

Backflow Prevention and Cross-Connection Program



City of Rutland, Vermont

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City of Rutland Backflow Prevention and Cross Connection Policy

The Rutland City Water Department in fulfilling its responsibility to the citizens of Rutland City and Rutland Town, recognizes the need to protect the public potable water supply from the possibility of contamination or pollution by isolating, within its customers internal distribution system, such contaminants or pollutants which could backflow or back-siphon into the public water system.

The Rutland City Water Department also recognizes its responsibility to promote the elimination or control of any existing cross connection control, actual or potential, between its customer's in-plant potable water systems, and non-potable systems.

Finally, the Water Department recognizes the importance of providing for the maintenance of a continuing program of cross connection control, which will work toward preventing the contamination or pollution of all water systems by cross connection. Therefore, the following shall be considered an Addendum to the City of Rutland Water Distribution System Regulations.

Regulations of Backflow Device Use

Purpose

These rules and regulations are designed to regulate, control and prevent the contamination of public drinking water by the backflow of other liquids, gases, or mixtures or other substances into the water distribution system from a source or sources other than its intended source.

Applicability

Rules regulating the installation and use of backflow devices, valves and other necessary components for the protection of the public water system owned by or physically connected to the Rutland City System and providing penalties for violations thereof.

Abbreviations

For the purpose of the Rules and Regulations, the following abbreviations shall have the meaning ascribed to them under this ARTICLE. References to standards of the following organizations shall refer to the latest edition of it.

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
GMWEA	Green Mountain Water Environment Association, Inc.
NPC	National Plumbing Code
NERWA	New England Rural Water Association
NEWWA	New England Water Works Association, section of AWWA
NFPA	National Fire Protection Association
UL	Underwriters Laboratory
USC	University of Southern California

Article 1

Authority

The city of Rutland Department of Public Works Commissioner shall have the authority to implement measures for the protection of the public water potable distribution system from contamination or pollution due to the backflow of contaminants or pollutants through water service connections.

If, in the judgment of the Commissioner an approved backflow prevention assembly is required at the consumer's water service connection; or, within the consumer's private water system for the safety of the water system, the Commissioner or his designated agent shall give notice to said consumer to install such an approved backflow prevention assembly(s) at a specific location(s) on his premise.

The consumer shall install such an approved backflow prevention assembly(s) at the consumer's own expense within the time schedule required by the notice; and, failure, refusal, or inability on the consumer to install, have tested and maintained said assembly(s) shall constitute grounds for disconnecting water service to the premises until such requirements have been satisfactorily met.

Water System

The water system shall be considered as made up of two (2) parts; The City owned system and the Consumer's system.

City Owned System

The City system shall consist of the supply facilities and distribution system; and shall include all those facilities of the water system under the complete control of the Water Department, up to the point where the consumer's system begins.

The supply shall include all components of the facilities utilized in the production, treatment, storage, and delivery to the consumer's system.

The distribution system shall include the network of pipes or conduits that are used for the delivery of water from the source to consumer's system.

Consumer's System

The consumer's system shall include those parts of the facilities beyond the termination of the City's distribution system, which are utilized in conveying potable water to points of use. For the purpose of this policy, the consumers system shall begin at the downstream side of the curb stop or gate valve and proceed and end at the upstream side of the water meter, then begin again on the downstream side of the water meter.

Policy

Inspections

The consumer system shall be open for inspection at all reasonable times to authorized representatives of the Department for the purposes of inspection, observation, measurement, sampling, testing and maintenance, and to determine whether there exist any unprotected cross-connections or other structural or sanitary hazards, or violations of the Regulations exists.

Service Disconnections

If a property owner, resident, or occupant denies the Commissioner or other duly authorized employees of the Department access after reasonable notice has been provided to the property owner, resident, or occupant, the Commissioner may direct disconnection on forty-eight (48) hours written notice to the owner, resident, or occupant. Once water service has been disconnected it will not be restored until access has been provided and the Department has been paid all applicable charges. If a potential for backflow is discovered, the Commissioner may deny or immediately discontinue service to the premises until the consumer has corrected the condition(s) in conformance with this policy and the Water Distribution Regulations of the City of Rutland.

The Department shall have authority to terminate water service to any facility where cross connections are found to be in non-compliance.

If necessary, water service shall be disconnected for failure to test or maintain backflow prevention devices in a manner acceptable to the Department.

If it is found that the backflow prevention device has been removed or bypassed or otherwise rendered ineffective, water service shall be discontinued unless corrections are made immediately.

