

Prepared for:

City of Norfolk

Department of Utilities
Division of Water Quality
6040 Water Works Road
Norfolk, Virginia 23502



CROSS CONNECTION CONTROL PLAN MANUAL

For

City of Norfolk, Virginia

City of Norfolk Approval Date: "city approved"

Virginia Department of Health (VDH) Approval Date: "VDH approved"

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1. INTRODUCTION

1.1. Purpose

The purpose of this document is to outline the City of Norfolk's Cross Connection Control policies for all commercial, institutional, industrial, residential and miscellaneous facilities, and is summarized as follows:

- Protect the public water supply from contaminants and/or pollutants that could backflow through the customer service connection.
- Promote the elimination of actual and/or potential cross connections between the public potable water supply and non-potable water systems, plumbing fixtures, sources and/or systems containing substances of unknown or questionable quality.
- Provide guidance for the maintenance of a continuing Cross Connection Control program.

1.2. Legality

In accordance with the requirements of the Virginia Department of Health 12 VAC 5-590 *Waterworks Regulations*, the City of Norfolk proclaims this program as a continuing effort to maintain pure, clean, safe potable water. By reference to the State of Virginia Department of Health, 12 VAC 5-590 *Waterworks Regulations*, PART II OPERATION REGULATIONS FOR WATER WORKS, Article 3 Cross Connection Control and Backflow Prevention in Waterworks, 12 VAC 5-590-580 and 12 VAC 5-590-600, "*we hereby establish the City of Norfolk Cross Connection Control Program.*" This program was adopted by the hereby above described governing body on "city approved" and made effective upon approval of the VDH on "VDH approved".

1.3. Ordinance

Legal authority to carry out and enforce the City of Norfolk's Cross Connection Control Program is provided in the City of Norfolk Code of Ordinances, Chapter 11.1, Article VII. A copy of said ordinance can be found in Section 2 of this plan.

2. ORDINANCE AND STANDARD OPERATING PROCEDURES

2.1. Ordinance

ARTICLE VII. - CROSS CONNECTIONS

[Sec. 11.1-110. - Definitions.](#)

[Sec. 11.1-111. - Violations.](#)

[Sec. 11.1-112. - Inspections generally; notice to correct defects.](#)

[Sec. 11.1-113. - Termination of service to uninspected premises.](#)

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[Sec. 11.1-119. - Location and installation requirements for protective devices.](#)

[Sec. 11.1-120. - Responsibility of owner as to testing, repair, etc., of protective devices.](#)

[Sec. 11.2-121. - Certification of testers—Generally.](#)

[Sec. 11.1-122. - Same—Procedures.](#)

Sec. 11.1-110. - Definitions.

(a) *Generally.* For the purposes of this article, certain words and phrases shall have the meanings ascribed to them in this section:

Air gap means the unobstructed vertical distance through a free atmosphere between the lowest perimeter of a water outlet and the flood level rim of any receptacle. This distance will be a minimum of one inch or two (2) times the diameter of the outlet. In case of near-walls, this distance will be three (3) times the diameter of the outlet.

Auxiliary supply means any water source or system other than the public water supply that may be available in the building or premises.

Backflow means the reversal of flow from its intended direction as a result of backsiphonage or backpressure.

Backsiphonage means the reversal of the normal direction of flow in a system caused by negative pressure (vacuum or partial vacuum) in the supply line.

Backpressure means the condition existing when the pressure within a system exceeds the supply pressure and tends to create backflow.

Cross Connection Specialist means the personnel and/or official in charge of inspections and administering the Virginia Uniform Statewide Building Code (USBC) as defined in Section 1041 of the USBC, or designated agent.

Contamination means any introduction into potable water of toxins, micro-organisms, wastes, wastewater, undesirable chemicals, gases or other substances as may be deemed harmful by the director of utilities or the code official.

Cross-connection means any physical connection between a potable water supply and any waste pipe, soil pipe, sewer, drain, or any unapproved source or system; or [one that] can be submerged in waste and/or other source of contamination.

Director means the director of the Norfolk Department of Utilities, or their designated representative.

Double-check valve assembly means an assembly of two (2) internally loaded, specially designed and independently operating check valves, together with a tightly closing shut off valve on the upstream and the downstream side of the check valves, equipped with properly placed female threaded test cocks.

Existing ground level means the level above which surface water will not accumulate under normal conditions.

Flood-level rim means the top edge of the receptacle over which water could overflow.

Hazard means any condition, device or practice in the water usage system and its operation which creates or reasonably tends to create a danger to the health and wellbeing of the water customer.

Owner means the person having legal title to the property or who is in charge, care and control of the property where the facilities in question are located; or the tenant of such property; or the customer who applied for water service for such property.

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 unnecessary risk or impair the usefulness of the water.

Readily accessible means that which enables a fixture, appliance or equipment to be directly reached without requiring the removal or movement of any panel, door or similar obstruction.

Reduced pressure zone (RPZ) backflow preventer means an assembly of differential valves and check valves, including an automatically opened spillage port to the atmosphere, designed to prevent backflow.

Service connection means the terminal end of a service line from the waterworks. If a meter is installed at the end of the service, then the service connection means the downstream end of the meter.

Service line means that portion of the waterline from the consumer's side of the water meter to the first water outlet.

Toxin means any substance of solids or liquids harmful for human consumption.

Vacuum breaker, atmospheric means a vacuum breaker designed so as not to be subjected to continuous static line pressure.

Vacuum breaker, pressure type means a vacuum breaker designed to operate under conditions of static line pressure.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-111. - Violations.

Any person violating any provision of this article shall be guilty of a class 1 misdemeanor. Each day of violation shall constitute a separate offense. In addition to any penalty imposed, a judge hearing the case shall direct the person responsible for the violation to correct the violation and each day's default in the connection shall constitute a violation of and a separate offense under this article.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-112. - Inspections generally; notice to correct defects.

Cross connection personnel shall inspect the plumbing in every building or premises in the city as frequently as may be necessary at reasonable times to ensure that such plumbing has been installed and maintained in such a manner as to prevent the possibility of pollution or contamination of the public water supply. Cross connection specialists shall notify or cause to be notified, the owner, occupant or authorized agent of the owner of any such building or premises to correct, within a time set by the authority, any plumbing installed or existing contrary to or in violation of this article and which may create the risk of pollution of the city water supply or otherwise adversely effect the public health, which shall be corrected within the time set by the authority.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-113. - Termination of service to uninspected premises.

Should any owner refuse to allow the authority access to the premises for the purpose of conducting an inspection, or should cross connection personnel not be able to contact the owner for purposes of obtaining permission to inspect and the authority has cause to believe that a cross-connection hazard exists in the subject premises and such hazard jeopardizes the integrity or the purity of the city water supply, cross connection personnel shall request the director of utilities to terminate the water service to the subject premises.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-114. - General design installation and maintenance standards for potable water supply system.

A potable water supply system shall be designed, installed and maintained in such a manner as to prevent contamination from non-potable liquids, solids or gases, either harmful or benign, from being introduced into the potable water supply through cross-connections or any other piping connections to the system. This shall be accomplished by protecting every water outlet from the potable water system which poses a possible cross-connection. Wherever such outlets cannot be protected in accordance with the minimum air gap, a mechanical device shall be utilized to prevent backflow from backsiphonage or backpressure. The appropriate device shall be determined by cross connection personnel, in cases where water usage is sufficiently complex or the severity of the hazard warrants, the director or their representative may require an air gap or backflow prevention device immediately downstream from tile service connection or at a point approved by the authority. Cross connection personnel shall have authority to promulgate rules, standards and regulations regarding the design installation and the maintenance of any system or connection.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-115. - Service line protection.

Whenever it is determined by the authority that the potential hazard within any premises requires isolation from the system, an approved backflow preventer shall be installed on the service line. Whenever continuous service is imperative, a pair of backflow preventers shall be installed in parallel.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-116. - Protective devices for fire service systems.

(a) Fire service systems having direct connections from the waterworks shall be provided with an air gap or a reduced pressure zone backflow preventer.

(b) In systems such as those referred to in subsection (a) which have booster pumps installed in the connection from the waterworks, provision shall be made to avoid lowering the pressure at the connection below ten (10) psi.

(c) Systems with direct connections to the waterworks, which are comparable to the systems described in subsections (a) and (b), must provide an air gap or a reduced pressure zone backflow preventer.

(d) Systems having direct connections to the waterworks and interconnections to auxiliary supplies, such as pumps taking suction from raw water sources, exposed storage tanks, industrial water supplies, connections to unapproved ground waters, or to which antifreeze or other chemicals are added, or other applications as determined by cross connection personnel must be protected by an air gap or a reduced pressure zone backflow preventer.

(e) Systems having direct connections to the waterworks from buildings having combined industrial and fire systems, either with or without storage tanks or pump connections, must provide an air gap or a reduced pressure zone backflow preventer.

(Ord. No. 40,553, § 1, 12-11-01; Ord. No. 43,836, § 1, 5-18-10)

Sec. 11.1-117. - Low-pressure cutoff for booster pumps installed in the potable water system.

A low-pressure cutoff switch shall be installed on all booster pumps on potable water pressure booster systems in such a manner as to maintain a minimum pressure of ten (10) psi on the suction side of the pump.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-118. - Submission of plans prior to construction of certain facilities.

Certified plans for construction of the following types of facilities shall be submitted in duplicate to the cross connection office for review and approval prior to issuance of a water service available statement.

An approved backflow prevention device shall be installed at each service connection to a consumer's water system serving, but not limited to:

- (1) Hospitals, mortuaries, clinics, veterinary establishments, nursing homes and medical buildings;
- (2) Laboratories;
- (3) Piers, docks and waterfront facilities;
- (4) Sewage treatment plants, sewage pumping stations, or stormwater pumping stations;
- (5) Food and beverage processing plants;
- (6) Chemical plants, dyeing plants and pharmaceutical plants;
- (7) Metal plating industries;
- (8) Petroleum or natural gas processing or storage plants;
- (9) Radioactive materials processing plants or nuclear reactors;
- (10) Car washes or laundries;
- (11) Lawn sprinkler systems, irrigation systems;
- (12) Fire service systems;
- (13) Slaughter houses and poultry processing plants;
- (14) Farms, where the water is used for other than household purposes; plants;
- (15) Commercial greenhouses and nurseries;
- (16) Health clubs with swimming pools, baths, hot tubs or saunas;
- (17) Paper and paper products plants and printing plants;
- (18) Pesticide or exterminating companies and their vehicles with storage or mixing tanks;
- (19) Schools or colleges with laboratory facilities;
- (20) Highrise buildings (four (4) or more stories);
- (21) Multiuse commercial, office or warehouse facilities; and
- (22) Others specified by the cross connection office and/or director of utilities, when reasonable cause can be shown for a potential backflow or cross connection hazard.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-119. - Location and installation requirements for protective devices.

Backflow prevention devices shall be readily accessible, preferably in the same room with the fixture they serve. Installation shall be in accordance with manufacturer's recommendations.

- (1) Devices shall be located in secured enclosures such that they are protected from physical damage and freezing.
- (2) Reduced pressure zone backflow preventers shall be installed a minimum of twelve (12) inches above the existing ground level/100-year flood elevation, whichever is whichever is higher, in a location readily accessible for testing and maintenance.
- (3) Devices installed on domestic service lines shall be protected by a strainer installed on the inlet side of the device.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-120. - Responsibility of owner as to testing, repair, etc., of protective devices.

(a) The owner of any premises where backflow prevention devices are installed shall have such devices tested at least once annually, beginning at installation. Testing shall be accomplished by a backflow prevention device tester approved by cross connection personnel in accordance with this article. The date of annual testing shall be within thirty (30) days before or thirty (30) days after the anniversary date of installation. If the authority concludes that more frequent tests are required, the owner of said property shall be notified.

(b) Backflow prevention devices shall be tested, repaired, overhauled or replaced as necessary at the expense of the owner. The results of such tests, repairs or overhauls shall be recorded upon the approved form and the original of that form submitted to the office of cross connection.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.2-121. - Certification of testers—Generally.

Plumbing/mechanical tradesmen, maintenance personnel, employees of owners or owners of backflow prevention devices may become certified to test and repair such devices, by completing a written and performance examination to the satisfaction of the cross connection control office.

Testers shall be classified as follows:

- (1) *Limited tester*: A person who has completed certification training and is qualified to perform the periodic testing, inspection and repairs on those devices installed within a specific building, plant or institution.
- (2) *General tester*: An individual who has completed certification training and a. holds a valid plumbing/mechanical masters, certificate or b. is a journeyman employed by and performing device testing under the aegis of a master.

General testers are qualified to inspect, test and repair all approved devices.

(Ord. No. 40,553, § 1, 12-11-01)

Sec. 11.1-122. - Same—Procedures.

(a) Examination for backflow prevention device testers shall be given at such times as may be fixed by the cross connection control office. In case of the failure of any applicant to pass the examination, he shall be eligible for reexamination at the next scheduled examination.

(b) Applicants achieving a passing score on the written and performance examinations shall be certified and issued a license valid for a period of one year or until such time as applicant may change employment, whichever occurs first.

