
# CROSS CONNECTION AND

# BACKFLOW PREVENTION CONTROL PROGRAM

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# TOWN OF LEESBURG
# CROSS CONNECTION AND
# BACKFLOW PREVENTION CONTROL PROGRAM

## I. Purpose and applicability

1. *Purpose*. The purpose of this program, adopted by ordinance, is to abate or control actual or potential cross connections and protect the public health. The ordinance provides for establishment and enforcement of a cross connection control and backflow prevention program in accordance with the Commonwealth of Virginia, State Board of Health, *Waterworks Regulations 1995*, or as amended. **THIS PROGRAM IS DIRECTED AT SERVICE LINE PROTECTION (CONTAINMENT).**

2. *Applicability*. The provisions of this program will apply to all premises connected to Town's water system.

## II. Definitions

*Air Gap* — means the unobstructed vertical distance through the free atmosphere between the lowest point of the potable water outlet and the rim of the receiving vessel.

*ASSE* – means the American Society of Sanitary Engineering.

*Atmospheric Vacuum Breaker (AVB)* – means a backflow prevention device consisting of a float check, a check seat, and an air inlet port. The device is designed to allow atmospheric pressure to enter the air–inlet port thus breaking the vacuum and preventing backsiphonage. The device must be installed at least six inches above the highest outlet and may never be subjected to a back pressure condition or have a downstream shutoff valve, or be installed where it will be subject to continuous pressure for more than 12 hours.

*Auxiliary Water System* — means any water system on or available to the premises other than the waterworks. These auxiliary waters may include 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 an unapproved water source or system over which the water purveyor does not have control.

*Backflow* — means the unintended reversal of flow of water or other liquids, mixtures, or substances into a waterworks from any source or sources other than its intended source.

*Backflow Prevention by Separation ("Separation")* — means preventing backflow by either an air gap or by physical disconnection of a waterworks by the removal or absence of pipes, fittings, or fixtures that connect a waterworks directly or indirectly to a non-potable system or one of questionable quality.

*Backflow Prevention Device ("Device")* — means any approved device intended to prevent backflow into a waterworks.

*Backpressure Backflow* — means backflow caused by pressure in the downstream piping which is superior to the supply pressure at the point of consideration.

*Backsiphonage Backflow* — means backflow caused by a reduction in pressure which causes a partial vacuum creating a siphon effect.

*Consumer* — means person who drinks water from a waterworks.

*Containment* — means the prevention of backflow into a waterworks from a customer's water supply system by a backflow prevention device or by backflow prevention by separation in the service connection.

*Contaminant* — means any objectionable or hazardous physical, chemical, biological, or radiological substance or matter in water.

*Cross Connection* — means any connection or structural arrangement, direct or indirect, to the waterworks whereby backflow can occur.

*Customer* – Customer means the consumer, owner, tenant, or person responsible for water purchased from the waterworks owner at any premise with a connection to the Town's water system.

*Customer's Water Supply System ("Customer's System")* — means the water service pipe, water distributing pipes, and necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to the building or premises.

*Degree of Hazard* — means either a high or low hazard based on the nature of the contaminant; the potential health hazard; the probability of the backflow occurrence; the method of backflow either by backpressure or by backsiphonage; and the potential effect on waterworks structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water.

*Director* — means the Town of Leesburg Department of Utilities Director, or his/her authorized designee

*Distribution Main* — means a water main whose primary purpose is to provide treated water to service connections.

*Division* — means the Commonwealth of Virginia, Virginia Department of Health, Office of Water Programs, Division of Water Supply Engineering.

*Domestic Use or Usage* — means normal family or household use, including drinking, laundering, bathing, cooking, heating, cleaning and flushing toilets.

*Double Check Valve Assembly* — means an approved assembly designed to prevent backsiphonage or backpressure backflow and used for low hazard situations, composed of two

independently operating, spring-loaded check valves, tightly closing shutoff valves located at each end of the assembly and fitted with properly located test cocks.

*Dual Check* -- Valve-type backflow preventer (Dual Check) - means a device used to prevent the reverse flow of liquids in a plumbing system from entering the drinking water supply where there is a non-health hazard. Designed for residential water system containment at the service connection and generally installed immediately downstream of the water meter.

*Entry Point* — means the place where water from the source is delivered to the distribution system.