Case and Conditions for Required Installations

Backflow devices shall be installed on a retrofit basis on existing service lines at a time deemed appropriate by the Department. An approved backflow prevention assembly shall be installed on each service line of a consumer's water service at or near the property line or immediately inside the building being served; but, in all cases, before the first branch line leading from the service line wherever the following conditions exist:

- A. Premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality and which is not acceptable as an additional source by the Commissioner.
- B. Premises on which any industrial fluids or any other objectionable substance is handled in such a fashion as to create actual or potential hazard to the public water system. This shall include the handling of process waters and waters originating from the municipal water system which have been subject to deterioration in municipal quality. This includes

manufacturing facilities, car washes, restaurants, buildings with boilers, fire sprinklers, and/or irrigation systems.

- C. Premises having (1) internal cross-connection that cannot be permanently corrected or protected against, or (2) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impractical or impossible to ascertain whether or not dangerous cross-connections exist.
- D. For all other buildings, residential dual check or other backflow device shall be installed on a retrofit basis on an existing service line at a time deemed appropriate by the Department.

The type of protective assembly required under subsections A, B, C, and D above shall depend upon the degree of hazard which exists as follows:

- A) In the case of any premises where there is an auxiliary water supply as stated in subsection (A) above of this section, the public water system shall be protected by an approved air gap or an approved reduced pressure principle backflow prevention assembly.
- B) In the case of any premises where there is a water or substance that would be objectionable but not hazardous to health if introduced into the public water system, the public water system shall be protected by an approved double check valve backflow prevention assembly.
- C) In the case of any premises where there is any material dangerous to health, which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an approved air gap or an approved reduced pressure principle backflow prevention assembly. Examples of premises where these conditions will exist include sewage treatment plants, sewage pumping stations, chemical manufacturing plants, hospitals, mortuaries, and plating plants.
- D) In the case if any premises where there are any unprotected cross-connections either actual or potential, the public water system shall be protected by an approved air gap or an approved reduced pressure principle backflow prevention assembly at the service connection.
- E) In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete in-plant cross-connection survey, the public water system shall be protected by an approved air gap or an approved reduced pressure principle backflow prevention assembly on each service to the premise.

The term “Approved Backflow Prevention Assembly” shall mean an assembly that is listed on the most recent version of the Approved Backflow Prevention Assemblies published by the University of Southern California(USC). The City has a copy of this list and will check for a device listing when requested.

All domestic backflow prevention devices shall be installed and repaired in accordance with local, state, and federal regulations, which may require persons performing repairs to hold a professional license and certification.

Testing

It shall be the duty of the property owner at any premise where reduced pressure backflow prevention assemblies are installed to have a field test performed by a certified backflow prevention assembly tester(as mentioned in Article 2) upon installation and at least once per year.

It shall be the duty of the property owner at any premise where pressure vacuum breakers are installed to have field tests performed by a certified backflow prevention assembly tester upon installation and at least once per year.

In those instances where the Commissioner deems the hazard to be great enough, the Commissioner may require field tests at more frequent intervals. These tests shall be at the expense of the water user and shall be performed by properly certified or licensed independent contractors.

These assemblies shall be repaired, overhauled, replaced, and retested at the expense of the property owner whenever said assemblies are found to be defective. Records of such tests, repairs, and overhauls shall be made available to the Department within fourteen (14) days of the completion of the test.

“Grandfathered” Assemblies

All presently installed backflow prevention assemblies which do not currently reside on the Approved Backflow Prevention Assemblies list and are not deemed testable but were approved devices for the purpose described herein at the time of installation and which have been properly maintained, shall be except for the testing and maintenance requirements stated within these rules. Backflow prevention assemblies shall be excluded from the requirements of these rules only so long as the Commissioner is assured that they will satisfactorily protect the municipal water system. Whenever the existing device is moved from the present location or requires more than the minimum maintenance or when the Commissioner finds that the disturbance of the device or continued use constitutes a hazard to health, the unit shall be replaced, at the expense of the owner, with an approved backflow prevention assembly meeting the requirements of this section.

Private Water Systems (Well, Reservoir, Etc.)

A private water system to which the customer has connected a water service line shall be disconnected before municipal water service begins so that water from the private system cannot feed back into the municipal system’s network. The Department reserves the right to inspect premises at any time for compliance with this section.