(c) The holder of a license as a backflow prevention device tester shall renew their license annually and upon changing employment. Renewal licenses shall be issued upon written application to the cross connection control office, unless it is made to appear, by affidavit filed with the office, that the applicant is no longer competent or entitled to such renewal license, in which event the renewal license shall not be granted until the applicant has undergone and passed another examination.

(d) All licenses provided for herein shall be valid for one year from the date of issuance; provided, that any licenses may be revoked by the authority at any time, upon sufficient written sworn charges filed with the office showing the holder of the license to be then incompetent or guilty of a willful breach of the rules, regulations or requirements of the authority, or the provisions of this policy or other causes, sufficient for the revocation of their license, of which charges the holder of such license shall have written notice and shall have the right to be heard.

(e) If any license is not renewed in the thirty (30) days next following the expiration date thereon or the date of changing employers, the license of the holder shall be void and any device tests performed by such holder will not be recognized, unless and until the holder of said license shall have made application and been reexamined in accordance with the procedure described in this section,

(Ord. No. 40,553, § 1, 12-11-01)

2.2. Standard Operating Procedures

Norfolk Department of Utilities
Standard Operating Procedure

Title: Backflow Prevention and Device Testing
SOP #: 313
Date: April 13, 2010
Revised Date: June 4, 2012
Author(s): Andrew J. Northcutt
Associated Documents:

I. Purpose

The purpose of this Standard Operating Procedure (SOP) is to provide the guidelines for notifying owners of Backflow Prevention Devices of annual re-certification requirements and initiating enforcement for non-compliance.

II. Scope

This SOP applies to the annual re-certification of all testable Backflow Prevention Devices located within the City of Norfolk as required by Norfolk City Code Sec. 11.1.

III. History

There are over 4,000 testable Backflow Prevention Devices in use in the City of Norfolk. Backflow Prevention Devices are mechanical devices installed at the water meter (the point at which the public water supply connects to a private water system), or at other locations on the private side of the water meter, for fire and irrigation systems to prevent potentially contaminated water from re-entering the public water supply once it has passed through the meter and entered the private water system. Backflow Prevention Devices are essential for the protection of the public water supply and, per City Code, must be inspected and certified every year by a Licensed Backflow Prevention Device Tester.

IV. Policy

Testable Backflow Prevention Devices are required, by City Code Sec. 11.1, to be inspected for proper operation each year by a Licensed Backflow Prevention Device Tester. Non-testable devices are excluded from this requirement. The Office of Cross Connection within the Department of Utilities, Division of Water Quality, maintains all backflow prevention test reports and records for 10 years.

V. Procedures

A. Residential, Commercial/Industrial and Quasi-Governmental

1. First Notice: Forty-five (45) days before the certification due date, Cross Connection will mail, via US Mail, a first notice to the property owner notifying the owner that their Backflow Prevention Device is coming up for its annual re-certification. This notice will state the reasons for having Backflow Prevention Devices annually tested and certified and the consequences if they do not have their Backflow Prevention Device re-certified.
2. Second Notice: One week after the certification due date, Cross Connection will verify the address of the property owner and mail, via US Certified Mail, a second notice to the property owner notifying the owner that they are past due on re-certifying their Backflow Prevention Device. This notice will state if the property owner does not have their Backflow Prevention Device re-certified and confirm receipt of proper documentation by the City within 30 days, Cross Connection staff will initiate procedures to terminate water service at the property.
3. Third and Final Notice: Thirty (30) days after the certification due date, Cross Connection will deliver a door hanger to the property, notifying the property owner that they are 30 days delinquent in having their Backflow Prevention Device re-certified. This notice will also inform the property owner that if the device is not tested and re-certified within 48 hours, Cross Connection will initiate procedures to terminate water service to the property. Additional consequences could include removal of the water meter on the property, fees for water meter removal (\$25) and re-installation (\$125), Class 1 misdemeanor citations and placarding of the building.
4. If Cross Connection does not receive confirmation of re-certification of the Backflow Prevention Device within 48 hours after delivering the third and final notice, process to terminate water service to the property will be initiated.
5. The Department of Utilities will terminate water service to the property within 48 hours of receiving notification from Cross Connection.

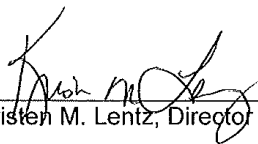
B. City Owned Facilities

1. First Notice: Forty-five (45) days before the certification due date, Cross Connection will mail a first notice to the responsible department notifying them that their Backflow Prevention Device is coming up for its annual re-certification. This notice will state that testing can be performed by their certified staff or by the City's contracted testing service. This notice will also provide information on how to have their staff certified to test devices. Each

department will be responsible for the costs associated with the testing of their devices.

2. Second Notice: One week after the certification due date, Cross Connection will call the maintenance staff of the department to inform the department that they are past due on re-certifying their Backflow Prevention Device and inquire to their plans to have the device re-certified. If a plan has not been established, Cross Connection will request the Assistant Director of Utilities to send a memo to the Assistant Director of the responsible department. This memo will state the responsible department has a backflow prevention device that is not in compliance with City Code and corrective action is required.


VI. Signatures




Kristen M. Lentz, Director of Utilities




Eric G. Tucker, Assistant Director of Utilities



Charles L. Dunbar, Operations Manager, Utilities



Trinette D. Hodges, Customer Service Manager, Utilities



Alicia A. Connelly, Water Quality Manager

3. DEFINITIONS

Absolute pressure. Gauge pressure plus atmospheric pressure. It is measured in units of pounds per square inch absolute (psia).

Agent. A duly authorized representative of the Authority.

Air gap. The unobstructed vertical distance through the free atmosphere between the lowest effective opening from any pipe or faucet conveying water to a tank, plumbing fixture, receptor or other assembly and the flood level rim of the receptacle. These vertical, physical separations must be at least twice the effective opening of the water supply outlet, never less than 1 in. (25 mm) above the receiving vessel flood level rim.

Approved. Accepted by the Authority having jurisdiction as meeting an applicable standard, specification, requirement, or as suitable for the proposed use.

Assembly. A configuration of one or more approved body components, including approved shutoff valves.

Atmospheric pressure. The pressure exerted by the atmosphere at any point. Such pressure decreases as the elevation of the point above sea level increases. One atmosphere is equivalent to 14.7 psi (101.4kPa), 29.92 in. (760 mm) of mercury, or 33.0 ft (10.1 m) of water column at average sea level.

Atmospheric vacuum breaker (AVB). The AVB consists of a float check, a check seat, and an air inlet port. A shutoff valve immediately upstream may or may not be an integral part of the device. The AVB is designed to allow air to enter the downstream water line to prevent backsiphonage. This unit may never be subjected to backpressure or have a downstream shutoff valve, or be installed where it will be in continuous operation for more than 12 hours.

Authority. Official office, board, department, director or agency authorized by law to administer and enforce regulation and or code requirement relating to cross connection and backflow prevention.

Auxiliary water supply. Any water supply on or available to the consumer's premises other than the water purveyor's approved public water supply, which may include wells, lakes, springs, rivers, streams, harbors, reclaimed waters, recycled waters or industrial fluids. These water s may be contaminated or polluted or they may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

Backflow. The undesirable reversal of flow of a liquid, gas, or other substance in a potable water piping system as a result of a cross connection.

Backflow preventer. An assembly, device, or method that prohibits the backflow of water into potable water supply systems.

Backpressure. A pressure, higher than the supply pressure, caused by a pump, elevated tank, boiler, air/steam pressure, or any other means, which may cause backflow.

Backsiphonage. A type of backflow where the upstream pressure to a piping system is reduced to a sub-atmospheric pressure.

Backflow-Prevention Device Tester. A person who has demonstrated competence to test, repair, and maintain backflow-prevention devices as evidenced by certification that is recognized by the approving Authority.

Consumer. The owner, operator, or customer having a service from a public potable water system.

Containment. Backflow protection installed on the water supply line to a consumer's premises as close to the service connection to the public water system as possible.

Continuous pressure. Pressure greater than 12 hours within a 24 hour period.

Cross connection. Any physical connection between a potable water supply and any waste pipe, soil pipe, sewer, drain, or any unapproved source or system; or can be submerged in waste and/or other source contamination.

Cross Connection Control Program. A program required by federal regulations that is designed to monitor, eliminate and protect all cross connections within a locality.

Director. The director of the department of utilities or their designated agent in charge of the cross connection control program.

Double check valve assembly (DCV). A complete assembly consisting of two, internally loaded, independently operating check valves, located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. This assembly shall only be used to protect against a non-health hazard.

Field testing. A procedure to determine the operational and functioning status of a backflow preventer.

Flood level rim. That level from which liquid in plumbing fixtures, appliances, or vats could overflow to the floor, when all drain and overflow openings built into the equipment are obstructed.

Gauge pressure. The pressure at a point of a substance (gas or liquid) above that of the atmosphere.

Gray water. Waste water discharged directly from lavatories, bathtubs, showers, clothes washers and laundry sinks. Water may be recycled/used for flushing water closets and urinals or other purposes approved by the local Authority. Gray water is considered an auxiliary water supply.

Hazard. Any condition, device or practice in the water distribution system and its operation which creates or reasonably tends to create a danger to health and wellbeing of the consumer.

Health hazard (High Hazard). A cross-connection or potential cross-connection involving any substance that could, if introduced into the potable water supply, cause death or illness, spread disease, or have a high probability of causing such effects. Synonymous with **contamination**.

Isolation. Isolation, or "fixture isolation" is a method of backflow prevention in which a backflow prevention device, assembly or method is used to correct an internal cross-connection at a "point of use" within a consumers water system other than at the water service entrance. (i.e. air gap, AVB, DC, HCVB) installed on specific fixtures.

Non-health hazard (Low Hazard). A cross-connection or potential cross-connection involving any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the potable water supply. A low probability exists of the occurrence of backflow primarily by backsiphonage. Synonymous with **pollution**.

Plumbing system. All potable water and distribution pipes, fixtures, joints, connections, devices, assemblies, receptacles, and appurtenances within the property lines of a premises.

Potable water. Water that is safe for human consumption as described by the public health authority having jurisdiction and the USEPA National Primary Drinking Water Regulations.

Pressure vacuum breaker assembly. An assembly consisting of an independently operating, internally loaded check valve, an independently operating, loaded air inlet valve located on the discharge side of the check valve, with properly located resilient – seated test cocks and tightly closing resilient-seated shutoff valves attached at each end of the assembly designed to be operated under pressure for prolonged periods of time to prevent backsiphonage. The pressure vacuum breaker may not be subjected to backpressure, but can be used to protect against a health (high) hazard.

Reclaimed water. Water that, as a result of treatment of wastewater (sewage), is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is not safe for human consumption.

Reduced pressure principle backflow-prevention assembly (RP or RPBA or RPA or RPZ). A complete assembly consisting of a mechanical, independently acting, hydraulically dependent relief valve, located between two, internally loaded, independently operating check valves, located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. This assembly may be used to protect against a health (high) hazard.

Service connection. A piping connection between the water purveyors main and a consumer’s system.

Shall. “Shall” is mandatory.

Single check valve. A single check valve is a directional control valve, not an approved backflow preventer.

Spill resistant vacuum-breaker backsiphonage-prevention assembly (SVB). An assembly consisting of an independently operating, internally loaded check valve, and an independently operating, loaded air inlet valve located on the discharge side of the check valve. The assembly is to be equipped with a properly located resilient seated test cock, a properly located bleed/vent valve, and tightly closing resilient seated shutoff valves attached at each end of the assembly. The SVB may not be subjected to backpressure, but can be used to protect against a health (high) hazard.

Submerged inlet. An inlet pipe opening that is below the flood level rim of the receptacle.

Survey. A visual examination of backflow protection equipment, materials, workmanship or portion thereof to verify installation and operational performance. This may also include a visual survey of a plumbing system to identify unprotected cross connections and to assess how to properly eliminate or protect them.

Test equipment. An electronic or mechanical instrument recognized by the Authority having jurisdiction to adequately field test the operational performance of a backflow preventer.

Vacuum breaker. A device that permits air into a water supply distribution line to prevent backsiphonage.

VDH. Virginia Department of Health.

Water purveyor. The owner or operator of a public (or private) potable water works system.

4. AUTHORITY AND ADMINISTRATION

The City of Norfolk Department of Utilities shall be the Authority and the Administrator of the Cross Connection Control Program. This shall include, but not be limited to administering the following:

- Inspections
- Inspection Requirements
- Backflow Prevention Assembly Testing
- Notifications
- Data Management
- Recordkeeping/Reporting
- Public Relations/Education

4.1. Inspector/Designated Agent

The City of Norfolk or Designated Agent (Authority/Agent) conducting inspections on behalf of the City of Norfolk must be designated/approved by the City of Norfolk Department of Utilities. The Authority/Agent must meet both 1) an experience component and 2) a certification/training component. Some acceptable components are as follows:

Experience

- Been employed by a Utility, Water Purveyor, Building Department, or similar body of jurisdiction and must meet the qualifications and training requirements as dictated by the Authority.
- Have held a similar position (CCC Surveyor) with another municipality.
- Two- (2) years' experience in a plumbing/mechanical field with acceptable certification/training.