*Health Hazard* — means any condition, device, or practice in a waterworks or its operation that creates, or may create, a danger to the health and well-being of the water consumer.

*Isolation* — means the prevention of backflow into a waterworks from a customer's water supply system by a backflow prevention device or by backflow prevention by separation at the sources of potential contamination in the customer's water supply system. This is also called point-of-use isolation. Isolation of an area or zone within a customer's water supply system confines the potential source of contamination to a specific area or zone. This is called area or zone isolation.

*Maximum Contaminant Level* — means the maximum permissible level of a contaminant in water which is delivered to the free flowing outlet of the ultimate user of a waterworks, except in the cases of turbidity and VOC's, where the maximum permissible level is measured at each entry point to the distribution system. Contaminants added to the water under circumstances controlled by the user, except those resulting from corrosion of piping and plumbing caused by water quality, are excluded from this definition. Maximum contaminant levels may be either "primary" (PMCL) meaning based on health considerations or "secondary" (SMCL) meaning based on aesthetic considerations.

*Plumbing Fixture* — means a receptacle or device which is either permanently or temporarily connected to the water distribution system of the premises, and demands a supply of water there from; or discharges used water, waste materials, or sewage either directly or indirectly to the drainage system of the premises; or requires both a water supply connection and a discharge to the drainage system of the premises.

*Pollution* — means the presence of any foreign substance (chemical, physical, radiological, or biological) in water that tends to degrade its quality so as to constitute an unnecessary risk or impair the usefulness of the water.

*Pollution Hazard* — means a condition through which an aesthetically objectionable or degrading material may enter the waterworks or a customer's water system.

*Premises* — means a piece of real estate; house or building and its land.

*Pressure Vacuum Breaker (PVB)* — means an approved assembly designed to prevent backsiphonage backflow and used for high or low hazard situations, composed of one or two

independently operating, spring-loaded check valves; an independently operating, spring-loaded air-inlet valve; tightly closing shutoff valves located at each end of the assembly; and fitted with properly located tests cocks.

*Process Fluids* — means any kind of fluid or solution which may be chemically, biologically, or otherwise contaminated or polluted which would constitute a health, pollution, or system hazard if introduced into the waterworks. This includes, but is not limited to:

1. Polluted or contaminated water,
2. Process waters,
3. Used water, originating from the waterworks 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, and
7. Oils, gases, acids, alkalis, and other liquids and gaseous fluid used in industrial or other processes, or for firefighting purposes.

*Pure Water or Potable Water* — means water fit for human consumption and domestic use which is sanitary and normally free of minerals, organic substances, and toxic agents in excess of reasonable amounts for domestic usage in the area served and normally adequate in quantity and quality for the minimum health requirements of the persons served.

*Reduced Pressure Principle Backflow Prevention Device (RPZ) device)* — means an approved assembly designed to prevent backsiphonage or backpressure backflow used for high or low hazard situations, composed of a minimum of two independently operating, spring-loaded check valves together with an independent, hydraulically operating pressure differential relief valve located between the two check valves. During normal flow and at the cessation of normal flow, the pressure between these two checks **will** be less than the supply pressure. The unit must include tightly closing shutoff valves located at each end of the assembly and be fitted with properly located test cocks.

*Seasonal Public Swimming Pool* – means any pool used for public recreation and open to the general public, with or without a fee, which is open only during the summer months, generally Memorial Day thru Labor Day.

*Service Connection* — means the point of delivery of water to a customer's building service line as follows:

1. If a meter is installed, the service connection is the downstream side of the meter;
2. If a meter is not installed, the service connection is the point of connection to the waterworks;
3. When the water purveyor is also the building owner, the service connection is the entry point to the building.

*System Hazard* — means a condition posing a threat of or actually causing damage to the physical properties of the waterworks or a customer's water supply system.

*Town Manager* — means the Town Manager, or his authorized designee.

*Used Water* — means water supplied from the waterworks to a customer's water supply system after it has passed through the service connection.

*Water Supply* — means the water that will have been taken into a waterworks from all wells, streams, springs, lakes, and other bodies of surface water (natural or impounded), and the tributaries thereto, and all impounded groundwater, but the term "water supply" will not include any waters above the point of intake of such waterworks.

*Waterworks* — means a system that serves piped water for drinking or domestic use to (1) the public, (2) at least 15 connections, or (3) an average of 25 individuals for at least 60 days out of the year. The term "waterworks" will include all structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water except the piping and fixtures inside the building where such water is delivered (see Title 32.1, Article 2, *Code of Virginia,* 1950, as amended).