Pumps

The use of a pump at a customer’s premise which is connected in any way to the municipal water system is prohibited except upon prior written consent of the Department. In no instance shall any pump use be allowed to interfere with the quality of service to other customers and/or where the possibility of damage to piping of the respective system or other customers could occur. Any pump that is connected to the municipal water system, with permission from the Department, shall automatically require the installation of a backflow prevention device (type to be determined by the Commissioner or his/her designee).

Exemptions

The Department may grant exemptions in the following categories:

1. The exemption shall not result in an unreasonable risk to the public health.
2. The owner is unable to comply with the rule due to compelling factors, not including economic factors.

An exemption shall not alter the degree of hazard classification of the cross-connection. Each exemption shall also be conditioned on monitoring, testing, analyzing, or other requirements at the owner's expense to ensure the protection of public health and shall include a compliance schedule.

Existing Backflow Devices

Any existing backflow prevention device shall be allowed to continue in service unless:

1. The Commissioner considers the condition of any portion of the device to be such that replacement should be made; or
2. The degree of hazard has changed so as to supersede the effectiveness of the present backflow prevention device.

For backflow prevention devices existing prior to the start of this program, the Department shall perform evaluations and inspections of plans and/or premises and inform the owner of any corrective action deemed necessary, the method of achieving the corrections, and the time allowed for the correction to be made. Ordinarily, ninety (90) days will be allowed, however this time period may be shortened depending on the degree of hazard involved and the history of the device.

Any existing backflow prevention device shall be allowed to continue in service unless the degree of hazard is such to supersede the effectiveness of the backflow prevention device, or result in an unreasonable risk to the public health. Where the degree of hazard has increased, any existing backflow prevention device(s) must be upgraded to a reduced pressure principle device.

Article II

Department Duties

The Department shall have the following duties relative to cross-connections:

- to ensure that backflow prevention devices are installed where required, tested for proper functioning upon completion of installation, and to see that the devices are inspected and tested at least annually, or more frequently as may be required by the Commissioner, and to determine that the devices meet applicable performance standards
- to ensure that a certified backflow prevention device inspector performs all inspection duties
- to establish a time for completion of necessary corrections or removal of actual or potential cross-connections, taking into consideration the degree of hazard involved, and the time required to obtain and install the needed equipment. The Department shall use every means at their disposal to obtain voluntary cooperation.
- inform the owner of any failure to comply by the time of the first re-inspection. The Department will allow an additional fifteen (15) days for the correction. In the event the owner fails to comply with the necessary correction by the time of the second re-inspection, the Department will inform the owner by letter that the water service to the premises will be terminated within a period not to exceed five (5) days. In the event that the owner informs the Department of extenuating circumstances as to why the correction has not been made, a time extension may be granted by the Commissioner but not to exceed an additional thirty (30) days.
- If the Commissioner determines at any time that a serious threat to the public health exists, the water service will be terminated immediately
- Have on file a list of certified backflow device testers
- Shall review and approve plans for proposed new installations of backflow assemblies. The Department shall ensure, upon completion of installation that backflow prevention devices are installed properly according to the design data sheet and plans, and tested for proper operation.
- Shall maintain the following documentation:
 - A schedule of all facilities inspected and/or surveyed
 - Records of all device locations
 - Related correspondence, including notices of violations; and
 - List of devices and inspectors of approved backflow prevention devices for a period of two (2) years

Owners Duties

The owner of any backflow prevention device shall have the following duties relative to cross-connections:

- Eliminate and disconnect any cross-connections that are maintained between their private system and the City of Rutland Water distribution system, unless deemed necessary by the Department and protected by a backflow prevention device approved by the Commissioner for the degree of hazard associated with the cross-connection.
- Notify the Department of all cross-connections protected by a DCV, RPZ, or PVB and comply with all necessary approvals and permits from the Department for the maintenance of cross-connections, in compliance with the Rules and Regulations.
- Be responsible for complying with all building, plumbing, fire safety or other applicable codes, regulations or requirements.
- **Ensure the proper installation, operation and maintenance of an approved backflow prevention device and necessary thermal expansion provisions inside the building in a manner approved by the Department.** Perform all interior and exterior plumbing necessary to accommodate the required backflow devices.
- Shall at his/her expense, install, maintain, and have tested by certified backflow prevention device inspector, any and all backflow prevention devices on the premises, and shall correct any malfunction of the backflow device which is revealed by periodic inspection. The owner shall make certain that the device is tested as specified by these requirements or as required by the Commissioner.
- Comply with all provisions of the Department's cross-connection control program.
- Ensure the protection of the "in-plant" water supply system by the installation of other approved backflow prevention devices where necessary.
- Ensure the protection of the "in-plant" water supply system by the installation of other approved backflow prevention devices where necessary.
- Have suitable arrangements made so that inspections can be made during the regular business hours of the Department.
- Maintain a spare parts kit and any special tools required for the removal of, repair and re-assembly of the backflow prevention device. Such spare parts kits shall be in a location to be protected and easily accessible at the time of the backflow inspection.
- Overhaul, repair, or replace within fifteen (15) days of the initial Inspection and have retested by a certified backflow prevention tester, any device which is found to be defective.
- Notify the Department of any change in use that may require a change in the hazard classification for that facility. Notify the Department of all cross-connections protected by a RPZ, DCV, or PVB assembly.
- Shall not install any bypass around the backflow prevention device unless there is a backflow prevention device of the same type on the bypass. Owners who cannot shut