Acceptable Certification/Training

- Any approved cross connection course for inspecting, as approved by the Authority for conducting inspections. Submission requirements for approvals must include the following:
 - Course outline
 - Certificate of satisfactory completion

4.2. Other Applicable Laws

The Authority shall conduct this Cross Connection Control Program in accordance with:

- Virginia Uniform Statewide Building Code
- Virginia Department of Health
- Any other applicable laws affecting public health protection through cross connection control

4.3. Recordkeeping

- The cross connection control program shall include a record system which will maintain data on inspections, re-inspections, backflow prevention assembly tests, repairs, and alterations. All cross connection control records shall be kept on file for a period of not less than ten- (10) years. This information should include:
 - Facility address and location
 - Owner name and contact information
 - Required re-inspection frequency
 - Inventory list of backflow prevention assemblies and devices
 - Location of assemblies and devices
 - Make, model, and size of assemblies
 - Testing and maintenance of assemblies

Additionally, all written backflow incident reports and annual cross connection control program activity reports shall be maintained for a period of no less than ten– (10) years.

5. INSPECTIONS

5.1. Rights of Inspection

Cross connection personnel having proper identification shall be permitted to enter the consumers building/premises at reasonable times for the purpose of inspecting for the presence or absence of cross connections, or any backflow prevention device connected to the water system. The Authority shall deny or discontinue, after reasonable notice to the occupants, water service to any building/premises for refusal or failure to arrange for a cross connection inspection. The Authority shall deny or discontinue water service if there is reason to believe the building/premises pose a potential for danger to the public and/or occupants.

5.2. Responsibility of Owner

The Owner of the property shall be responsible for the protection of the public water supply from contamination due to backflow through the Owner's water service connection. The Authority may require the Owner, at the owners' expense, to install, alter, replace, or repair any plumbing connected to the public water system that may pose a threat to public health. Failure or refusal on the part of the Owner to correct any deficiency or violation in the time frame allotted shall be cause for the Authority to deny or discontinue water service to the building/premises.

5.3. Inspection Procedures

Cross connection control inspections shall be completed as follows:

- 1) Identify consumer's building to be inspected.
- 2) Meet on-site with facility contact/owner. Confirm contact information.
- 3) Explain the Cross Connection Control Program to the facility contact/owner before inspection of the facility.
- 4) Inspect the building /premises and complete the inspection forms with the following information:
 - Identify all potable water supplies - service line connections. Are they currently protected with a backflow prevention device, method or assembly?
 - Determine existence of a secondary/auxiliary source of water (i.e., private well).
 - The surveyor may physically review all exposed piping and all water outlets/uses within the facility.
 - Identify all of the building/premises water using equipment and determine if cross connections exist.
 - Determine if existing cross connections are properly protected, require protection or shall be eliminated.
 - Inventory (1) all existing backflow preventers and (2) all requirements for corrective action.
 - Determine if the facility shall install a containment device, assembly or method at the service line, or if the facility may be required to perform internal point of use isolation protection.
 - Identify facility hazard/type/classification and designate an on-going re-inspection frequency based on the degree of hazard.

5.4. Exit Interview

After completing the inspection, cross connection personnel will review with the facility contact/owner the cross connections found. If it is possible or necessary, the inspector may request that the cross connections be addressed immediately. The *Inspection Field Form* will be signed by the cross connection and facility/owner during the exit interview.

5.5. Inspection Form

An *Inspection Field Form* shall be used in every inspection, as required, and will be filed in a location as identified by the Authority/Agent along with other pertinent information accumulated.



Page ____ of ____

Department of Utilities
 Division of Water Quality
 6040 Waterworks Road - Norfolk, Virginia 23502
 (767) 441-5774 (ext. 262, 274)

INSPECTION REPORT FOR CROSS-CONNECTIONS OF THE WATER SYSTEM

Builder Owner/Tenant Name: _____ Phone: _____

Property Address: _____ Zip Code: _____

DEVICES INSTALLED AS OF THIS DATE

Date: _____

Device	Manufacturer	Size	Serial # or # of Devices	Location Installed

Remarks: _____

- No visible violations as of this date: _____
- In violation as of this date: _____
- Violation to be corrected as of this date: _____
- Violations corrected on this date: _____

Printed Name of Inspector: _____

 Printed name of representative

 Signature of representative

5.6. Initial Inspection Non-Compliance Notice

After the initial survey, an *Inspection Non-Compliance Notice #1* will be sent to each building/premises having unprotected cross connections which require corrective action. The *Inspection Non-Compliance Notice #1* will include a list of requirements and provide the time allocated for compliance*.

* **The Authority reserves the right to adjust the number of days allocated for compliance based on the degree of hazard associated with existing and/or potential cross connections.**

Once requirements are completed, a *Compliance Inspection* shall be performed to verify compliance status. If no further action is required, an *Inspection Compliance Notice* will be issued. If the facility does not respond to the *Inspection Non-Compliance Notice #1*, subsequent notification(s) may be sent.

5.7 Inspection Non-Compliance Notice # 1 and Violation Notice



**City of
Norfolk**

Department of Utilities
Division of Water Quality
Office of Cross Connection
6040 Waterworks Road
Norfolk, Virginia 23502
(757) 441-5774 (ext. 262, 274)

VIOLATION NOTICE

Date: _____

Page ____ of ____

Name of Business
Or Owner: _____

Address: _____ Zip Code _____

Please be advised that I have made an inspection of the above premises as required by the City of Norfolk Code, Chapter 11.1, Article VII. The device(s) listed below must be installed on the following system or equipment in accordance with all applicable codes and manufacturer's recommendation/specifications:

TYPE DEVICE(S) REQUIRED

- | | |
|--|---|
| <input type="checkbox"/> Reduced Pressure Zone Backflow Preventer | <input type="checkbox"/> Anti-Siphon Ball Cock Valve Assembly |
| <input type="checkbox"/> Double Check Valve Assembly | <input type="checkbox"/> Hose Connection Vacuum Breaker |
| <input type="checkbox"/> Pressure Type Vacuum Breaker | <input type="checkbox"/> Low Pressure Cut-Off Switch |
| <input type="checkbox"/> Atmospheric Vacuum Breaker (SVB) | <input type="checkbox"/> Atmospheric Vacuum Breaker |
| <input type="checkbox"/> Double Check Valve with Intermediate Vacuum Breaker | |

PLUMBING/MECHANICAL PERMIT REQUIRED FOR INSTALLATION: Yes No

APPROVED ENGINEERED PLANS REQUIRED FOR INSTALLATION: Yes No

Comments: _____

Printed name of responsible party: _____

Signature: _____

Telephone Number: () _____

Printed name of inspector: _____

Inspector Signature: _____

Telephone Number: () _____

White – Office copy
Yellow – Client's copy
Pink – Inspector's copy

Inspection Non-Compliance Notice #1

<<Date>>

<<SendTo>>

RE: <<Facility>> at <<Address>>

Dear <<Contact>>,

The purpose of the City of Norfolk's Cross Connection Control Program, as defined in Code of Ordinances Chapter 11.1, Article VII, is to help eliminate possible contamination of the public water distribution system. There are two required components of the program; 1) site survey, and 2) testing of backflow prevention assemblies.

A survey of your facility's water distribution system was completed on <<InspectionDate>>. Inspectors reviewing your water system found connections that could possibly contaminate the public water distribution system. **A list of requirements is attached.**

Requirements on this list must be addressed using only approved backflow prevention devices or assemblies. A licensed plumber should be able to assist you with acquiring approved backflow preventers. Some backflow prevention devices (assemblies) also require testing by a Certified Tester. We suggest that the licensed plumber installing the testable assemblies also have the certification to test assemblies. ***All testable assemblies must be tested immediately at the time of installation.***

These requirements must be completed by <<ReinspectionDate>>. After the requirements have been completed, please call the number below on or before the date listed to schedule a compliance survey. Failure to do so will result in future non-compliant notices.

To arrange for a compliance review or if you require additional information, please contact us at the number below.

<<CCInfo>>

5.8 Inspection Non-Compliance Notice #2

Failure to comply with the *Inspection Non-Compliance Notice #1* within the number of days as determined by the Authority will result in issuing a second notice of inspection non-compliance. Included with the notice will be a Requirements List. The facility will be given a specific time frame to comply with *Inspection Non-Compliance Notice #2*.

The Authority reserves the right to adjust the number of days allocated for compliance based on the degree of hazard associated with existing and/or potential cross connections.

Inspection Non-Compliance Notice #2

<<Date>>

<<SendTo>>

RE: <<Facility>> at <<Address>>

Dear <<Contact>>,

The purpose of the City of Norfolk's Cross Connection Control Program, as defined in Code of Ordinances Chapter 11.1, Article VII, is to help eliminate possible contamination of the public water distribution system.

As part of this program, a survey of your facility's internal water distribution system was completed on <<InspectionDate>>. Inspectors reviewing your water system found connections that could possibly contaminate the public water distribution system. A letter of notification was previously sent to you outlining required corrective measures. For your reference, a duplicate list of requirements is attached.

Requirements on this list must be addressed using only approved backflow prevention devices and assemblies. A licensed plumber should be able to assist you with acquiring approved backflow preventers. Some backflow prevention devices (assemblies) also require testing by a Certified Tester. We suggest that the licensed plumber installing the testable assemblies also have the certification to test assemblies. ***All testable assemblies must be tested immediately at the time of installation.***

These requirements must be completed by <<ReinspectionDate>>. After the requirements have been completed, please call the number below on or before the date listed to schedule a compliance survey. Failure to do so will result in future non-compliant notices.

To arrange a compliance review or if you require additional information, please contact us at the number below.

<<CCInfo>>

5.9. Inspection Non-Compliance Notice #3

Failure to comply with the *Inspection Non-Compliance Notice #2* within the number of days as determined by the Authority will result in issuing a third and final notice of non-compliance. Included with the notice will be a Requirements List and a scheduled shut off date. The facility will be given a specific time frame to comply with the *Inspection Non-Compliance Notice #3*.

The Authority reserves the right to adjust the number of days allocated for compliance based on the degree of hazard associated with existing and/or potential cross connections.

Inspection Non-Compliance Notice #3

<<Date>>

<<SendTo>>

RE: <<Facility>> at <<Address>>

Dear <<Contact>>,

The purpose of the City of Norfolk's Cross Connection Control Program, as defined in Code of Ordinances Chapter 11.1, Article VII, is to help eliminate the possible risk of contamination to the city's public water distribution system.

A survey of your facility's internal plumbing system was completed on <<InspectionDate>>. Inspectors reviewing your facility found connections that could possibly contaminate the public water distribution system. Two- (2) previous letters of notification were sent to you outlining the required corrective measures. **For your reference, a duplicate list of requirements is attached.**

Requirements on this list must be addressed using approved backflow prevention devices and assemblies. A licensed plumber will be able to assist you with acquiring approved backflow preventers. Some backflow prevention devices (assemblies) also require annual testing by a "Certified Tester". ***All testable devices must be tested immediately at the time of installation. Please have your backflow prevention device installed and tested immediately. Once you have completed these requirements, please hand-deliver the completed test report to the Office of Cross Connection located at 6040 Waterworks Road Norfolk, VA 23502.***

Corrective action must be completed by <<OverDueDate>>. Upon completion, please notify the Office of Cross Connection on or before the noted date to schedule a compliance inspection. Failure to do so will result in the termination of water service to your property. If you have already completed these requirements, please call the number below to schedule a compliance inspection.

You are hereby notified that in accordance with the City of Norfolk Code of Ordinances Chapter 11.1, Article VII, the water supply to the above noted premises will be discontinued as of <<ShutOffDate>>. Water service may not be resumed until corrective measures have been addressed.

If you have any questions or require additional information, please contact the office at the number listed below.

Thank You,

<<CCInfo>>

6. PERIODIC INSPECTION COMPLIANCE MONITORING

6.1. Subsequent Inspection Frequency

Subsequent inspections, or *re-inspections*, conducted after obtaining compliance as a result of a cross connection control inspection, will be scheduled based upon the degree of hazard designated to a facility, which dictates the re-inspection frequency. The degree of hazard shall be derived from the evaluation of conditions within a facility which can be classified as either pollution (Low Hazard), or contamination (High Hazard). A low hazard condition may exist when the occurrence of backflow may occur primarily by means of back-siphonage that may create a non- health hazard, is a nuisance or aesthetically objectionable, and a high hazard condition may exist when the occurrence of backflow may occur either by backpressure or backsiphonage and is a danger to the health and well-being of the consumer.

6.2. Re-inspection Frequency Determination

The re-inspection frequency is based on the "degree of hazard" assigned to a facility and will range from one- (1) to five- (5) years, or a time frame acceptable to the Authority. The re-inspection frequency will be determined by the Authority/Agent and the Summary of Facility Types Chart (Section 12).

6.3. Re-inspection Frequency Criteria

Re-inspection frequency will be at the discretion of the Authority.

6.4. Compliance Inspection Procedure

Upon notification from the facility that all violations have been corrected and the necessary backflow prevention devices and assemblies are properly installed, a compliance inspection will be conducted.

Upon completion of the compliance inspection, a facility (1) having no cross connections, or (2) having addressed all existing or potential cross connections will receive an *Inspection Compliance Notice*. The *Inspection Compliance Notice* will be sent upon verification of compliance status. The facility will then be re-inspected verifying compliance.