*Waterworks Owner* — means an individual, group of individuals, partnership, firm, association, institution, corporation, government entity, or the Federal Government which supplies or proposed to supply water to any person within this State from or by means of any waterworks (see Title 32.1, Article 2, *Code of Virginia*, 1950, as amended).

**III. Objectives**

The objectives of this program are to:

1. Protect the public health, safety, and welfare through a cross-connection control and backflow prevention program intended to prevent the potential or actual occurrence where a backflow, backpressure condition, or cross connection within piping or other portions of customers' potable water systems could allow the entry of contaminants or pollutants into the public water system;
2. Eliminate or control existing cross-connections, actual or potential, at each water outlet from the customer's service line;
3. Provide a continuing inspection program of cross-connection control which will systematically and effectively control all actual or potential cross-connections which may be installed in the future;
4. Provide standards on the proper types and usage of cross connection hazard backflow prevention devises; and
5. Comply with all applicable regulations of the Commonwealth of Virginia pertaining to cross connection and backflow prevention.

**IV. Responsibilities of the Department of Utilities (Town), and Director**

1. The Program will be carried out in accordance with the Commonwealth of Virginia, State Board of Health, *Waterworks Regulations* and will as a minimum provide containment of potential contaminants at the customer's service connection.

2. The Town has full responsibility for water quality and for the construction, maintenance and operation of the waterworks beginning at the water source and ending at the service connection.
3. The Director will assess each high hazard facility on an annual basis with low hazard connections re-assessed every 3 – 5 years or as use may change.
4. In the event of the backflow of pollution or contamination into the waterworks, the Director will promptly take or cause corrective action to confine and eliminate the pollution or contamination. The Director will report to the appropriate Commonwealth of Virginia, Department of Health, Office of Water Programs Field Office in the most expeditious manner (usually by telephone) when backflow occurs and will submit a written report by the 10th day of the month following the month during which backflow occurred addressing the incident, its causes, effects, and preventative or control measures required or taken.
5. The Director will take positive action to ensure that the waterworks is adequately protected from cross connections and backflow at all times. If a cross connection exists or backflow occurs into a customer's water supply system or into the waterworks or if the customer's water supply system causes the pressure in the waterworks to be lowered below 10 psi gauge, the Director may discontinue the water service to the customer and water service will not be restored until the deficiencies have been corrected or eliminated to the satisfaction of the Director.
6. In order to protect the occupants of a premises, the Director or his/her designee should inform the customers of any cross connection beyond the service connection that should be abated or controlled by application of an appropriate backflow prevention device or separation. Appropriate backflow prevention device or separation should be applied at each point-of-use and/or applied to the customer's water supply system, isolating an area which may be a health or pollutional hazard to the customer's water supply system or to the waterworks.
7. Records of backflow prevention devices, separations, and customer's water supply systems, including inspection records, records of backflow incidents, and records of device tests will be maintained by the Director for ten years.
8. At a minimum, all new service connections will be protected with an approved backflow device consisting of a double check valve or dual check valve. (ASSE #1024).
9. Any existing residences without a dual check (ASSE #1024) will be fitted with a dual check when a service call is made to the property and found to not have the protection.

**V. Responsibilities of the Customer**

1. The customer, at their own expense, will install, operate, test, and maintain required backflow prevention devices or backflow prevention by separation. It is the duty of the owner of the backflow prevention assembly to see that testing is completed in a timely manner in accordance with the frequency of field testing specified in this ordinance. The customer may be required to notify the Town in advance when the tests are to be undertaken so that the Director may witness the tests if so desired. The customer must provide copies of test results, maintenance records and overhaul records to the Director within 30 days of the date of the annual test letter. Such testing or work will have been performed by a certified tester which has obtained a certificate of completion of a course

recognized by the Town of Leesburg, American Water Works Association, the Virginia Department of Health or the Virginia Cross Connection Control Association for cross connection control and backflow prevention inspection, maintenance and testing or otherwise be certified by a Commonwealth of Virginia tradesman certification program.

