



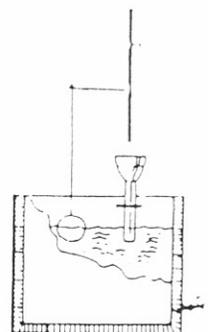
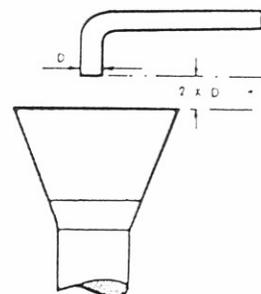
29 What are the five basic products used for protection of cross connections?

The five basic products are:

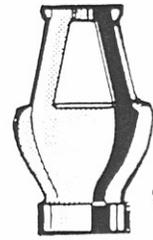
1. Air Gap
2. Atmospheric Vacuum Breakers - which also includes hose connection vacuum breakers
3. Pressure Vacuum Breakers - which also includes backflow preventer with intermediate atmospheric vent for 1/2" and 3/4" lines.
4. Double Check Valve Assembly
5. Reduced Pressure Principle Backflow Preventers

30 What is an Air Gap?

Air Gap is the physical separation of the potable and non-potable system by an air space. The vertical distance between



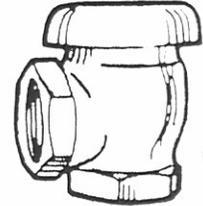
the supply pipe and the flood level rim should be two times the diameter of the supply pipe, but never less than 1". The air gap can be used on a direct or inlet connection and for all toxic substances.



909AG Series

31 Where is an Atmospheric Vacuum Breaker used?

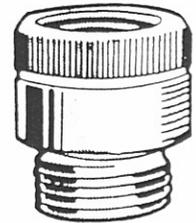
Atmospheric Vacuum Breakers may be used only on connections to a non-potable system where the vacuum breaker is never subjected to back-pressure and is installed on the discharge side of the last control valve. It must be installed above the usage point. It cannot be used under continuous pressure. (Also see No.11)



No. 288A

32 Where is a Hose Bibb Vacuum Breaker used?

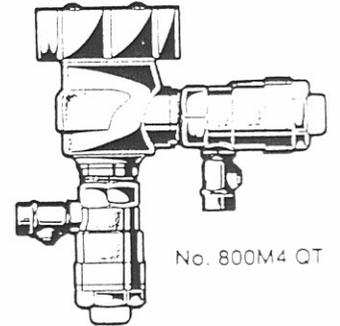
Hose Bibb Vacuum Breakers are small inexpensive devices with hose connections which are simply attached to sill cocks, and threaded faucets or wherever there is a possibility of a hose being attached which could be introduced to a contaminant. However, like the Atmospheric Vacuum Breaker they should not be used under continuous pressure.



No. 8

33 Where is a Pressure Vacuum Breaker used?

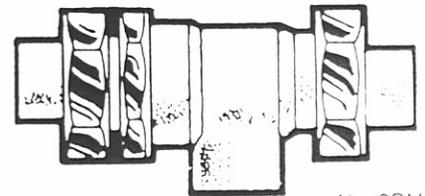
Pressure Vacuum Breakers may be used as protection for connections to all types of non-potable systems where the vacuum breakers are not subject to back-pressure. These units may be used under continuous supply pressure. They must be installed above the usage point.



No. 800M4 QT

34 Where is a Backflow Preventer with Intermediate Atmospheric vent used?

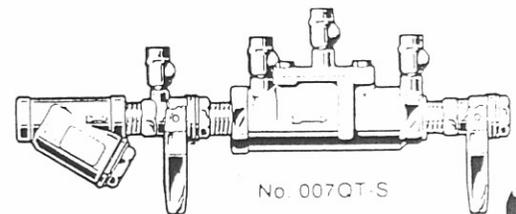
These devices are made for 1/2" and 3/4" lines and may be used as an alternate equal for pressure vacuum breakers. In addition, however, they provide the added advantage of providing protection against back-pressure.