down operation for testing of the device(s) must supply additional devices necessary in parallel for the testing to take place.

Backflow Device Inspector Duties

Certified backflow device inspectors shall have the following duties relative to this cross-connection control program:

- Only contractors that are NEWWA, ABPA, or ASSE certified backflow prevention device inspectors shall be permitted to inspect and test backflow prevention devices within the City of Rutland or Town of Rutland water distribution systems.
- All backflow device inspectors within Rutland City or Town shall supply the Department with a copy of their backflow device inspector's certification each January, and notify the Department if that certification is ever revoked, suspended, or not renewed.
- Shall make competent inspections and reports on the tested backflow prevention device on forms approved by the Department.
- Competently use all of the equipment necessary to test and inspect backflow prevention devices. Have a backflow preventer test kit that is maintained in proper working order and calibrated annually.
- Perform the work and be responsible for the competency and the accuracy of all tests and reports.
- Submit a copy of the backflow prevention device test report to the Department within fourteen (14) calendar days of the completion of the test of each device to:

**Rutland City D.P.W.
Water Distribution
Meter Division
P.O. Box 969
Rutland, VT 05702-0969**

Backflow Device Surveyors Duties

- All certified cross-connection control surveyors shall supply the Department with a copy of his/her surveyor's certification each January and notify the Department if that certification is ever revoked, suspended, or not renewed.
- The cross-connection control surveyor shall make competent inspections and reports of the premises on forms approved by the Department.
- The surveyor shall submit a copy of the cross-connection survey to the Department within fourteen (14) calendar days of the completion of the survey of the premises. This shall be required whether the surveyor has conducted the survey for the Department or for the customer. Surveys shall be delivered to:

Rutland City D.P.W.

Water Distribution

Meter Division

P.O. Box 969

Rutland, VT 05702-0969

Department Documentation

The Department shall maintain a list of the following information pertaining to its backflow prevention inspection program:

- Certified backflow prevention device inspectors eligible to work within the Department owned or managed water distribution system.
- A list of cross-connection locations which shall include:
 - The owner of the location
 - Hazard Class: High or Low
 - Location of the backflow prevention device(s)
 - Type of device
 - Installation Date
 - Size
 - Name and model #
 - Description of contaminant
 - Testing frequency and results

High hazard locations are defined as those that would present a human health risk and/or a risk to the distribution system piping if there were a backflow event.

Enforcement

Section 1

Any violation of this program, except as set forth in Section 2 below, may be pursued as a civil violation utilizing the civil ordinance enforcement procedures set forth in 24 V.S.A Section 1974a. Each day a violation continues shall be considered a new violation

Offenses shall be counted on a calendar year basis.

Section 2

Any violation of this program may be pursued as a criminal violation utilizing the criminal ordinance enforcement procedure set forth in 24 V.S.A. Section 1974.

Any failure to test will result in a notification from DPW and a fine of \$250.00. If satisfactory evidence is provided of a test within thirty (30) days of above mentioned DPW notification, the fine will then be waived.

Article III

Acceptable Devices for Types of Hazard

Only the following types of backflow prevention devices shown below shall be used for the containment of on-premise hazards for low and high situations respectively:

Low Hazard:

1. Air-gap
2. Atmospheric vacuum breaker (where no bacteria hazards are present)
3. Pressure vacuum breaker
4. Double check valve
5. Reduced pressure backflow device
6. Or a combination of the above

High Hazard:

1. Air-gap
2. Reduced pressure backflow device
3. Or a combination of the above

Any domestic, commercial, institutional, and fire protection service line, including each line of a multiple service line, and multi-family buildings serving more than two (2) units shall be equipped with an approved backflow prevention device or an air-gap separation on each line. All other connections to the water main, including standpipes leading to elevated tanks, temporary ferrules, hose connections, and irrigation systems shall be equipped with approved backflow prevention devices.