6.5. Containment and/or Isolation Requirement

The City of Norfolk's Cross-Connection Control Program is a two-fold program which enforces (a) Containment Protection (Service Line Protection) and (b) Isolation (Point of Use Protection), in which the authority is authorized to inspect and require protective devices on specific fixtures throughout a consumer's property beyond the water meter.

"Containment" is the installation of a backflow prevention device or assembly between the facility and the public water distribution system. Containment assures there is no chance for water of questionable quality to leave a facility and to enter the public water distribution system. See Section 12 of this plan for a partial listing of various high hazard type facilities that the Authority, shall require containment protection on the service line and before the first outlet to a consumer's water supply.

While a facility may be contained, the Authority also requires an inspection downstream of the containment device or assembly. It is the responsibility of the facility to provide potable water at all times to its employees and/or public. Failure on the facility's part to take corrective action would constitute a violation thus exposing the facility to possible legal ramifications.

The City Of Norfolk's Cross-Connection program requires service protection or isolation protection on specific water outlets deemed to be hazardous within a consumers plumbing system.

"Isolation" is a method of protection in which a backflow prevention device and/or method is installed or used on specific fixtures throughout a consumers internal plumbing system. This is an added means of protection at a point of use in the facility to eliminate the risk of backflow within a private plumbing system.

A *Containment and/or Isolation Requirement Notice* will be issued for any one of the following:

- Facility determined to be high hazard
- Facility has cross connections that, in the judgment of the Authority/Agent, may not be easily correctable or have intricate piping arrangements which make it impracticable to determine whether or not cross connections exist
- Facility, because of security requirements or other prohibitions or restrictions, is impossible or impracticable to determine whether or not cross connections exist
- Facility has a repeated history of cross connections being established or reestablished
- Facility in which any substance is handled in such a manner as to create an actual or potential hazard to a waterworks (*this shall include premises having sources or systems containing process fluids or waters originating from a waterworks system which is no longer under the control of the water purveyor*)
- Refusal to comply with the normal steps for non-compliance
- Facility does not allow free and unlimited access to areas requiring survey
- Piping systems are not distinguishable, are determined to be complex, not readily accessible (i.e. concealed piping)
- Multiple piping systems
- Inadequate piping identification
- Facility changes their plumbing configurations on a regular frequency
- Secondary/auxiliary water sources
- Manufacturing/use of industrial fluids in piping systems or facility operations
- Refusal of entry
- No current as-built/engineering drawings of the potable water system

Containment devices or assemblies do not negate the facility's responsibility to ensure the internal water system is protected utilizing appropriate backflow prevention methods.

6.6. Containment and/or Isolation Requirement Notice

Containment and/or Isolation Requirement Notice

<<Date>>

<<SendTo>>

RE: <<Facility>> at <<Address>>

Dear <<Contact>>,

The purpose of the City of Norfolk's Cross Connection Control Program, as defined in the City of Norfolk's Code of Ordinances Chapter 11.1, Article VII, is to help eliminate possible contamination of the public and private water distribution system.

"Containment" is the installation of a backflow prevention device or assembly between the facility and the public water distribution system. Containment assures there is no chance for water of questionable quality to leave your facility and to enter the public water distribution system.

"Isolation", or fixture isolation is a form of protection in which a backflow prevention device, assembly or method is used to correct an internal cross-connection at a "point-of-use" within a consumers water system other than at the water service entrance.

As authorized by Code of Ordinances Chapter 11.1, Article VII, the containment device or assembly on the attached list is to be installed after the municipal water meter and before the first tap. The isolation device or assembly on the attached list is to be installed immediately at the point of water service to said fixture. If a by-pass around the backflow preventer is required, the by-pass shall also be protected with a backflow preventer of equal protection. Your facility has 15 days to install the backflow preventer(s) shown on the attached pages and/or respond with a plan of action.

If you have any questions, please contact us at the number listed below.

Sincerely,

"[Enter your name]"

"[Enter your department name and title]"

<<CCInfo>>

7. BACKFLOW PREVENTION DEVICES AND ASSEMBLIES

7.1. Installation and Maintenance of Backflow Prevention Assemblies and Devices

With respect to backflow prevention devices and assemblies, the Authority will require the following:

- a) Installation, testing, repair, overhaul, and replacement of backflow prevention devices/assemblies/methods shall be the responsibility of the building/premises owner, occupant or legally responsible party.
- b) Backflow prevention devices and assemblies must be readily accessible and installed according to manufacturer's specifications and plumbing code on a secured foundation.
- c) Backflow preventers shall not be installed in pits, vaults, or potentially submerged locations.
- d) Backflow preventers shall be located in secured enclosures such that they are protected from physical damage and freezing when installed outdoors.
- e) Backflow prevention devices/assemblies/methods must meet the approval of the Authority and be consistent with what is allowed in the jurisdiction.

7.2. Backflow Prevention Assembly Testing Requirements

- a) Backflow prevention assemblies shall be tested upon installation and once each year thereafter, immediately after repair, or at an interval (no less stringent than annually) as determined by the Authority.
- b) Testing and repair of assemblies shall only be performed by certified individuals approved by an agency acceptable to the Authority.
- c) Backflow prevention assemblies shall be installed and tested according to ASSE Professional Qualification Standard 5000 Series instructions.
- d) The Authority may request from tester(s) to obtain documentation as to the annual calibration of test gauges used to perform backflow prevention assembly testing.
- e) Assembly test form(s) to record test results must be approved by the Authority/Agent.
- f) The completed, original assembly test form(s) shall be submitted to the Authority/Agent within the time frame established by the Authority.
- g) The Authority/Agent may require additional testing for any of the following reasons:
 - Loss of water flow/pressure to the facility
 - Repair or maintenance to the water distribution system at or near the facility
 - Verification of workmanship

DEVICE LEGEND/ABBREVIATIONS			
Acronym	Legend	A.S.S.E. Standard	Testable Device
AFHBVB	Anti-Frost Hose Bibb Vacuum Breaker	1011/1019	No
AG	Air Gap	NA	No
AGD	Air Gap Device	NA	No
ASFV	Anti-Siphon Fill Valve	1002	No
AVB	Atmospheric Vacuum Breaker	1001	No
CAP	Device and/or piping requires a cap	NA	NA
DC	Dual Check	1024	No
DCV	Double Check Valve Assembly	1015	Yes
DDCV	Double Detector Check Valve	1048	Yes
ET	Expansion Tank	NA	NA
FAUCET	Faucet	NA	NA
FVB	Fixture Vacuum Breaker	1001	No
HA	Hammer Arrestor	1010	NA
HB	Hose Bibb	NA	NA
HCVB	Hose Connection Vacuum Breaker	1011	No
THCBP	Field Testable Hose Connection Backflow Preventer	1052	Yes
LABEL	Pipe requires labeling	NA	NA
PLUG	Device and/or piping requires a plug	NA	NA
PVB	Pressure Vacuum Breaker	1020	Yes
REMOVE	Device removal required	NA	NA
REPAIR	Device is in need of repair	NA	NA
REPLACE	Requires replacement	NA	NA
REPLUMB	Requires relocation and/or new piping	NA	NA
RPBP	Reduced Pressure Backflow Preventer Assembly	1013	Yes
RPDA	Reduced Pressure Detector Assembly	1047	Yes
SC	Single Check Valve	NA	No
SVB	Spill Proof Vacuum Breaker	1056	Yes
BPIV	Backflow Preventer with Intermediate Atmospheric Vent	1012	No
DCVIVB	Double Check Valve with Intermediate Vacuum Breaker	1035	No
ILGBLE	Illegible		
INACC	Inaccessible		
NA	Not Available		

7.3. Approved Backflow Prevention Devices And Assemblies

The City of Norfolk accepts backflow prevention devices and assemblies as recognized by:

- American Society of Sanitary Engineers (A.S.S.E)
- American Water Works Association (AWWA)
- American National Standard Institute (ANSI)

7.4. Service Line Backflow Prevention Protection

With respect to backflow prevention at the service line, the Authority will require the following:

- a) Where service line protection is required the owner shall receive formal written notification detailing the requirement and instructions pertaining to the need for service line protection (see Section 6.5 *Containment Requirement Notification*).
- b) Service connections to fire protection systems shall require protection in accordance with the City of Norfolk Code of Ordinances, Article VII. A copy of the referenced Ordinance can be found in Section 2 of this manual.
- c) If an existing fire protection system requires a higher degree of protection than that which is currently installed, and additional or new backflow prevention assemblies are required that may affect the hydraulics of the system, the owner shall receive formal written notification detailing the requirement and it is the owners responsibility to hire a registered professional engineer or a certified fire-protection system contractor in order to ensure there will not be an adverse effect on the operation of the fire protection system as a result of installing the required backflow prevention assemblies.
- d) Backflow prevention assemblies, devices or methods installed as service line protection shall be installed downstream of the water meter and prior to the first branch line in the plumbing system closest to the point of service to the building.
- e) The installation of any backflow prevention device or assembly below grade or in an underground pit shall be prohibited.
- f) Assemblies located at the service line shall be tested upon installation, upon repair, upon responding to a reported backflow incident, and on an annual basis.

7.5. Certification for Testers, Procedures and Application

Approved testers conducting tests within the Authority's jurisdiction must have a current certification or license from an agency approved by the Authority.

The City of Norfolk conducts a DPOR approved 16 Hour Backflow Assembly Tester Course. This course consists of instruction in both a written and practical exam.

Testers shall be classified as follows:

1. Limited tester: A person who has completed certification training and is qualified to perform the periodic testing, inspection and repairs on those devices installed within a specific building, plant or institution.
2. General tester: An individual who has completed certification training and a. holds a valid plumbing/mechanical masters, certificate or b. is a journeyman employed by and performing device testing under the aegis of a master. General testers are qualified to inspect, test and repair all approved devices.

Procedures:

1. Examination for backflow prevention device testers shall be given at such times as may be fixed by the cross connection control officer. In case of the failure of any applicant to pass the examination, he shall be eligible for reexamination at the next scheduled examination.
2. Applicants achieving a passing score on the written and performance examinations shall be certified and issued a certificate valid for a period of one year or until such time as applicant may change employment, whichever occurs first.
3. The holder of a certification as a backflow prevention device tester shall renew his certificate annually and upon changing employment. Renewal certification shall be issued upon written application to the cross connection control office, unless it is made to appear, by affidavit filed with the cross connection control office, that the applicant is no longer competent or entitled to such renewal certification, in which event the renewal certification shall not be granted until the applicant has undergone and passed another examination.
4. If any certification is not renewed in the thirty (30) days next following the expiration date thereon or the date of changing employers, the license of the holder shall be void and any device tests performed by such holder will not be recognized, unless and until he shall have made application and been reexamined in accordance with the procedure described in this section,

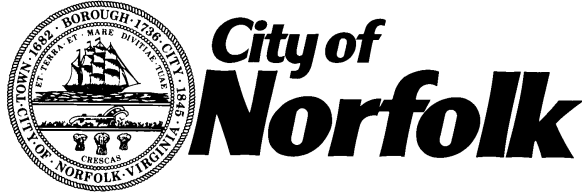
The Authority/Agent will generate an [Annual Test Requirement Notice](#) informing the facility of the testing requirements with respect to backflow prevention devices. Test notices and associated [Device Test Form\(s\)](#) will be sent prior to the required test date as determined by the Authority.

Testing of backflow prevention devices may include containment as well as isolation (individual point-of-use) devices used within the facility. Testing must be completed by an approved tester acceptable to the authority.

Upon completion of testing, original test forms shall be returned to the office of cross connections by the specified date at the address printed on the *Annual Assembly Test Requirement Notice*. Questions regarding testing can be addressed by contacting the cross-connection office at the phone number provided on the *Annual Assembly Test Requirement Notice*.

7.7. Annual Backflow Prevention Device Test Requirement Notice

Annual Backflow Prevention Device Test Requirement Notice



**Department of Utilities
Office of Cross Connection
6040 Waterworks Road - Norfolk, Virginia 23502
(757) 441-5774 ext [###], Fax (757) 441-5639**

[Date]

[Name]
[Name]
[Address]
[Address]

Our records indicate that you have a backflow prevention device installed on your property. The City of Norfolk Code, Chapter 11, Article VII requires that the owner of any premises where backflow prevention devices are installed have such devices tested at installation and annually (semi-annually in some high hazard systems). Annual tests and certifications of backflow prevention devices are essential for the protection of the public water supply.

Enclosed you will find a blank test report form for each backflow prevention device installed at your location. Each backflow prevention device must be tested and certified by a Licensed Backflow Prevention Device Tester.

Please have the required test performed and return the completed original blue report form to this office no later than the due date noted in the upper left hand corner of the test report form. Be sure to give the Licensed Backflow Prevention Device Tester the enclosed original blue test report form. An original test report form must be filed with the Office of Cross Connection. Photocopies, duplicates or other substitutes will not be accepted. Should you lose or misplace the original test report form, please call this office for a replacement.

The Licensed Backflow Prevention Device Tester shall replace, repair or isolate any defective device found during testing. If a device must be isolated from the potable water system, a completed test report form shall be forwarded to this office stating the system is isolated, the type of defect and estimated time of repair. Upon completion of the repair, the device shall be re-tested and a revised test report form sent to this office listing the corrective action taken.