2. The customer has the responsibility of preventing pollutants or contaminants from entering the customer's water system or entering the waterworks. The customer's responsibility starts at the point-of-delivery and includes all piping, plumbing and related appurtenances downstream of the meter.
3. In the event of pollution or contamination of the waterworks or a residential water system due to backflow, the customer's will promptly take steps to confine further spread of the pollution or contamination and will promptly notify the Town of the condition.
4. No customer will install or maintain a water service connection to any premises where cross connections to the town's water system or a customer's water system may exist, unless such cross connections are abated or controlled to the satisfaction of the town.
5. No customer's swill install or maintain any connection whereby water from an auxiliary water system may enter the town's or customer's water system, unless the auxiliary water system and the method of connection and use of such systems will have been approved by the town.
6. The owner of the premises served has responsibility for water quality and for the construction, maintenance, and operation of the customer's water supply system from the water meter crock assembly to all free flowing outlets.
7. All water meter assemblies purchased from the Town up to 2" are provided with dual check valves meeting ASSE #1024. Meters larger than 2" must, at minimum, have a double check valve assembly (ASSE #1015) installed within the premises.

**VI. Responsibilities of the Certified Tester**

1. Certified testers must have a current certification to perform such responsibilities such as certificate of completion of a course recognized by the Town of Leesburg, American Water Works Association, the Virginia Department of Health or the Virginia Cross Connection Control Association for cross connection control and backflow prevention inspection, maintenance and testing or otherwise be certified by a Commonwealth of Virginia tradesman certification program. A copy of the certificate for all testers must be provided to the Town.
2. The tester has the responsibility of filling out the Town of Leesburg Backflow Prevention Device Testing, Maintenance and Inspection Report completely and returning to homeowner or Town.
3. All testers must, upon request, meet with the Director for the purpose of maintaining compliance with this ordinance, observation of testing or repairs, and verification or clarification of test results.
4. All testers will use test kits that are certified annually. Copies of certifications and calibrations will be sent to the Town annually.
5. A failed backflow prevention assembly requires a repair or replacement and retest of the assembly. Failed reports are submitted to the Town of Leesburg. A failed backflow prevention assembly is considered a violation of the Virginia Waterworks Regulations and Virginia Plumbing Code. All repairs and replacements must be completed within 15 business days.

**VII. Requirements**

1. Each high hazard facility will be accessed at least annually, and low hazard facilities every three to five years, for cross connection hazards. Assessment may be performed by inspections, interviews, or by responding to mailed letter and testing report.
2. Each customer will be notified in writing as to any testing requirements 30 days prior to their annual due date.
3. Each residential irrigation system customer will be notified in writing of the testing requirement and submission of backflow test results will be due to the Town annually on or before June 1.
4. If an irrigation system customer chooses to no longer use the system one of the following requirements must be met:

   1. The customer must have the backflow prevention assembly connected, inspected and tested prior to–the June 1st deadline for residential, or annual test date for commercial facilities.

   2. The customer will permanently cut and cap the water line and contact the Town for inspection by the Town's Environmental Compliance Inspector. The customer must sign a Memorandum of Understanding (MOU) stating that if the lawn irrigation system is returned to service the customer must notify the Town and test the backflow prevention assembly immediately or risk a non-compliance penalty.
5. Each seasonal public swimming pool will be notified in writing of the testing requirement 30 days prior to the annual test date. Submission of backflow test results must be received by the Town annually on or before June 1.

   (1) Annual inspections of seasonal public swimming facilities will be inspected within the first two weeks of being open to the public. If the backflow test results are not received by June 1, or if there is a violation of any provision of this ordinance, a letter of non-compliance will be sent to the management address or HOA office or both, stating the nature of the violation or device testing required, corrective actions required and providing a reasonable time limit, not to exceed 15 days from the date of the notice of non-compliance to bring the customer's water supply system into compliance with this program.

6. Customers requesting a new service connection or reconnection to the waterworks must be assessed by on-site interview and inspection for cross connection hazards and the appropriate separation installed, inspected, and operational prior to making the service connection.
7. The town manager and duly authorized employees of the town bearing proper credentials and identification will be permitted to enter upon all properties for the purpose of inspection, observation, sampling and testing.
8. Prior to obtaining Utilities Department sign off for sanitation portion of occupancy permit, all final Loudoun County inspector sign offs for Building, Plumbing Mechanical, and/or Gas must be obtained. All Town inspections of water and sanitary sewer connections must be completed and approved. The customer is responsible for having all testable devices tested by a certified tester and for providing documentation to the Department of Utilities prior to sign off.