An approved backflow prevention assembly shall be installed to any premise where multistoried (more than two stories) buildings such as a hotel, apartment building, offices, etc. are operated or maintained. An approved air-gap or RPZ shall be installed where there is a potential health, contamination, or system hazard. A DCV shall be installed where there is only a pollution hazard.

Fire Protection

Devices and valves installed on fire protection systems including dual check backflow prevention devices for residential fire sprinkler systems shall be listed by Vermont Labor and Industry or the USC list of Approved Backflow Prevention Assemblies, unless otherwise approved by the head of the local fire department.

All new or modified fire systems with or without a Siamese connection, shall have installed as a minimum, an approved DCV. Based upon the degree of hazard, an RPZ may be required. The DCV or RPZ shall be installed on the line leading into the fire system.

An RPZ is required on all new or modified fire sprinkler systems with or without a Siamese connection if chemicals are added to the fire sprinkler system. The RPZ shall be installed on the line leading to the fire system.

Irrigation Systems

An approved backflow prevention assembly shall be installed on each service to premises on which there is an irrigation system.

1. An approved air-gap or RPZ shall be installed where there is an actual or potential health hazard caused by the installation of facilities for injecting under pressure fertilizers, fungicides, pesticides, soil conditioners and other noxious or objectionable substances through the irrigation system.
2. An approved air-gap or DCV shall be installed where there is an actual or potential cross-connection, which may adversely or unreasonably affect the aesthetic qualities of the domestic water supply.
3. A dual check valve assembly shall be installed on the irrigation line at the location of the separate water meter for the irrigation line at the residential settings if there are none of the actual or potential hazards in #1 above.
4. Alternatively, a pressure vacuum breaker may be installed on the irrigation system according to the above requirements and manufacturers specifications if there are none of the actual or potential hazards listed in #1 above, and if the device is not subject to backpressure from pumps or elevated piping. The owner must protect the device from freezing and maintain the device as required.

Facilities and Equipment Requiring Backflow Prevention Assemblies

The following is a list of the types of facilities which are considered as possible cross connection hazards and require backflow devices. Backflow prevention devices listed below may not be appropriate in every case due to location specific hazards. The final determination of the acceptability of any backflow device is made by the Department:

<u>FACILITY</u>	<u>AG</u>	<u>RPZ</u>	<u>DCV</u>	<u>PVB</u>
A. Medical Facilities				
1. Hospitals	X	X		
2. Clinics	X	X		
3. Laboratories	X	X		
4. Veterinary Hospitals/Clinics	X	X		
5. Nursing and Convalescent Homes		X	X	
6. Physical Therapy Clinics		X	X	
7. Morgues		X	X	
8. Mortuaries	X	X		
9. Autopsy Facilities		X	X	
10. Embalmers	X	X		
11. Dental Offices	X	X		
12. Medical offices with radiographic, physical therapy and/or lab facilities	X	X		
B. Treatment Plants				
1. Sewerage	X	X		
2. Waste Water	X	X		
3. Industrial Waste		X	X	
4. Pumping Stations		X	X	
C. Commercial Manufacturing/Storage				
1. Automotive Plants	X	X		
2. Aircraft/Missile Plants		X	X	
3. Beverage Bottling Plants		X	X	
4. Breweries/Distilleries	X	X		
5. Chemical Plants		X	X	
6. Car Wash Facilities	X	X		
7. Dairies and Cold Storage Plants		X	X	X
8. Dye Works	X	X		
9. Irrigation Systems	X	X	X	X
10. Laundries	X	X	X	

11. Meat Packing Plants	X	X
12. Metal Manufacturing Plants	X	X
13. Paper/Paper Products Plants	X	X

<u>FACILITY</u>	<u>AG</u>	<u>RPZ</u>	<u>DCV</u>	<u>PVB</u>
14. Petroleum or Gas Processing Plants		X	X	
15. Photographic Film Processing Plants	X	X		
16. Plating Plants	X	X		
17. Power Plants	X	X		
18. Radioactive Handling Plants	X	X		
19. Rubber Plants	X	X		
20. Gravel, Concrete, Asphalt Plants		X	X	
21. Swimming Pools		X	X	X
22. Technical Schools, Colleges, Universities		X	X	X
23. Solar Energy/Heating Services		X	X	
24. Temporary Services using Hydrants		X	X	X
25. Waterfront Facilities	X	X		