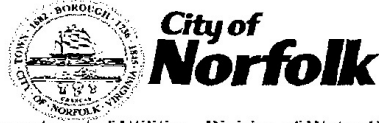
It is essential that you have your backflow prevention device tested and certified by the time noted on the test report form. Failure to do so will result in termination of water service to your property.

Should you have additional questions or require further assistance, please feel free to contact me at (757) [Phone number].

Sincerely,

[Name]
Cross Connection Inspector
Cross Connection Control Office

7.8. Backflow Device Test Form



Department of Utilities - Division of Water Quality
 Office of Cross Connections
 6040 Waterworks Road - Norfolk, VA 23502
 (757) 441-5774 ext 262 or 274 FAX (757) 441-5639

Backflow Prevention Device Test Report

Name of Premises _____

Service Address _____

Use & Location of Device _____

Device _____
 Manufacturer _____ Model _____ Size _____ Serial No. _____

Line Pressure at Time of Test _____ psi		Circle one EXISTING/REPLACEMENT/NEW		
Reduced Pressure Zone Device				
Requirement	Initial Test	Repairs	Retest	
Check valve #1 Pressure drop across Check valve #1	Closed Tight min. of 5.0 psid	Yes /No (Circle one) _____ psid (A)		Yes /No (Circle one) _____ psid (A)
Check Valve #2	Closed Tight	Yes/No (Circle one)		Yes/No (Circle one)
Differential Pressure Relief Port	Must open @ min. of 2.0 psid	Opened @ _____ psid (B)		Opened @ _____ psid (B)
Pressure Buffer	A - B >= 3.0 psid	_____ psid		_____ psid
Double Check Valve Device				
Requirement	Initial Test	Repairs	Retest	
Check Valve #1	Closed Tight @ Min. of 1.0 psid	Yes/No (Circle one) _____ psid		Yes/No (Circle one) _____ psid
Check Valve #2	Closed Tight @ Min. of 1.0 psid	Yes/No (Circle one) _____ psid		Yes/No (Circle one) _____ psid
Pressure / Anti Spill Vacuum Breaker				
Requirement	Initial Test	Repairs	Retest	
Air Inlet	Opened @ min. of 1.0 psid	_____ psid		_____ psid
Check Valve	Pressure Drop/ Differential min. of 1.0 psid	_____ psid		_____ psid

Remarks _____

Certification: I have made the above test and hereby certify that this backflow prevention device performed satisfactorily and meets all federal, state and local codes and regulations as required.

Tester Name _____ (Print) _____ (Signature) Date _____

Test Kit Serial Number _____ Calibration Date _____

License # _____ Expiration Date _____ City of Certification _____

Testing Company _____ Phone # _____

Company Address _____

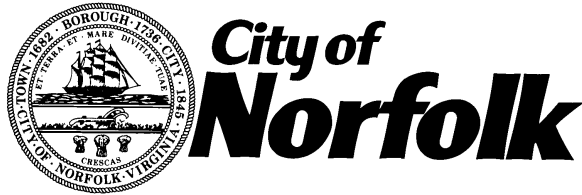
7.9. Annual Backflow Prevention Device Test Requirement Notice #2

Failure to comply with the [Annual Backflow Prevention Device Test Requirement Notice](#) within the number of days* as determined by the Authority will result in issuing a second **Assembly Test Requirement Notice**.

Included with the notice will be the necessary [Assembly Test Forms](#). The facility will be given a specific time frame to comply with [Annual Assembly Test Requirement Notice #2](#).

- * **The Authority reserves the right to adjust the number of days allocated for assembly testing.**

Annual Backflow Prevention Test Requirement Notice #2



Department of Utilities
Office of Cross Connection
6040 Waterworks Road - Norfolk, Virginia 23502
(757) 441-5774 ext [####], Fax (757) 441-5639

SECOND NOTICE

[Date]

[Name]
[Address]
[Address]

Dear [Name/title]:

Our records indicate that you have a backflow prevention device installed on your property. The City of Norfolk Code, Chapter 11, Article VII requires annual testing of these devices by a Licensed Backflow Prevention Device Tester.

It is important that backflow prevention devices be tested and certified on an annual basis to protect the public water supply. A test report form was sent to you to complete this requirement but as of this date, we have not received the completed test report form indicating compliance.

A second test report form is enclosed to complete this requirement. If you have had this device tested recently, please send the completed original test report form to the address above so we can show you are in compliance. One test report form is required for each device.

It is essential that you have your backflow prevention device tested and certified. The Cross Connection Office must receive proper confirmation that your device has been successfully tested and certified within 30 days after the due date. If confirmation is not received within 30 days after the due date, the Office of Cross Connection will initiate procedures to terminate water service to the property.

Should you have additional questions or require further assistance, please feel free to contact me at (757) [Phone number].

Sincerely,

[Name]
Cross Connection Inspector
Cross Connection Control Office

7.10. Shut-Off Notice - Assembly Testing

Termination* of water service will be for any of the following reasons:

- a) Imminent health threat
- b) Non-compliance (i.e.: Failure to test assemblies and submit assembly test forms)
- c) Refusal of entry

* Termination procedures to be determined by the Authority

7.11. Shut-Off Notice Procedure - Assembly Testing

Failure to comply with the second assembly test notice within the number of days as determined by the Authority will result in issuing an *Assembly Test Shut-Off Notice*. The notice may be sent registered mail, return receipt requested or other means of service as determined necessary by Authority.

7.12. Assembly Test Shut-Off Notice



City of Norfolk

Department of Utilities/Division of Water Quality
Office of Cross Connection
Waterworks Road
Norfolk, Virginia 23502
(757) 441-5774 – EXT 274, 272, 262 – FAX (757) 441-5639

FINAL NOTICE

March 3, 2021

Name
Address
City, State & Zip code

ATTN:

Our records indicate that you have a backflow prevention device installed on your property. The City of Norfolk Code, Chapter 11.1, and Article VII require annual testing of these devices by a Licensed Backflow Prevention Device Tester.

Test report forms were sent to you on two separate occasions to complete this requirement but as of this date, we have not received the completed test report form indicating compliance. You are currently over 30 days delinquent in having your backflow device tested and certified. **More importantly, you are currently in violation of Norfolk City Ordinance – Chapter 11.1 and Article VII- Sec. 11.1-120 Responsibility of owner as to testing, repair, etc., of protective devices and are jeopardizing the integrity and purity of the public water system.**

Within 48 hours we will initiate procedures to terminate water service to your property. Please have your backflow device tested and certified immediately. Once certified, please hand-deliver the completed test report form to the Office of Cross Connection located at 6040 Waterworks Road, Norfolk, Virginia, 23502

Should you have additional questions or require a new test report form, please feel free to contact me at (757) 441-5774 ext.274

Thank You,

[Name]
Cross Connection Inspector
Cross Connection Control Office

NEW SERVICE INSPECTIONS

7.13. Procedures

All plumbing plans and permits for a proposed building shall be reviewed by the appropriate City Authorities: Cross Connection Control Specialist, Plumbing Inspector, Building Inspector and building contractor(s). The Authority's Cross Connection Control Plan and Backflow Prevention requirements will be reviewed with the responsible party.

7.14. Inspections

The Authority/Agent conducting the cross connection control survey shall inspect the building/premises for compliance with the Cross Connection Control Program.

7.15. Compliance

Upon completion of the cross connection control inspection, if it is determined that the facility is in compliance and has met any required actions of this plan a certificate of occupancy may be initiated.

7.16. Non-Compliance

If the facility does not comply with the Cross Connection Control Program the Authority shall enforce this plan as required. The certificate of occupancy will not be initiated until compliance is achieved and approved.

8. PIPING IDENTIFICATION

8.1. Requirements

- 8.1.1.** When two or more piping systems are used for water in a building or industrial plant, extreme care should be taken not to interconnect the systems. There may be a potable water system and systems carrying lesser quality water such as for fire protection. To help prevent the possibility of two systems being interconnected, pipes must be identified adequately. Legends and color coding should be based on the American Standards Association "Scheme for Identification of Piping Systems" (ANSI A13.1) or an identification plan accepted by the Authority and posted throughout the facility.
- 8.1.2.** Color-coding and/or labeling should not be used solely to identify the contents of pipes but should be used supplementary to the use of legends. Potable water lines must be painted and/or labeled and the words "Potable Water" put on the pipe at appropriate intervals. Pipes carrying water for fire protection must be painted or labeled. Piping systems carrying other material, or water for other purposes, must also be clearly identified with the appropriate legends and color-coding. Flow arrows should be included to indicate the direction of flow.
- 8.1.3.** Each outlet on a non-potable water line that may be used for drinking or domestic purposes shall be posted: **DANGER-UNSAFE WATER or NONPOTABLE WATER-DO NOT DRINK.**
- 8.1.4.** When the piping system layout creates an unusual or extreme situation in a limited area of inaccessibility, the Authority may permit the use of permanently attached durable sign(s), or such segments of piping may require substitute techniques to achieve positive identification. The use of substitute techniques shall not deviate from ANSI A13.1 standards and must be approved by the Authority.
- 8.1.5.** All openings from which secondary water may be obtained shall have at all times a sign prominently posted within two (2) feet of the opening bearing the following warning: WATER UNSAFE FOR DRINKING. Such sign shall be at least eight (8) inches by ten (10) inches in size, prominently lettered in contrasting colors, with no letters less than one (1) inch in height. Signs are to be furnished and maintained by the owner of the secondary supply and must be of material and design acceptable to the Authority.

9. EMERGENCY RESPONSE PLAN

9.1. Emergency Response Plan Procedures

The City of Norfolk shall develop and maintain an Emergency Response Plan (ERP) document intended to facilitate in properly responding to a backflow event. The written ERP shall be readily available to designated personnel.

Investigative actions to address an actual or potential backflow event are intended to:

- a) Protect the distribution system from the spread of a contaminant detected in the water supply
- b) Quickly restore the quality of water in the distribution system if a contaminant has entered the system through backflow
- c) Prevent any further contamination of the distribution system

The facilities investigation should include these steps:

- Locate the source of contamination
- Isolate the source to protect the water distribution system from further contamination
- Determine the extent of the spread of contamination through the distribution system and provide timely, appropriate notification to the public and it's regulatory agencies as applicable
- Take corrective action to clean the contamination from the distribution system
- Restore water service

9.2. Emergency Scenarios

Common scenarios causing unintended backflow forcing execution of Emergency Response may include the following:

- a) Main water supply pipe break
- b) Internal facility water pipe break
- c) Internal facility – unprotected cross connection allowing contaminant to flow into potable water distribution system
- d) Report of illness due to water supply contamination
- e) Report of discolored water

9.3. Sample Emergency Response Plan

BACKFLOW INCIDENT REPORT FORM

There are many backflow incidents, which occur that are not reported. This is usually because they are of short duration, are not detected, the customer is not aware they should report it or it may not be known to whom the incident should be reported to. If you have any knowledge regarding incidents, please complete the form below and return it to the Municipal Engineer at the above address.

Reporting Agency: _____ Report Date: _____
Reported By: _____ Position: _____
Mail Address: _____ City: _____
Province: _____ Postal Code: _____ Telephone: _____
Date of Incident: _____ Time of Occurrence: _____
General Location (Street, etc.): _____

1. Backflow Originated From:

Name of Premise: _____
Street Address: _____ City: _____
Contact Person: _____ Telephone: _____
Type of Business: _____

2. Description of Contaminant(s):

(Attach Chemical Analysis if available)

3. Distribution of Contaminant(s):

Contained within customer's property: Yes: ___ No: ___
Number of persons affected: _____

4. Effect of Contamination:

Illness reported: _____

Physical irritation reported:

5. Cross Connection Source of Contaminant:

(boiler, chemical pump, irrigation system, etc.)

6. **Cause of Backflow:**
(main break, fire flow, etc.)

7. **Corrective Measures Taken to Restore Water Quality:**
(main flushing, disinfection, etc.)

8. **Corrective Action Ordered to Eliminate or Protect from Cross Connection:**
(type of backflow preventer, location, etc.)

9. **Previous Cross Connection Survey of Premise:**

Date: _____ By: _____

10. **Type(s) of Backflow Preventer Isolating Property:**

RP: ___ RPDA: ___ DCVA: ___ DCDA: ___ PVB: ___ SVBA: ___
AVB: ___ Air Gap: ___ None: ___ Other Type: _____

11. **Date of Latest Test of Device:** _____

12. **Notification of Health Department:**

Date: _____ Time: _____ Person Notified: _____

Attach sheets containing any additional information, sketches, etc. to the back of this form

10.REGULATIONS

Virginia Department of Health Cross Connection Control Regulations

Article 3. Cross Connection Control and Backflow Prevention in Waterworks.

12 VAC 5-590-580. General.

The purpose of this article is to require as a condition for the issuance and continued use of the operation permit for the waterworks that each owner of a waterworks establish and enforce a program of cross connection control and backflow prevention for each waterworks. The cross connection control and backflow prevention program shall be approved by the division prior to issuance of the operation permit (see Appendix I).