**VIII. Program Enforcement**

1. The Director will have the right of entry into any building, during reasonable hours, for the purpose of making inspections of the water distribution system installed in such building or premise. Upon request, the customer or owner of the premises served will furnish to the Director or his/her designee pertinent information regarding the customer's water supply or systems on such premises for the purpose of assessing the customer's water supply system for cross connection hazards and determining the degree of hazard, if any. The refusal of such information, when requested, will be deemed evidence of the presence of a high degree of hazard cross connection.
2. Letter of Non-Compliance: Prior to the issuance of any civil penalty and summons, a customer found to be in violation of any provision of this program will be served a written letter of non-compliance sent to the service address, stating the nature of the violation, corrective action required and providing a reasonable time limit, not to exceed 30 days, from the date of the notice of non-compliance, to bring the customer's water supply system into compliance with this program.
    (1) In the event, the customer fails to comply with the terms of the letter of non-compliance, the Town Attorney will serve a written notice and order sent certified mail to the last known post office address, stating the nature of the violation, corrective action required within 14 days to bring the facility into compliance with this program
    (2) In addition, the Director may cause water service to the premises to be terminated. When an issue constitutes an imminent and substantive endangerment to public health, the Director will terminate water service. The cost of disconnection and reconnection will be paid by the customer prior to restoration of water service to the premises.
3. Civil Penalties; In addition to disconnection of water service as set forth above and not in lieu thereof, any violation will subject the violator to a civil penalty of not more than $100.00 for the initial summons, not more than $150.00 for each additional summons, and not more than a total amount of $3,000.00 for a series of specified violations arising from the same operative set of facts, as follows:
    i. The town may issue a civil summons ticket for a scheduled violation. Any persons summoned or issued a ticket for a violation may make an appearance in person or in writing by mail to the town's director of finance and administrative services prior to the date fixed for trial in court. Any person so appearing may enter a waiver of trial, admit liability and pay the civil penalty established for the violation.

    ii. If a person charged with a violation does not elect to enter a waiver of trial and admit liability, the violation will be tried in the general district court in the same manner and with the same right of appeal as provided for by law. In any such trial, the town will have the burden of proving by a preponderance of the evidence the liability of the alleged violator.

    iii. An admission of liability or finding of liability under this section will not be deemed an admission at a criminal proceeding, and no civil action

authorized by this section will proceed while a criminal action is pending.

iv. Any civil penalties imposed pursuant to this subsection will be applied to the purpose of abating, preventing or mitigating contamination.

4. Inspections Fees- As required by the Commonwealth of Virginia/State Board of Health, Waterworks Regulations, the town will conduct annual cross connection/backflow prevention inspections of non-single family residential plumbing systems connected to the town's water distribution system. The charge for each inspection per connection, premises or account will be:

| | | |
|---|---|---|
| 5/8" | Meter | $25.00 |
| 3/4" | Meter | $32.50 |
| 1" | Meter | $47.50 |
| 1 ½" | Meter | $75.00 |
| 2" | Meter | $120.00 |
| 3" | Meter | $225.00 |
| 4" | Meter | $375.00 |
| 6" | Meter | $750.00 |

**IX. Maintenance and Inspection Requirements**

1. It will be the responsibility of the customer to maintain all backflow prevention devices or separations installed in good working order and to make no piping or other arrangements for the purpose of bypassing or defeating backflow prevention devices or separations.
2. Operational testing and inspection schedule of all devices is hereby established and will be inspected and tested immediately upon installation, upon repair or relocation and at least annually. More frequent testing and/or inspection may be required at the discretion of the Director.
3. Backflow prevention device overhaul procedures and replacement parts will be in accordance with the manufacturer's recommendations.
4. Backflow prevention device testing procedures will be in accordance with the ASSE Standards, Foundation for Cross-Connection Control and Hydraulic Research, Backflow Prevention Assembly Field Test Procedure, and the manufacturer's instructions.