No. 90M3/M2

35 Where is a Double Check Valve Assembly used?

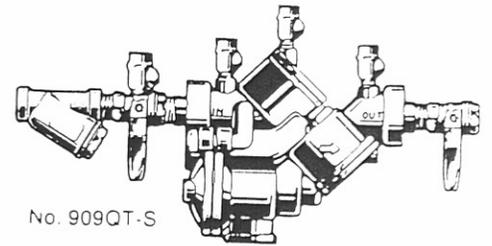
A double check valve assembly may be used as protection of all direct connections through which foreign material might enter the potable system in concentration which would constitute a nuisance or be aesthetically objectionable, such as air, steam, food, or other material which does not constitute a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



No. 007QT-S

36 Where is a Reduced Pressure Principle Backflow Preventer used?

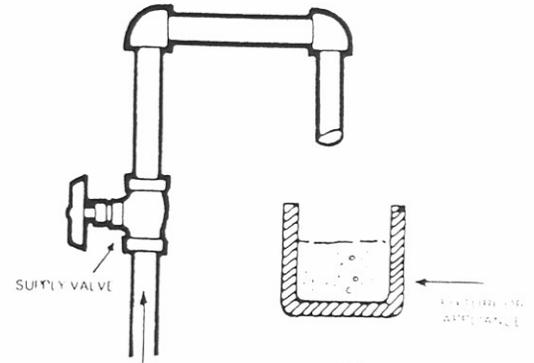
Reduced Pressure Zone Assemblies may be used on all direct connections which may be subject to backpressure or back-siphonage, and where there is the possibility of contamination by the material that does constitute a potential health hazard.



No. 909QT-S

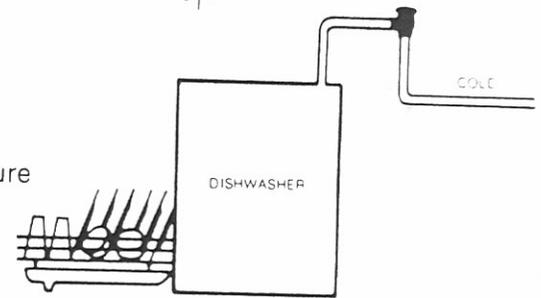
37 What are typical applications for an Air Gap?

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 application, but care should be taken that subsequent alterations are not made to the piping which would result in a direct connection.



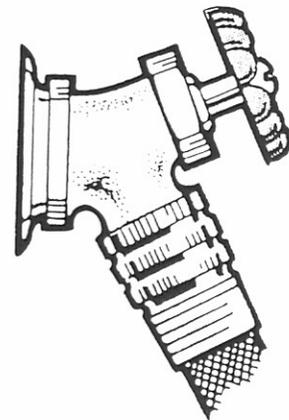
38 What are typical applications for Atmospheric Vacuum Breakers?

Atmospheric Vacuum Breakers can be used on most inlet type water connections which are not subject to back-pressure 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.



39 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.

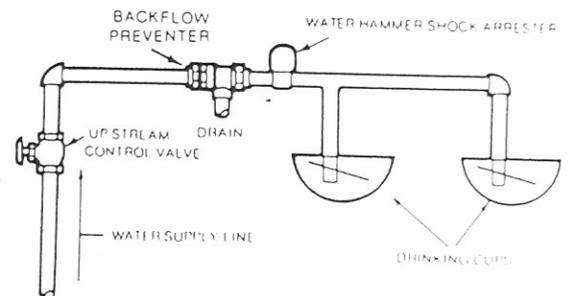


40 What are typical applications for Pressure Vacuum Breakers?

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 back-pressure.

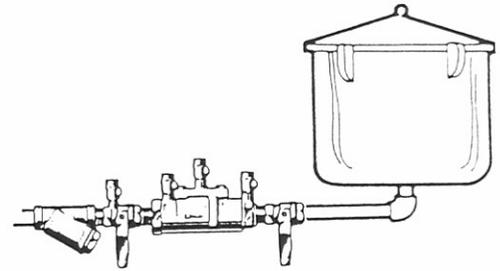
41 What are typical applications of Backflow Preventer with Intermediate Vent?

For 1/2" and 3/4" lines these devices are popularly used on 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 back-pressure and can be used under continuous pressure.



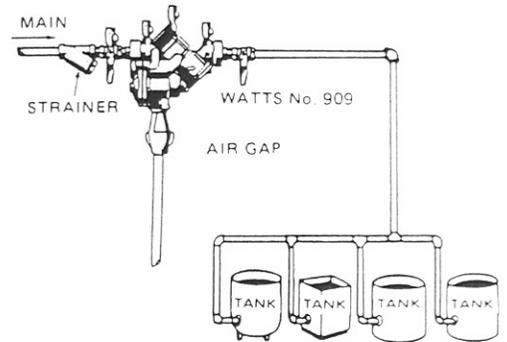
42 What are typical applications for Double Check Valve Assemblies?

Briefly, Double Check Valve Assemblies may be used where the degree of hazard is low, 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.