12 VAC 5-590-590. Cross connections.

A. The purveyor shall not install, maintain, or allow to be installed a water service connection to any premises where cross connections to a waterworks or a consumer's water system may exist unless such cross connections are abated or controlled to the satisfaction of the water purveyor or the division.

B. The purveyor shall not install, maintain, or allow to be installed any connection whereby water from an auxiliary water system may enter a waterworks or 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 water purveyor and by the division.

12 VAC 5-590-600. Responsibilities.

A. General. Effective cross connection control requires the cooperation of the water purveyor, the building official, the consumer, the Virginia Department of Health, and the backflow prevention device tester.

B. Water purveyor.

1. The purveyor shall establish or cause to be established and operate a cross connection control and backflow prevention program consistent with the extent of the system and the type of consumer served. This program shall include at least one designated individual who shall be responsible for the inspection of the waterworks for cross connection and backflow prevention control. This program shall be carried out in accordance with the Uniform Statewide Building Code and shall be a continuing program.
2. Suggested elements of this program are contained in Appendix I. The purveyor 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 purveyor shall have thorough inspections and operational tests made at least annually of backflow prevention devices which are required and installed at the service connection.
4. In the event of backflow of pollution or contamination into the waterworks, the purveyor shall promptly take or cause corrective action to confine and eliminate

12 VAC 5-590, *Waterworks Regulations*

the pollution or contamination. The purveyor shall immediately notify the division when backflow occurs.

5. The purveyor shall take positive action to ensure that the waterworks is adequately protected at all times. If a cross connection exists or backflow occurs into a consumer's water system or if the pressure in the waterworks is lowered below 10 psi gauge, the purveyor may discontinue the water service to the consumer and water service shall not be restored until the deficiencies have been corrected or eliminated to the satisfaction of the purveyor.

12 VAC 5-590-610. Containment policy.

A. An approved backflow prevention device shall be installed at each service connection to a consumer's water system where, in the judgment of the water purveyor or the division, a health, pollution, or system hazard to the waterworks exists.

B. When, as a matter of practicality, the backflow prevention device cannot be installed at the service connection, the device may be located downstream of the service connection but prior to any unprotected takeoffs.

C. A backflow prevention device shall be installed at each service connection to a consumer's water 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 shall include premises having sources or systems containing process fluids or waters originating from a waterworks which are no longer under the control of the water purveyor);

2. Premises having internal cross connections that, in the judgment of the water purveyor or the division, may not be easily correctable or have 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 a complete cross connection survey;

4. Premises having a repeated history of cross connections being established or reestablished;

5. Premises having fire protection systems utilizing combinations of sprinklers, fire loops, storage tanks, pumps, antifreeze protection, or auxiliary water sources including siamese connections (fire loops and sprinkler systems with openings not subject to flooding, and containing no antifreeze or other chemicals, no separate fire protection storage, or auxiliary sources, will not normally require backflow prevention); and

6. Other premises specified by the division or the purveyor when cause can be shown that a potential cross connection hazard not enumerated above exists.

D. Premises having booster pumps connected to the waterworks shall be equipped with a low pressure regulating or cutoff device to shut off the booster pump when the

pressure in the waterworks drops to a minimum of 10 psi gauge.

E. An approved backflow prevention device shall be installed at each service connection to a consumer's water system serving, but not necessarily limited to, the following types of facilities:

1. Hospitals, mortuaries, clinics, veterinary establishments, nursing homes, and medical buildings;
2. Laboratories;
3. Piers, docks, and waterfront facilities;
4. Sewage treatment plants, sewage pumping stations, or storm water pumping stations;
5. Food and beverage processing plants;
6. Chemical plants, dyeing plants and pharmaceutical plants;
7. Metal plating industries;
8. Petroleum or natural gas processing or storage plants;
9. Radioactive materials processing plants or nuclear reactors;
10. Car washes and laundries;
11. Lawn sprinkler systems, and irrigation systems;
12. Fire service systems;
13. Slaughter houses and poultry processing plants;
14. Farms where the water is used for other than household purposes;
15. Commercial greenhouses and nurseries;
16. Health clubs with swimming pools, therapeutic baths, hot tubs, or saunas;
17. Paper and paper products plants and printing plants;
18. Pesticide or exterminating companies and their vehicles with storage or mixing tanks;
19. Schools or colleges with laboratory facilities;
20. Highrise buildings (four or more stories);
21. Multiuse commercial, office, or warehouse facilities; and
22. Others specified by the purveyor or the division when reasonable cause can be shown for a potential backflow or cross connection hazard.

12 VAC 5-590-620. Type of protection required.

The type of protection required shall depend on the degree of hazard which exists or may exist and on the method of potential backflow. Backflow occurs either by back pressure or by back siphonage.

The degree of hazard, either high, moderate, or low, is based on the nature of the contaminant; the potential of the health hazard; the probability of the backflow occurrence; and the effect on waterworks structures, equipment, and appurtenances used in the storage, collection, purification, treatment, and distribution of pure water.

Table **(2.10 2.15)** shall be used as a guide to determine the degree of hazard for any situation.

A. Air gaps give the highest degree of protection and shall be used whenever practical to do so in high hazard situations subject to back pressure.

B. An air gap separation and a reduced pressure principle backflow prevention device will protect against back pressure when operating properly. Vacuum breakers will not protect against back pressure, but will protect against back-siphonage when operating properly.

C. Backflow prevention devices consisting of dual independent check valves with or without an intermediate atmospheric vent shall only be used in low hazard situations.

D. Barometric loops are not acceptable.

E. An interchangeable connection or change-over device has limitations which prevent its use where back pressure is present or may occur, the auxiliary supply is not an approved source, or the waterworks line pressure is less than 20 psi. Since this type connection is one of the easiest to bypass, the use of this type device will be approved only as a temporary and continuously supervised arrangement. In most instances, an approved device or method must be included and approved by the purveyor and division.

F. Reduced pressure principle type backflow preventers shall not be installed in pits or areas subject to flooding.

12 VAC 5-590-630. Backflow prevention devices.

A. Any backflow prevention device shall be of the approved type and shall comply with the Uniform Statewide Building Code.

B. Any backflow prevention device shall be installed in a manner approved by the water purveyor and in accordance with the Uniform Statewide Building Code.

C. Existing backflow prevention devices approved by the purveyor and the division prior to the effective date of this chapter shall, except for inspection, testing, and maintenance requirements, be excluded from the requirements of 12 VAC 5-590-600 A and B if the water purveyor and the division are assured that the devices will protect the waterworks.

TABLE **(2.10 2.15)**. DETERMINATION OF DEGREE OF HAZARD

Premises with one or more of the following conditions shall be rated at the corresponding degree of hazard.

- High Hazard
- The contaminant would be toxic, poisonous, noxious or unhealthy.
 - A health hazard would exist.
 - A high probability exists of a backflow occurrence either by back pressure or by back siphonage.
 - The contaminant would disrupt the service of piped water for drinking or domestic use.
 - Examples - sewage, used water, nonpotable water, auxiliary water systems, toxic or hazardous chemicals, etc.
- Moderate Hazard
- The contaminant would only degrade the quality of the water aesthetically or impair the usefulness of the water.
 - A health hazard would not exist.
 - A moderate probability exists of a backflow occurrence either by back pressure or by back siphonage.
 - The contaminant would not seriously disrupt service of piped water for drinking or domestic use.
 - Examples - Food stuff, nontoxic chemicals, nonhazardous chemicals, etc.
- Low Hazard
- The contaminant would only degrade the quality of the water aesthetically.
 - A health hazard would not exist.
 - A low probability exists of the occurrence of backflow primarily by back siphonage.
 - The contaminant would not disrupt service of piped water.
 - Examples - food stuff, nontoxic chemicals, nonhazardous, chemicals, etc.

American Water Works Association M14 Cross Connection Control Manual

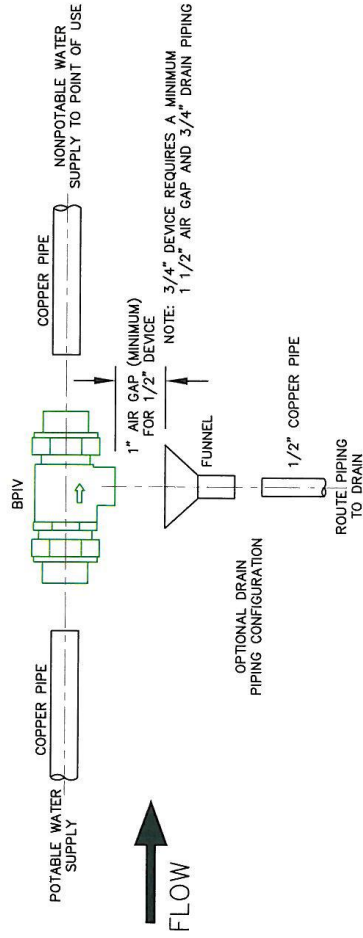
Uniform Statewide Building Code (USBC), Plumbing

USBC, Plumbing

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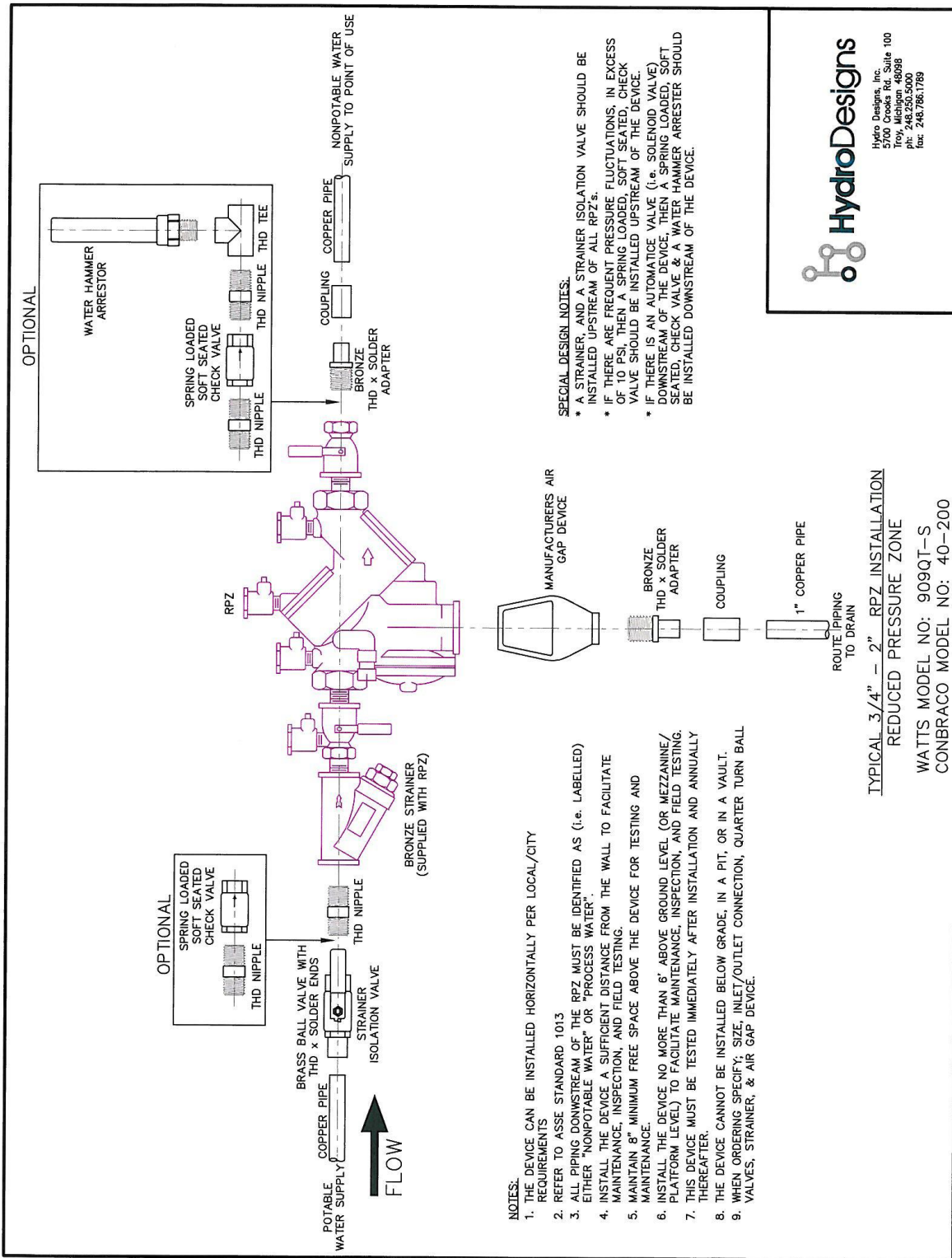
11. INSTALLATION SCHEMATICS

Drawings contained in this section are only “typical” installations for reference purposes. All new installations must be installed per code and manufacturer specifications.

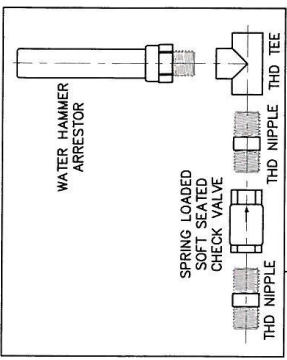


- NOTES:**
1. THE BPIV CAN BE INSTALLED VERTICALLY OR HORIZONTALLY.
 2. REFER TO MANUFACTURERS INSTALLATION & MAINTENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
 3. WHEN ORDERING SPECIFY: SIZE & INLET/OUTLET CONNECTION.