**X. Records**

1. An up-to-date database of all cross connection control devices (including pressure sensing devices) or separations (including separations from auxiliary or non potable water systems and air gaps) installed will be maintained by the Town. The database at a minimum will contain:
    A. Location of backflow prevention device (address)
    B. Manufacturer of device
    C. Device model number
    D. Device serial number

E. Device size
F. ASSE number
G. Device testing frequency
H. Last date tested

2. Test results will be maintained by the Town for ten years.

**XI. Location of Protection**

1. Service Line Protection - Backflow prevention device or separation will must be installed at the service connection to a customer's water supply system where, in the judgment of the Director a health or pollutional hazard to the customer's water supply system or to the waterworks exists or may exist unless such hazards are abated or controlled to the satisfaction of the Director.
2. Special Conditions for Service Line Containment - When the backflow prevention device or separation cannot be installed at the service connection, the device or separation may be located downstream of the service connection but prior to any unprotected connections.
3. Point-of-Use Isolation Protection - Where all actual or potential cross connections can be easily correctable at each point-of-use and where the customer's water supply system is not intricate or complex, point-of-use isolation protection by application of an appropriate backflow prevention device or backflow prevention by separation may be used at each point-of-use in lieu of installing a containment device at the service connection.
4. A backflow prevention device or backflow prevention by separation will be installed at each service connection to a customer's water supply system serving premises where the following conditions exist:
   (1) Premises on which any substance is handled in such a manner as to create an actual or potential hazard to a waterworks (this will include premises having auxiliary water systems or having sources or systems containing process fluids or waters originating from a waterworks which are no longer under the control of the waterworks owner).
   (2) Premises having internal cross connection that, in the judgment of the Director may not be easily correctable or intricate plumbing arrangements which make it impracticable to determine whether or not cross connections exist.
   (3) Premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make an evaluation of all cross connection hazards.
   (4) Premises having a repeated history of cross connections being established or reestablished.
   (5) Other premises specified by the Director where cause can be shown that a potential cross connection hazard not enumerated above exists.

**XII. Preventive and Control Measures**

1. Premises having booster pumps or fire pumps connected to the waterworks will have the pumps equipped with a pressure sensing device to shut off or regulate the flow from the booster pump when the pressure in the waterworks drops to a minimum of 10 psi gauge at the service connection.

2. The following facilities will install a reduced pressure zone (RPZ) device as an approved backflow prevention device at the service connection:
    - Hospitals, out-patient surgical facilities, renal dialysis facilities, funeral homes, mortuaries, clinics, veterinary establishments, nursing homes, dental offices and medical buildings;
    - Laboratories;
    - Piers, docks, waterfront facilities;
    - Sewage treatment plants, sewage pumping stations, or storm water pumping stations;
    - Food and beverage processing plants;
    - Breweries, Distilleries, Bottling Plants
    - Chemical plants, dyeing plants and pharmaceutical plants;
    - Metal plating industries;
    - Petroleum or natural gas processing or storage plants;
    - Radioactive materials processing plants or nuclear reactors;
    - Car washes**;**
    - Laundries and Dry Cleaning;
    - Commercial sprinkler systems and irrigation systems with chemical treatment
    - Slaughter houses and poultry processing plants;
    - Farms where the water is used for other than household purposes;
    - Commercial greenhouses and nurseries;
    - Health clubs with swimming pools, therapeutic baths, hot tubs or saunas;
    - Paper and paper products plants and printing plants;
    - Pesticide or exterminating companies;
    - Schools or colleges with laboratory facilities;
    - High-rise buildings (4 or more stories);
    - Multi use commercial, office, or warehouse facilities;
    - Multiple commercial units served by a master meter;
    - Swimming pools without dedicated, hard piped and inspected fill spout with an air gap;
    - Others specified by the Director when reasonable cause can be shown for a potential backflow or cross connection hazard.

3. Where lawn sprinkler systems, irrigation systems or fire service systems are connected directly to the waterworks with a separate service connection, a backflow prevention device or backflow prevention by separation will be installed at the service connection or installed under Special Conditions.
4. Residences or businesses may maintain an auxiliary water source (groundwater well or spring for example) on the premises for heating or cooling, irrigation, watering etc. if a physical separation from the residential water system and the waterworks is provided and maintained at all times.
5. Upon installation, premises having a fire service system will be inspected and protection devices determined based on degree of hazard for each individual system in accordance with the Virginia Statewide Building Code (Plumbing).
6. Others specified by the Town where reasonable cause can be shown for a potential backflow or cross connection hazard.

**XIII. Type of Protection Required**

The type of protection required will depend on the degree of hazard which exists or may exist. The degree of hazard, either high or low, is based on the nature of the contaminant; the potential health hazard; the probability of the backflow occurrence; the method of backflow either by a backpressure or by backsiphonage; and the potential effect on waterworks structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water.