D. Buildings

1. With Sewerage Ejectors		X	X	
2. With Water Booster Pump and/or Storage Tank	X	X		
3. Supermarkets	X	X	X	
4. Restaurants	X	X	X	
5. Schools, Research Facilities, any buildings with Laboratories		X	X	
6. Buildings with Fire Service		X	X	X
7. Warehouses used for Hazardous Material Storage		X	X	
8. Factories	X	X	X	
9. Shopping Malls		X	X	X
10. Multifamily	X	X	X	
11. Multistory	X	X	X	

E. Miscellaneous Equipment and Facilities

1. Domestic Water Booster Pumps		X	X	
2. Food and Drug Processing		X	X	X
3. Hydraulic Equipment	X	X		
4. Sinks with Hose Threads	X	X		X
5. Submerged Inlets		X	X	
6. Valve Outlets or Fixtures with Hose Attachments				

7. High and Low Pressure Boilers		X	X	
8. Reservoirs-Cooling Towers, Reticulating Systems		X	X	X
<u>FACILITY</u>		<u>AG</u>	<u>RPZ</u>	<u>DCV</u> <u>PVB</u>
9. Premises where Inspection is Prohibited	X	X		
10. Commercial Dishwashers	X	X	X	
11. Soap Injector	X	X		
12. Steam Generating Plant	X	X		
13. Tank Truck, Lawn Care, Sweeper	X	X	X	
14. Water Cooled Equipment	X	X		
15. Boilers		X		
16. Heat Exchangers with Added Chemicals		X		
17. Solar Heating Systems with Added Chemicals				X

Article IV

General Installation and Device Information

Approved backflow prevention devices shall be located so as to provide containment protection, and may be supplemented with the installation of in-plant protection backflow prevention devices.

Only backflow prevention devices approved by the Department shall be used.

All approved devices shall allow for accurate testing so as to allow verification of their performance.

In general, protection shall be provided by an air-gap or a Department approved RPZ or DCV with the manufacturer approved inlet and outlet control valves and four (4) test cocks as a complete unit, installed in a horizontal alignment, unless otherwise approved by the Department.

The Department reserves the right to prohibit the use of any backflow prevention devices if the Department determines that such devices are found, after subsequent review, to be defective or to have performed inadequately in the field.

No person shall remove or contract with another person for the removal of any required backflow prevention device without obtaining the approval of the Department for the removal of said device.

If an RPZ, DCV, or PVB cannot be removed from service for maintenance and testing, then a second device of the same type shall be installed in parallel so as to permit inspection and repair of either unit.

The assembly should be sized hydraulically, taking into account both the volume requirements of the service and the head loss of the assembly. Refer to manufacturers head loss curves.

Every backflow prevention device installed up to two (2") inches shall be installed with port ball type shutoff valves approved by the manufacturer.

A backflow prevention device shall not be installed in locations where the device is subject to corrosive fumes, grit, sticky, or abrasive liquids. The device shall be protected against mechanical abuse. All devices shall be installed so they are easily accessible for testing, repair, and inspection.

Each backflow prevention device installed in a building shall be located in a room or structure that is well lighted, properly drained, and not subject to flooding.

All assemblies shall be adequately supported and/or restrained to prevent lateral movement. Pipe hangers, braces, saddles, stanchions, piers, etc., shall be used to support the devices and should be placed in a manner that will not obstruct function or access to the relief valves.

Approved backflow prevention devices shall be located so that protection of all cross-connections is achieved with a minimum number of devices.

Pit Installations

Primarily due to consideration for access, safety, and gravity drainage, no devices shall be installed in pits except as specifically approved by the Department in cases of unique circumstances.