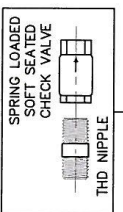
TYPICAL BPIV INSTALLATION
BACKFLOW PREVENTER WITH INTERMEDIATE VENT
 WATTS MODEL NO: 9D
 CONBRACO MODEL NO: 40-400



OPTIONAL



OPTIONAL



NOTES.

1. THE DEVICE CAN BE INSTALLED HORIZONTALLY PER LOCAL/CITY REQUIREMENTS
2. REFER TO ASSE STANDARD 1013
3. ALL PIPING DOWNSTREAM OF THE RPZ MUST BE IDENTIFIED AS (i.e. LABELLED) EITHER "NONPOTABLE WATER" OR "PROCESS WATER".
4. INSTALL THE DEVICE A SUFFICIENT DISTANCE FROM THE WALL TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
5. MAINTAIN 8" MINIMUM FREE SPACE ABOVE THE DEVICE FOR TESTING AND MAINTENANCE.
6. INSTALL THE DEVICE NO MORE THAN 6' ABOVE GROUND LEVEL (OR MEZZANINE/PLATFORM LEVEL) TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
7. THIS DEVICE MUST BE TESTED IMMEDIATELY AFTER INSTALLATION AND ANNUALLY THEREAFTER.
8. THE DEVICE CANNOT BE INSTALLED BELOW GRADE, IN A PIT, OR IN A VAULT.
9. WHEN ORDERING SPECIFY: SIZE, INLET/OUTLET CONNECTION, QUARTER TURN BALL VALVES, STRAINER, & AIR GAP DEVICE.

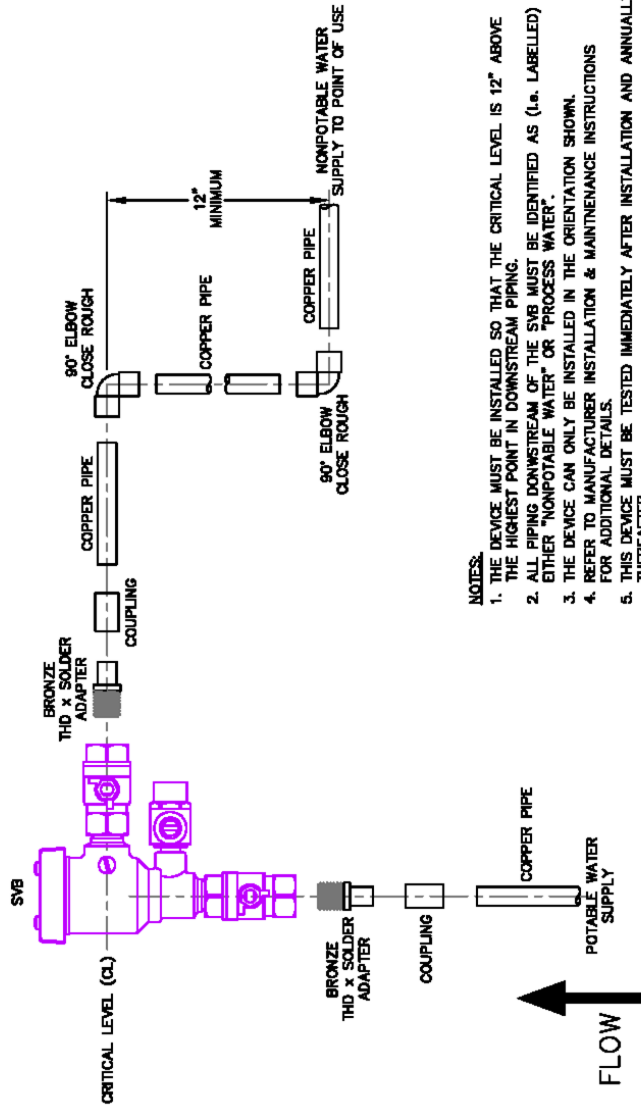
SPECIAL DESIGN NOTES.

- * A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPZ's.
- * IF THERE ARE FREQUENT PRESSURE FLUCTUATIONS, IN EXCESS OF 10 PSI, THEN A SPRING LOADED, SOFT SEATED, CHECK VALVE SHOULD BE INSTALLED UPSTREAM OF THE DEVICE.
- * IF THERE IS AN AUTOMATIC VALVE (i.e. SOLENOID VALVE) DOWNSTREAM OF THE DEVICE, THEN A SPRING LOADED, SOFT SEATED, CHECK VALVE & A WATER HAMMER ARRESTER SHOULD BE INSTALLED DOWNSTREAM OF THE DEVICE.

TYPICAL 3/4" - 2" RPZ INSTALLATION
REDUCED PRESSURE ZONE

WATTS MODEL NO: 909QT-S
CONBRACO MODEL NO: 40-200

Hydro Designs, Inc.
5700 Crocker Rd. Suite 100
Troy, Michigan 48068
ph: 248.255.5000
fax: 248.786.1789



NOTES:

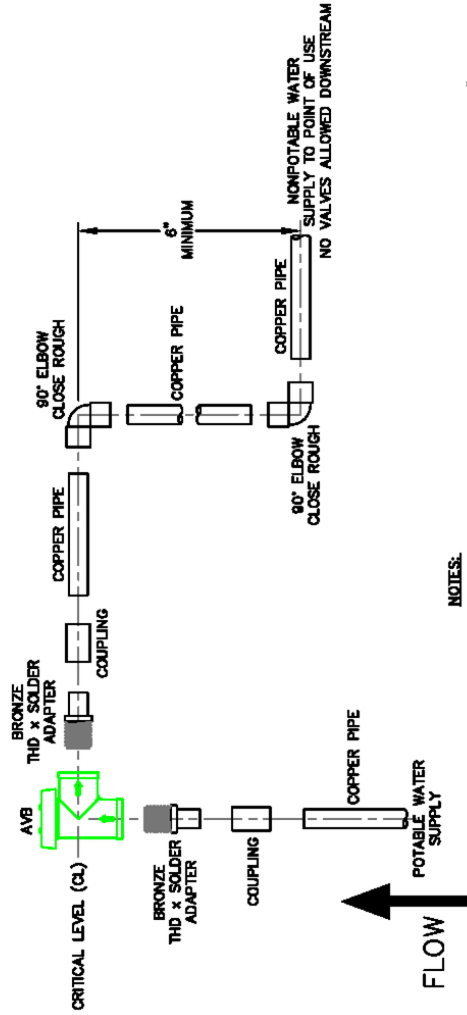
1. THE DEVICE MUST BE INSTALLED SO THAT THE CRITICAL LEVEL IS 12" ABOVE THE HIGHEST POINT IN DOWNSTREAM PIPING.
2. ALL PIPING DOWNSTREAM OF THE SVB MUST BE IDENTIFIED AS (1.6. LABELLED) EITHER "NONPOTABLE WATER" OR "PROCESS WATER".
3. THE DEVICE CAN ONLY BE INSTALLED IN THE ORIENTATION SHOWN.
4. REFER TO MANUFACTURER INSTALLATION & MAINTENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
5. THIS DEVICE MUST BE TESTED IMMEDIATELY AFTER INSTALLATION AND ANNUALLY THEREAFTER.
6. INSTALL THE DEVICE NO MORE THAN 6' ABOVE GROUND LEVEL (OR MEZZANINE/PLATFORM LEVEL) TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
7. INSTALL THE DEVICE A SUFFICIENT DISTANCE FROM THE WALL TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
8. MAINTAIN 8" MINIMUM FREE SPACE ABOVE THE DEVICE FOR TESTING AND MAINTENANCE.
9. THE DEVICE CANNOT BE INSTALLED BELOW GRADE, IN A PIT, OR IN A VAULT.
10. WHEN ORDERING SPECIFY: SIZE, INLET/OUTLET CONNECTION, & QUARTER TURN BALL VALVES.

TYPICAL SVB INSTALLATION
SPILL PROOF VACUUM BREAKER
 WATTS MODEL NO: 008QT
 CONBRACO MODEL NO: N/A



Hydro Designs, Inc.
 2222 Franklin Rd.
 Bloomington, IL 61704
 Phone: 248.335.3122
 Fax: 248.335.6699

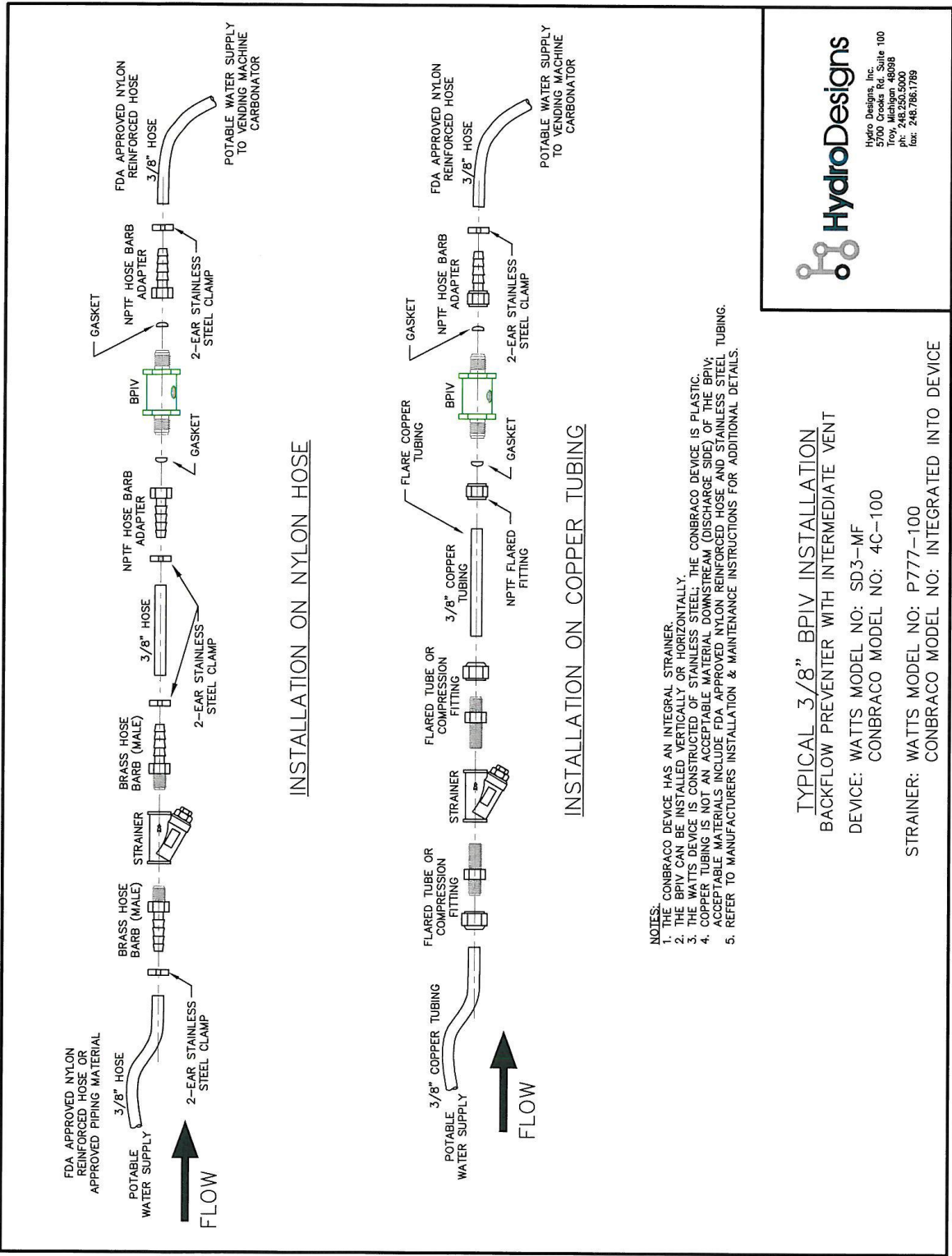
dwg. name: PWA.dwg effective: 2/17/02



- NOTES:**
1. THE DEVICE MUST BE INSTALLED SO THAT THE CRITICAL LEVEL IS 6" ABOVE THE HIGHEST POINT IN DOWNSTREAM PIPING.
 2. NO VALVES ARE ALLOWED DOWNSTREAM OF THE AVB
 3. ALL PIPING DOWNSTREAM OF THE AVB MUST BE IDENTIFIED AS (i.e. LABELLED) EITHER "NONPOTABLE WATER" OR "PROCESS WATER".
 4. THE DEVICE CAN ONLY BE INSTALLED IN THE ORIENTATION SHOWN.
 5. REFER TO MANUFACTURER INSTALLATION & MAINTENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
 6. WHEN ORDERING SPECIFY: SIZE & INLET/OUTLET CONNECTION.