Table 1 below will be used as a guide to determine the degree of hazard for any situation.

**TABLE 1 - DETERMINATION OF DEGREE OF HAZARD**

Premises with the following conditions will be rated at the corresponding degree of hazard:

| Hazard Type | Conditions | Examples |
|---|---|---|
| High - The contaminant is toxic, poisonous, noxious or unhealthy. | ▪ In the event of backflow of the contaminant, a health hazard would exist.<br>▪ A high probability exists of a backflow occurrence either by backpressure or by backsiphonage.<br>▪ The contaminant would disrupt the service of piped water for drinking or domestic use. | Sewage, used water, non-potable water, auxiliary water systems and toxic or hazardous chemicals. |
| Low - The contaminant would only degrade the quality of the water aesthetically. | ▪ In the event of backflow of the contaminant, a health hazard would not exist.<br>▪ A low probability exists of the occurrence of backflow.<br>▪ The contaminant would not disrupt service of piped water. | Food stuff, nontoxic chemicals and nonhazardous chemicals. |

The list below will be used as a guide to select the required backflow device:

- An air gap or physical disconnection gives the highest degree of protection and will be used whenever practical to do so in high hazard situations.
- An air gap, physical disconnection and a reduced pressure principle backflow prevention device will protect against backpressure when operating properly.
- Pressure vacuum breakers will not protect against backpressure, but will protect against backsiphonage when operating properly. Pressure vacuum breakers may be used in low or high hazard situations subject to backsiphonage only.
- A double check valve assembly will not be used in high hazard situations.
- Barometric loops are not acceptable.
- Interchangeable connections or change-over devices are not acceptable.

## XIV. Backflow Prevention Devices and Backflow Prevention by Separation for Containment

1. Backflow prevention devices for containment include the Reduced Pressure Principle backflow prevention assembly (RP) and Double Check valve assembly and must meet ASSE standards.
2. Backflow prevention by separation will be an air gap or physical disconnection. The minimum air gap will be 1 inch or two times the pipe diameter, whichever is greater.
3. Backflow prevention devices will be of the approved type, meeting ASSE standards, and will comply with the most recent Virginia Uniform Statewide Building Code and Virginia Waterworks Regulations and the Town of Leesburg Design and Construction Standards (DCSM).
4. Backflow prevention devices will be installed by a plumber licensed in the Commonwealth of Virginia, in a manner approved by the Director and in accordance with the Virginia Uniform Statewide Building Code and Virginia Waterworks Regulations, the Town of Leesburg Design and Construction Standards (DCSM), and the manufacturer's installation instructions. Vertical or horizontal positioning will be as approved by the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research.
5. For the purpose of application to Special Conditions, point-of-use isolation devices or separations will be as specified by the Director where reasonable assurance can be shown that the device or separation will protect the waterworks. At a minimum, point-of-use devices should bear an appropriate American Society of Sanitary Engineering Standard Number, and must meet all other requirements of this program. See the Cross Connection Control Program, Appendix A, for Isolation Device Application.
6. Backflow prevention devices with openings, outlets, or vents that are designed to operate or open during backflow prevention will not be installed in pits or areas subject to flooding.

## Appendix A

This Appendix Section was prepared to establish guidelines to assist plumbers, suppliers, cross connection control inspectors, plumbing officials, regulatory agencies, etc., in the selection of backflow prevention devices for typical potable water fixtures throughout the industry. This section should be utilized as a guide for selection of backflow devices.

The use of manufacturer's trade names in this manual is for reference as to type, quality, materials and workmanship and will not be considered as product endorsement by preparers of this manual.

All devices shown herein must meet ASSE standards.