Where pit installations are approved, however, they shall be designed with the following standards:

1. Pits or vaults shall be watertight, flood free, and maintained free from standing water by means of either a sump pump or a suitable drain. Such a pump or drain shall not connect to a sanitary sewer, nor permit flooding of the pit or vault by reverse flow from its point of discharge.
2. Drainage capacity shall be sized to accommodate both the intermittent and catastrophic failure of the relief valve. All drainage from an RPZ must be through a gravity drain.
3. Sump pumps are not allowed unless they are sized to accommodate the maximum discharge rate and connected to emergency power supplies
4. The pit opening and manhole cover must be at least 36" in diameter.
5. The foothold inserts must be a maximum 12" apart, and must be installed so that the top foothold is within 12" of the manhole cover and the bottom foothold is within 12" of the bottom of the pit floor.
6. The pit floor shall be pitched to the drain.
7. If built in a roadway, the top of the pit must be adequately reinforced.
8. Pits must have crane access for installing and removing large assemblies, if required.
9. Pits must have adequate ground cover to prevent freezing.
10. Surface grading must divert runoff away from the entrance.

Vacuum Breakers

A hose bib vacuum breaker should be installed on all outlets having a hose thread connection. It is screwed directly to the sill cock. Freezing conditions require a draining feature.

An atmospheric vacuum breaker shall be located beyond the last control valve prior to the first outlet. All vacuum breakers shall be installed at an elevation at least six inches (6") above the highest outlet. All atmospheric vacuum breakers shall be installed so that they are not subject to backpressure or continuous operating pressure for more than twelve (12) hours duration. An AVB shall be installed in such a fashion that they will not be subject to corrosion that may render them inoperable.

Strainers

The department strongly recommends that all new and retrofit installations of reduced pressure principle devices and double check valve backflow prevention devices includes the installation of strainers located immediately upstream of the backflow device. Installation of backflow prevention devices after meters with existing strainers will preclude the fouling of backflow devices due to both foreseen and unforeseen circumstances occurring to the water supply system such as main repairs, water main breaks, fire periodic cleaning and flushing of mains, etc. These occurrences may "stir up" debris within the water main that will cause fouling of backflow devices installed without the benefit of strainers.

Backflow Prevention Assembly Installations

Please note that the installation of any backflow device has the potential to cause water damage in the event of a discharge. Please plan accordingly.

Please also note that provisions may have to be made by the owner to provide for thermal expansion within a closed loop system, i.e. the installation of thermal expansion devices and/or pressure relief valves.

Reduced Pressure Principle Backflow Preventer (RPZ)

1. All RPZ assemblies must be purchased and installed with the manufacturers approved inlet and outlet control valves and four (4) test cocks and a complete package.
2. This assembly shall be installed a minimum of twelve inches (12") away from the nearest wall. Also, the manufacturer must state if the device has been approved for use in either the horizontal or vertical flow up or down configuration.
3. The assembly shall be installed a minimum of twelve inches (12") away from the nearest wall. Also, the manufacturer must state if the device has been approved for use in either the horizontal or vertical flow up or down configuration.
4. Brass ¼" adapters shall be installed on each test cock of the device.
5. The water service line must be thoroughly flushed before installing the assembly.
6. If continuous, uninterrupted water service is desired, two smaller RPZ assemblies may be installed in parallel. When the RPZ devices are used in parallel, the total capacity if the assemblies must equal or exceed the capacity of the main feed line. A bypass around the RPZ is not permitted.
7. The assembly must be sized hydraulically to avoid excessive pressure loss.
8. An RPZ installed above ground in an outdoor installation must have a minimum twelve inch (12") clearance. An approved on-site constructed or approved pre-manufactured shelter must be installed to provide additional protection against freezing and vandalism.
9. Where possible, an approved RPZ assembly shall be installed within a building on the service connection after but close to the meter. In certain cases, a backflow prevention assembly may be installed at an alternative location such as outdoors or at the discharge side of a booster pump. The device shall be protected from freezing, flooding, and vandalism. RPZ devices shall not be installed in pit locations without specific approval from the Department.
10. Drinking and domestic water lines, lines for safety showers, and lines for eye wash units must be those devices installed as in-plant protection.
11. There shall be no outlet, tee, tap, or connection of any kind to or from the supply line between the meter and the backflow prevention device.
12. If the device is used on a hot water line, a device approved for use at the elevated temperature must be used.
13. The drain to the relief port must have an approved air-gap separation between the port and the drain line, at least twice the internal diameter of the discharge line. A drain, capable of

handling the maximum flow from the relief port, shall be provided. RPZ devices should be located in a location where water spillage is not objectionable.

14. While not effective in all cases, the installation of a soft seated check valve assembly immediately ahead of the RPZ will often hold the pressure constant to the assembly at all times of fluctuating pressure supply. This fluctuating pressure supply could cause nuisance dripping and potential fouling of the assembly if left without a soft seated check valve.
15. Provisions may have to be made by the owner to provide for thermal expansion within a closed loop system, i.e. the installation of thermal expansion devices and/or pressure relief valves.