TYPICAL AVB INSTALLATION
ATMOSPHERIC VACUUM BREAKER
WATTS MODEL NO: 288A-C
CONBRACO MODEL NO: 38-100



INSTALLATION ON NYLON HOSE

INSTALLATION ON COPPER TUBING

- NOTES:
1. THE CONBRACO DEVICE HAS AN INTEGRAL STRAINER.
 2. THE BPIV CAN BE INSTALLED VERTICALLY OR HORIZONTALLY.
 3. THE WATTS DEVICE IS CONSTRUCTED OF STAINLESS STEEL. THE CONBRACO DEVICE IS PLASTIC.
 4. COPPER TUBING IS NOT AN ACCEPTABLE MATERIAL DOWNSTREAM (DISCHARGE SIDE) OF THE BPIV. ACCEPTABLE MATERIALS INCLUDE FDA APPROVED NYLON REINFORCED HOSE AND STAINLESS STEEL TUBING.
 5. REFER TO MANUFACTURERS INSTALLATION & MAINTENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.



Hydro Designs, Inc.
 1000 N. J. Rd.
 Trumbull, CT 06620
 Tel: 248-256-5000
 Fax: 248-786-1789

TYPICAL 3/8" BPIV INSTALLATION

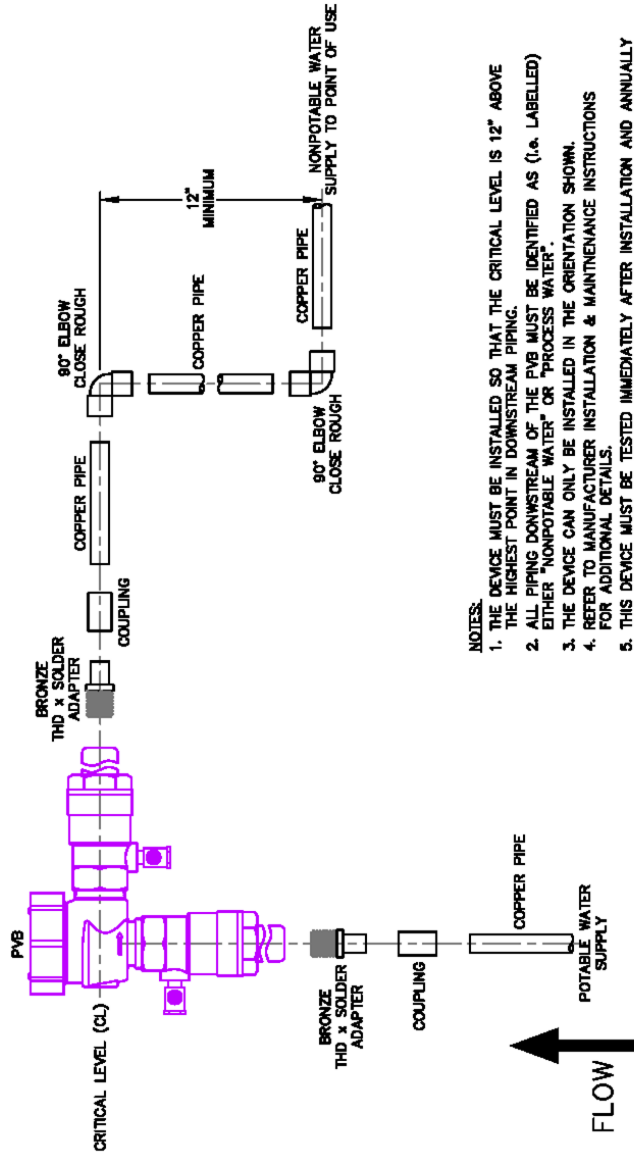
BACKFLOW PREVENTER WITH INTERMEDIATE VENT

DEVICE: WATTS MODEL NO: SD3-MF

CONBRACO MODEL NO: 4C-100

STRAINER: WATTS MODEL NO: P777-100

CONBRACO MODEL NO: INTEGRATED INTO DEVICE



NOTES:

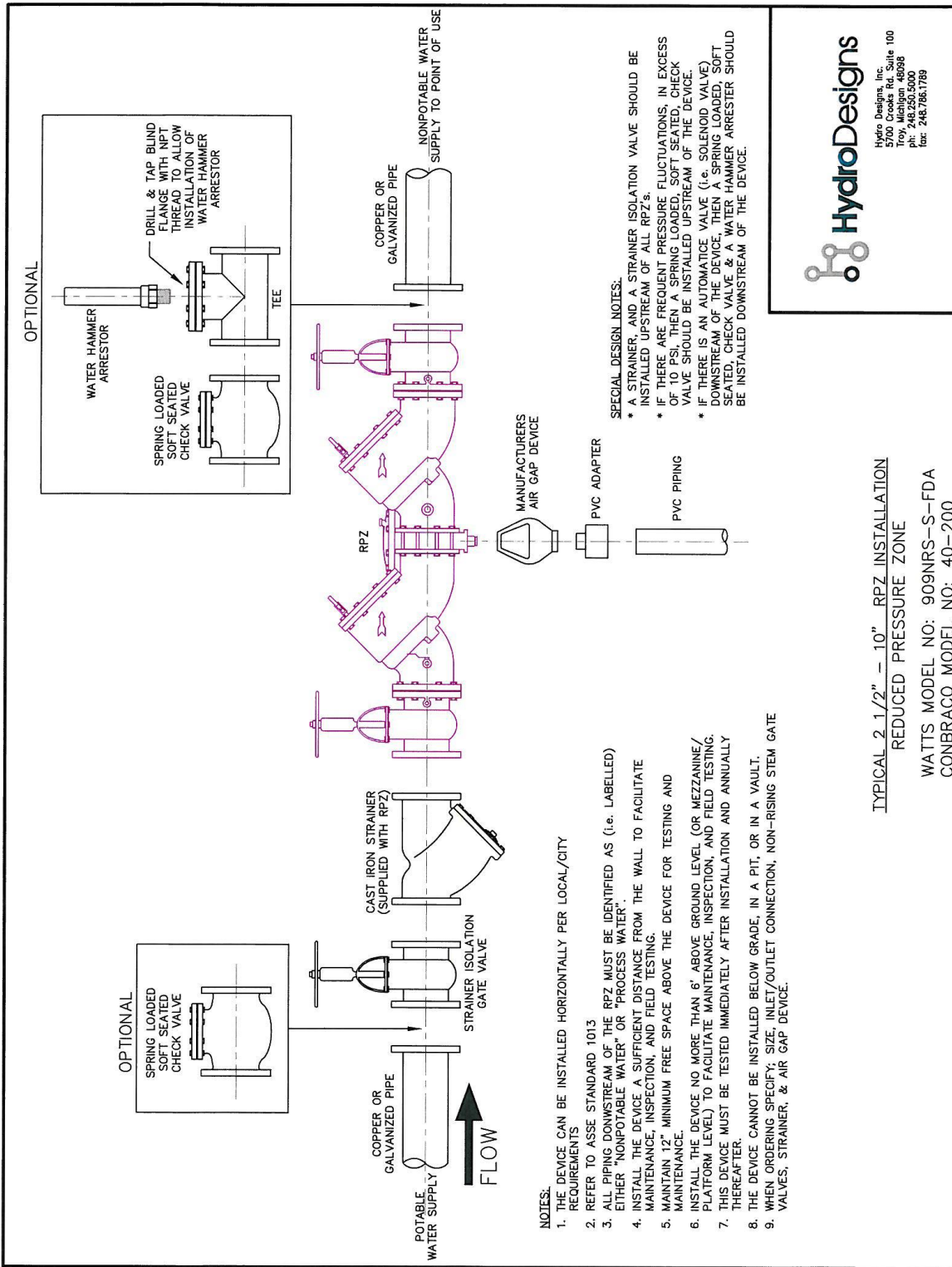
1. THE DEVICE MUST BE INSTALLED SO THAT THE CRITICAL LEVEL IS 12" ABOVE THE HIGHEST POINT IN DOWNSTREAM PIPING.
2. ALL PIPING DOWNSTREAM OF THE PVB MUST BE IDENTIFIED AS (I.e. LABELLED) EITHER "NONPOTABLE WATER" OR "PROCESS WATER".
3. THE DEVICE CAN ONLY BE INSTALLED IN THE ORIENTATION SHOWN.
4. REFER TO MANUFACTURER INSTALLATION & MAINTENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
5. THIS DEVICE MUST BE TESTED IMMEDIATELY AFTER INSTALLATION AND ANNUALLY THEREAFTER.
6. INSTALL THE DEVICE NO MORE THAN 6' ABOVE GROUND LEVEL (OR MEZZANINE/PLATFORM LEVEL) TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
7. INSTALL THE DEVICE A SUFFICIENT DISTANCE FROM THE WALL TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
8. MAINTAIN 8" MINIMUM FREE SPACE ABOVE THE DEVICE FOR TESTING AND MAINTENANCE.
9. THE DEVICE CANNOT BE INSTALLED BELOW GRADE, IN A PIT, OR IN A VAULT.
10. WHEN ORDERING SPECIFY: SIZE, INLET/OUTLET CONNECTION, & QUARTER TURN BALL VALVES.

TYPICAL PVB INSTALLATION
PRESSURE VACUUM BREAKER
WATTS MODEL NO: 800M4QT
CONBRACO MODEL NO: 40-500



Hydro Designs, Inc.
 2222 Franklin Rd.
 Rockville, MD 20850
 Tel: 301.330.3122
 Fax: 248.335.8558

dwg. name: PVB.dwg effective: 2/27/02



- NOTES:**
1. THE DEVICE CAN BE INSTALLED HORIZONTALLY PER LOCAL/CITY REQUIREMENTS
 2. REFER TO ASSE STANDARD 1013
 3. ALL PIPING DOWNSTREAM OF THE RPZ MUST BE IDENTIFIED AS (I.E. LABELLED) EITHER "NONPOTABLE WATER" OR "PROCESS WATER".
 4. INSTALL THE DEVICE A SUFFICIENT DISTANCE FROM THE WALL TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
 5. MAINTAIN 12" MINIMUM FREE SPACE ABOVE THE DEVICE FOR TESTING AND MAINTENANCE.
 6. INSTALL THE DEVICE NO MORE THAN 6' ABOVE GROUND LEVEL (OR MEZZANINE/PLATFORM LEVEL) TO FACILITATE MAINTENANCE, INSPECTION, AND FIELD TESTING.
 7. THIS DEVICE MUST BE TESTED IMMEDIATELY AFTER INSTALLATION AND ANNUALLY THEREAFTER.
 8. THE DEVICE CANNOT BE INSTALLED BELOW GRADE, IN A PIT, OR IN A VAULT.
 9. WHEN ORDERING SPECIFY: SIZE, INLET/OUTLET CONNECTION, NON-RISEING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.

- SPECIAL DESIGN NOTES:**
- * A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPZ's.
 - * IF THERE ARE FREQUENT PRESSURE FLUCTUATIONS, IN EXCESS OF 10 PSI, THEN A SPRING LOADED, SOFT SEATED, CHECK VALVE SHOULD BE INSTALLED UPSTREAM OF THE DEVICE.
 - * IF THERE IS AN AUTOMATIC VALVE (I.E. SOLENOID VALVE) DOWNSTREAM OF THE DEVICE, THEN A SPRING LOADED, SOFT SEATED, CHECK VALVE & A WATER HAMMER ARRESTER SHOULD BE INSTALLED DOWNSTREAM OF THE DEVICE.



TYPICAL 2 1/2" - 10" RPZ INSTALLATION
 REDUCED PRESSURE ZONE
 WATTS MODEL NO: 909NRS-S-FDA
 CONBRACO MODEL NO: 40-200

12.SUMMARY OF FACILITY TYPES REQUIRING CONTAINMENT

High Hazard Facilities that shall require containment on the service line with an approved Reduced Pressure Principle Backflow Prevention Assembly (ASSE 1013) include, **but may not be limited to:**

- Battery Manufacturer
- Bottling Plant
- Brewery
- Cannery
- Car Wash
- Chemical Plant
- Commercial Greenhouses and Nurseries
- Commercial Laundry
- Dairy
- Dental Office
- Dry Cleaner
- Dye Works
- Farming Operations
- Fertilizer Plant
- Film Lab
- Facility w/Fire P. System/ Chemical Additives
- Facility with Hydropneumatic Tanks
- Facility with Boilers and Heat Exchangers
- Facility with Auxiliary Water Supply
- Facility with Cooling Tower/Systems
- Food and Beverage Processing Plant
- Hospital or Clinic
- Laboratories
- Facility with Irrigation Systems (Chemical Additives)
- Facility with Reclaimed or Recycled Water System(s)
- Lawn Care Companies
- Lawn Irrigation Systems
- Marine Facilities
- Medical Building
- Metal Processing and Plating Plants
- Mortuary
- Multistoried Buildings (four or more stories)
- Nursing Home
- Nursery/Greenhouse
- Oil and Gas Storage/Production
- Paper Production Plants
- Petroleum or Natural Gas Processing/Storage Plants
- Piers, Docks and Waterfront Facilities
- Pharmaceutical Plant
- Power Plant
- Radioactive Handling
- Recycling Facility
- Restaurant
- Schools/Colleges with Laboratory Facilities
- Sewage Treatment Plant
- Slaughter Houses and Poultry Processing Plants
- Swimming Pool
- Veterinary Hospital/Establishment
- Pesticide/Exterminating Companies and their vehicles with storage/mixing tanks
- Health clubs with Swimming Pools, Therapeutic Baths, Hot Tubs, or Saunas