**GUIDE TO THE ASSESSMENT OF**

| **HAZARD AND SELECTION OF BACKFLOW DEVICES** | **Internal Fixtures Requiring Backflow Protection** | **Approved Devices** |
|---|---|---|
| 1. | Coffee Urns | Dual check |
| 2. | Commercial dishwasher | Atmospheric vacuum breaker |
| 3. | Commercial garbage disposal | Atmospheric vacuum breaker |
| 4. | Hose bibs –<br>▪ Outside | Vacuum breaker that permits manual draining for freeze protection |
| | ▪ Inside –<br>Note: All set screws must be secured and broken off | Vacuum breaker |
| 5. | Sterilizers | Dual check |
| 6. | Water closet tank | Anti-siphon ball cock (1" above water level) |
| 7. | Residential lawn sprinkler | Reduced pressure principle backflow preventer or PVB |
| 8. | Commercial lawn sprinkler | Reduced pressure principle backflow preventer. |
| 9. | Commercial laundry | Reduced pressure principle backflow preventer. |
| 10. | Laundry trays or janitor's sink | Atmospheric vacuum breaker or hose connection vacuum breaker |
| 11. | Tank vats or other vessels containing toxic substances | Reduced pressure principle backflow preventer |
| 12. | Ice makers | Air gap, Dual check |
| 13. | Shampoo sink | Dual check |
| 14. | Soda fountain | Dual check |
| 15. | Film developing tank | Air gap, Reduced pressure principle backflow preventer. |
| 16. | Film processor | Reduced pressure principle backflow preventer |
| 17. | Swimming pools | Air gap, Reduced pressure |

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| | | principle backflow preventer |
| 18. | Yard hydrants | Contact Town |
| 19. | Autoclave | Dual check |
| 20. | Boiler feed lines | |
| | ▪ Toxic chemicals | Reduced pressure principle backflow preventer |
| | ▪ Nontoxic chemicals | Dual check with atmospheric vent |
| 21. | Air conditioning chill water | |
| | ▪ Toxic chemicals | Reduced pressure principle backflow preventer |
| | ▪ Nontoxic chemicals | Dual Check with atmospheric vent |
| 22. | Air conditioning condenser water | |
| | ▪ Toxic chemicals | Reduced pressure principle backflow preventer |
| | ▪ Nontoxic chemicals | Dual Check with atmospheric vent |
| 23. | Air conditioning cooling towers | Air gap with no attached threads |
| | ▪ Chemical addition | Reduced pressure principle backflow preventer |
| 24. | Dental cuspidor | Air gap |
| 25. | Flush valves | Vacuum breaker |
| 26. | Ornamental fountains | Dual check valve assembly |
| 27. | Soap dispenser | Air gap, Atmospheric vacuum breaker |
| 28. | Serrated faucet | AVB |
| 29. | Baptismal fountain | Air gap, or dual check |
| 30. | Autopsy & mortuary equipment | |
| 31. | Service line | Reduced pressure principle backflow preventer |
| 32. | All equipment to be individually protected | |
| 33. | Bidet | Atmospheric vacuum breaker |
| 34. | Bottle washer | Atmospheric vacuum breaker |
| 35. | Hydro-therapy baths | Atmospheric vacuum breaker |
| 36. | Pipette washer | Atmospheric vacuum breaker |
| 37. | Pump prime lines | Dual check with intermediate atmospheric vent |
| 38. | Car washes | |
| | ▪ Main feed line | Reduced pressure principle backflow preventer |
| | ▪ Internal equipment to be protected on individual basis | |
| 39. | Fire sprinkler systems with chemical addition | Contact Town |
| 40. | Fire sprinkler systems (nontoxic) | Contact Town |

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|---|---|---|
| 41. | Degreasing equipment | Backflow preventer with intermediate atmospheric vent |
| 42. | Heat exchanger used for domestic hot water | |
| | ▪ Double wall heat exchanger | |
| | ▪ Toxic chemicals | Reduced pressure principle backflow preventer |
| 43. | Sewer flushing equipment | Air gap or reduced pressure principle backflow preventer |
| 44. | Kitchen equipment | Equipment to be protected on individual basis |
| 45. | Commercial water softeners | Reduced pressure principle backflow preventer |
| 46. | Livestock water systems | Internal connections to be protected on individual basis |
| 47. | Dairy equipment | Internal connections to be protected on individual basis |
| 48. | Booster pumps | Low pressure cutoff switch |
| 49. | Laboratory sinks | Double check valve with intermediate vacuum breaker |
| 50. | Vending machines | Double check valve with intermediate vacuum breaker |
| 51 | Dry cleaning equipment | Reduced pressure backflow preventer |
| 52. | Laboratories | All water outlets to be individually protected |
| 53. | Water hauling trucks | Air gap or double check valve assembly |
| 54. | Bathtub with water fill below water level | Atmospheric vacuum breaker located between faucet and discharge, 6 inches above flood level and accessible |