Approved Air Gap

An approved air-gap is an obstructed separation through free atmosphere between the lowest opening from any pipe or outlet supplying water to a task, plumbing fixture, or other device from the floor level rim of the receptacle. The air-gap is the most reliable means of backflow prevention.

1. The air-gap must be installed with a minimum separating distance of at least two times the diameter of the water supply pipe (measured vertically above the flood rim of the receptacle). In no case however, shall the separation be less than one inch (1").
2. The separation distance must be measured from the lowest point on the pipe or outlet supplying water to the receptacle.

Double Check Valve Assembly (DCV)

All DCV assemblies shall be installed in accordance with the manufacturer's specifications and the following requirements:

1. All DCV assemblies must be purchased and installed with the manufacturers approved full port inlet and outlet control valves and four (4) test cocks as a complete package.
2. This assembly shall be installed a minimum of twelve inches (12") from the floor to the lowest part of the device, and a maximum of sixty inches (60") above the surrounding ground or floor to the top of the device. A minimum of twelve inches (12") of clear space shall be maintained above the assembly to allow for servicing check valves and for operation of the shutoff valves.
3. The assembly shall be installed a minimum of twelve inches (12") away from the nearest wall. Also, the manufacturer must state if the device has been approved for use in either the horizontal or the vertical flow up or down configuration.
4. Brass ¼" adapters shall be installed on each test cock of the device.
5. The water service line must be thoroughly flushed before installing the assembly.
6. All domestic service lines tapped from sprinkler services for commercial and/or industrial buildings shall have a DCV installed as a minimum backflow prevention device.
7. If continuous, uninterrupted water service is desired, two smaller DCV assemblies may be installed in parallel. When the DCVs are used in parallel, the total rated capacity of the assemblies must equal or exceed the capacity of the main feed line. A bypass around the DCV is not permitted.

8. The assembly must be sized hydraulically to avoid excessive pressure loss.
9. Preferably all DCV assemblies should be installed above ground, but may be installed below ground level in a pit or chamber designed to prevent flooding. If the DCV is installed in a pit the following guidelines shall apply:
 - a. There shall be no outlet, tee, tap, or connection of any kind to or from the supply line between the meter and the backflow prevention device.
 - b. The device shall be protected against freezing. Access for routine testing and maintenance shall be provided.
 - c. If a drain in the pit is absolutely necessary there shall be no connection between the drain and sewer or appurtenance, which permits the passage of polluted water into the pit.
10. Where possible, an approved DCV assembly shall be installed within a building on the service connection after, but close to the meter. In certain cases, a backflow prevention assembly may be installed at an alternative location such as outdoors or at the suction side of a booster pump. The device shall be protected from freezing, flooding, and vandalism. Access for routine testing and maintenance shall be provided.
11. Drinking and domestic water lines, lines for safety showers, and lines for eye wash units must be taken off the upstream side of DCV assemblies for those devices installed as in-plant protection.
12. Provisions may have to be made by the owner to provide for thermal expansion within a closed loop system, i.e. the installation of thermal expansion devices and/or pressure relief valves.

Pressure Vacuum Breaker Assembly (PVB)

All PVB assemblies shall be installed in accordance with the manufacturer's specifications and the following Department requirements:

1. The critical installation level shall be no less than twelve inches (12") above the highest point used or downstream piping for pipe applied applications and one inch (1") for equipment mounted/deck mounted applications. They shall be used only where drainage is provided.
2. PVB assemblies must not be installed where the device is subject to corrosive fumes or dust.
3. Brass ¼" adapters shall be installed on each test cock of the device.
4. PVB assemblies shall be tested annually.

Residential Dual Check (DC)

All Residential Dual Check assemblies shall be installed in accordance with the manufacturer's specifications and the following Department requirements:

1. Effective the date of the acceptance of this Cross-Connection Program for the City of Rutland water distribution system, all new residential buildings will be required to install a residential dual check device immediately downstream of the water meter. Installation of the residential dual check device on a retrofit basis on existing service lines will be instituted at a time as deemed necessary by the Department.

2. Provisions may have to be made by the owner to provide for thermal expansion within a closed loop system, i.e. the installation of thermal expansion devices and/or pressure relief valves.
3. Typically, residential dual check devices are not testable, therefore not subject to testing requirements.