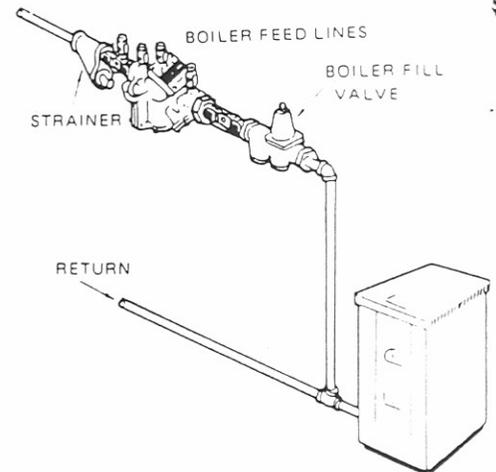
43 What are typical applications for Reduced Pressure Principle Backflow Preventers?

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.



44 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 Std. Building Code, Uniform Plumbing Code and City, State and Federal Regulations.



45 What Standards are available governing the manufacture of backflow prevention devices?

Table on Page 12 provides a summary of the various standards available relating to specific types of backflow preventers.

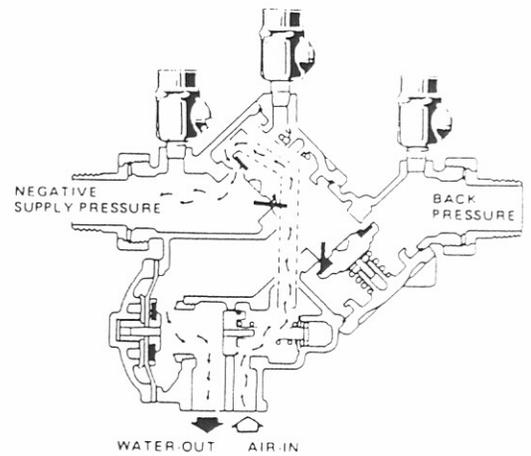
46 What is the benefit of a strainer preceding a backflow preventer?

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 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.



47 What would cause a reduced pressure principle 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.

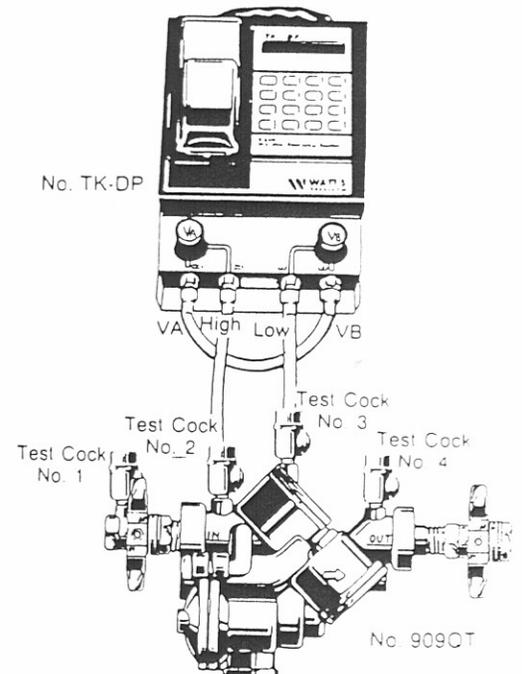


48 Is periodic testing required for reduced pressure principle backflow preventers?

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.

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

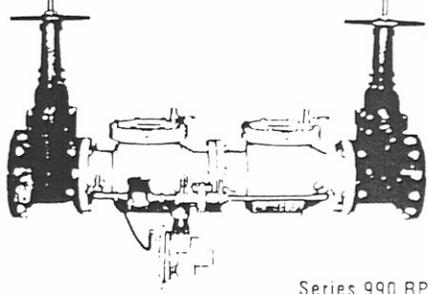
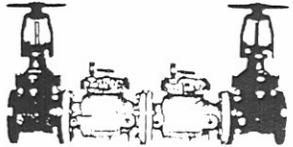
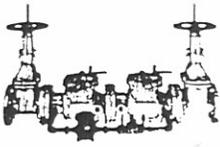
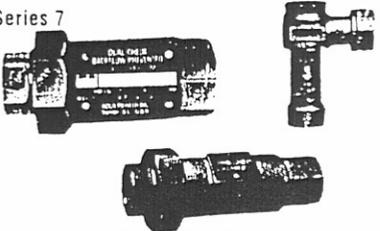
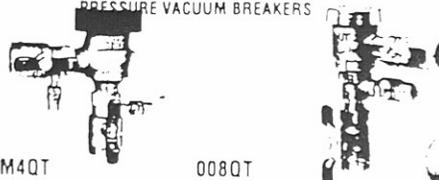
Because of the growing number of serious residential backflow cases, many water purveyors are now requiring the installation of approved dual check valve backflow preventers at residential water meters. They are also educating the public concerning cross connections and the danger of backflow into the 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.



50 What is a cross connection control program?

This is a combined cooperative effort between plumbing and health officials, water works 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.



APPLICABLE STANDARDS	USC Approvals*		AVAILABLE PRODUCT SIZES	PAGE NO.	
	Series	Size (Inches)			
ASSE Std 1013, AWWA C511-92, IAPMO PS31, CSA B64.4	009	1/2 - 3"	1/2 - 3	8	<p>REDUCED PRESSURE DETECTOR ASSEMBLIES, REDUCED PRESSURE ZONE BACKFLOW PREVENTERS</p>  <p>Series 990 RPDA</p>
ASSE Std 1013, AWWA C511-92, CSA B64.4, IAPMO PS31	909	3/4 - 10"	3/4 - 10	6, 7	
ASSE Std 1047, CSA B64.4	909RPDA	3 - 10"	3 - 10	11	
ASSE Std 1013, AWWA C511-92, IAPMO PS 31	990	4 & 8"	4 - 8	9	
ASSE Std 1047, CSA B64.4	990RPDA	4 & 8"	4 - 8	10	
ASSE Std 1013, AWWA C511-92, CSA B64.4	992	4 & 10"	4 - 10	†	
ASSE Std 1015, AWWA C510-92, CSA B64.5, APMO PS31	007	1/2 - 3"	1/2 - 3	12	<p>DOUBLE CHECK VALVE ASSEMBLIES</p>  <p>Series 770</p>
ASSE Std 1015, AWWA C510-92, CSA B64.5	709	2-1/2 - 10"	2-1/2 - 10	13	
ASSE Std 1015, AWWA C510-92, CSA B64.5	770	4 & 8"	4 - 8	14	
ASSE Std 1015, AWWA C510-92, CSA B64.5	772	4 & 10"	4 - 10	††	
ANSI/ASSE Std. 1048, CSA B64.5	007DCDA	2 1/2 - 3	2 1/2 - 3	12	<p>DOUBLE CHECK DETECTOR ASSEMBLIES</p>  <p>Series 770DCDA</p>
ANSI/ASSE Std 1048, CSA B64.5	709DCDA	3 - 10"	3 - 10	16	
ANSI/ASSE Std 1048, CSA B64.5	770DCDA	4 & 8"	4 - 8	15	
ANSI/ASSE Std. 1048, CSA B64.6	772DCDA	4 & 10"	4 - 10	†††	
ANSI/ASSE Std. 1024, CSA B64.6	7	—	1/2 - 1-1/4	18, 19	<p>DUAL CHECK VALVE BACKFLOW PREVENTERS</p> <p>Series 7</p> 
ANSI/ASSE Std 1024, CSA B64.6	7B	—	3/4	18	
ANSI/ASSE Std 1024, CSA B64.6	A7	—	5/8, 3/4	18	
ANSI/ASSE Std 1024, CSA B64.6	07S	—	1	19	
ASSE Std 1024, CSA B64.6	7C	—	3/8	20	
ANSI/ASSE Std 1012, CSA B64.8	9DM3/M2, 911	—	1/2 - 3/4	17	
CSA Std B64.8	9B0	—	3/8" FCT 1/4, 3/8 NPTM	21	
ASSE Std 1035, CSA B64.8	NLF9	—	3/8	20	
ASSE Std. 1035, CSA B64.8	N9	—	1/4, 3/8	20	
ANSI/ASSE Std 1001, CSA B64.1.1	288A	3/4 - 3"	1/4 - 3	25	<p>ATMOSPHERIC BREAKERS</p>  <p>Series 288A</p>
ANSI/ASSE Std 1001, CSA B64.1.1	N388	—	1/4 - 3/8	25	
ANSI/ASSE Std 1001, CSA B64.1	188A	—	3/4 - 2	25	
ANSI/ASSE 1020, CSA B64.1.2	800MQT	1/2, 3/4"	1/2, 3/4	22	<p>PRESSURE VACUUM BREAKERS</p>  <p>800M4QT 008QT</p>
ANSI/ASSE 1020, CSA B64.1.2	800M4QT	1/2 - 2"	1/2 - 2"	22, 23	
ASSE 1056	008QT	—	3/8 & 1/2	24	
ASSE Std 1011, CSA B64.2	S8C, 8, NFB	—	3/8, 1/2, 3/4 HT	26, 27	
ASSE Std 1019 CSA B64.3	FHB-1	—	1/2	27	<p>HOSE CONNECTION VACUUM BREAKERS</p>  <p>Series 8</p>

*For latest approval status, refer to Engineering Specification Sheets for approved sizes and product numbers. †See ES-992, †† See ES-772 †††. See ES-772DCDA