

COMMISSIONERS OF PUBLIC WORKS
of the
CITY OF CHARLESTON, SOUTH CAROLINA



Clean Water for Life

**CROSS-CONNECTION CONTROL
PROGRAM MANUAL**

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About this Manual

Charleston Water System, formally known as the Commissioners of Public Works of the City of Charleston, South Carolina, provides public water and wastewater service to the Greater Charleston area. Our potable water service area extends from Lincolville in the northwest, to Mount Pleasant in the northeast, to Johns Island in the southeast, and to the Towns of Hollywood, Ravenel, and Meggett in the west. Potable water is transported from our Hanahan Water Treatment Plant through large trunk mains, which are then connected to transmission mains that distribute water throughout our service area. The water distribution system is comprised of over 1,700 miles of piping, ranging in size from 2 ¼-inch to 48-inches in diameter, providing clean water to over 100,000 residential and commercial customer accounts.

Charleston Water System's mission *is to protect public health and enhance the environment of our service community by providing clean water services of exceptional quality and value.*

Safeguarding the public water system is an essential part of our mission to protect public health. Each connection to the public water system, whether it is a residential home or a commercial business, represents an opportunity for non-potable water to enter the public water system. To protect against this occurrence, Charleston Water System established a service area wide Cross-Connection Control Program. Administered through the Cross-Connection Control Department, Program responsibilities include reviewing all connections to the public water system, assessing the degree of hazard, and determining the appropriate level of protection. Responsibilities also include recommending cross-connection control policies and procedures and communicating Program requirements to Customers, backflow prevention assembly Installers and Testers.

The intended goal of this manual is to serve as the primary means for communicating Program requirements. To facilitate ease of communication, this manual is divided into the following sections: Program Overview, Customer Responsibilities, Installation and Inspection, Testing, Frequently Asked Questions, and Definition of Terms.

We hope the information provided in this manual is helpful. As always, your questions and feedback concerning Charleston Water System's Cross-Connection Control Program are welcomed and may be directed by email to backflow@charlestoncpw.com or by telephone at 843-727-7148. For additional information concerning Charleston Water System, please visit our web site at www.charlestonwater.com.

ISO 14001 Certification

Charleston Water System is certified under ISO 14001, the international standard for environmental management. Through our environmental management system, we prevent pollution, protect public health, and adhere to all legal and other requirements.

All parties performing work that may impact Charleston Water System, whether directly or indirectly, must adhere to our policies, which require strict adherence to all permits, regulations, and procedures in order to prevent any adverse impact to the environment. Deviation could result in disapproval of work and/or removal from approved lists.

To learn more about our environmental management system and ISO 14001 certification, visit our website www.charlestonwater.com.



Cross-connection control program manual

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Attachments

Acknowledgement of understanding	Revised 2/21/12
Approved field testing procedures for backflow prevention	Revised 2/21/12
Backflow prevention assembly installation guide	Revised 2/21/12
Field test report	Revised 2/21/12
Field test report fax cover sheet	Revised 2/21/12
System Protection Questionnaire	Revised 2/21/12

Section 1: Program Overview

A. Cross-Connection

The University of Southern California Foundation for Cross-Connection Control and Hydraulic Research defines a cross-connection as any actual or potential connection or structural arrangement between a public potable water system and any other source or system through which it is possible to introduce into any part of the potable water system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied.

Each Customer connection to the public water system represents a cross-connection and must be protected to prevent the backflow of water from a non-public system into the public system. Backflow is defined as the reversal of the normal direction of flow of water caused by either backpressure or backsiphonage. Backpressure occurs when the pressure on the Customer's side of the water meter is greater than the pressure on the public water system. This could occur as a result of pumps, elevated piping, steam pressure, air pressure, etc., connected to the Customer's system. Backsiphonage is a form of backflow due to a reduction in system pressure, which causes a sub-atmospheric pressure to exist in the public water system. This can occur as a result of a sudden drop in the public water system pressure resulting from such actions as a water main break, operation of a fire hydrant, or a sudden reduction in pumping capacity at the water treatment plant.

The Customer's connection to the public water system begins at the water meter and all piping on the Customer's side of the meter is considered part of a non-public system. Residential dual check valves, non-testable devices installed with each water meter, provide a basic level of system protection against backflow by limiting the flow of water through the water meter to one direction; from the public water system to the Customer.

When the degree of hazard presented by the Customer requires a higher level of system protection, the Customer will be required to install an approved backflow prevention assembly or Air-Gap separation.

B. Degree of Hazard

1. The type of backflow prevention assembly required is dependent on the degree of hazard presented by the Customer. Hazards are classified as either High Hazard Cross-Connections or Low Hazard Cross-Connections with special classifications for lawn irrigation systems and fire sprinkler systems.
 - a. High Hazard - A high hazard cross-connection is a connection between an approved public water system and a service or auxiliary

water system which has or may have any material in the water dangerous to health, or connected to any material dangerous to health, that is or may be handled under pressure, or subject to negative pressure.

b. Low Hazard - A low hazard cross-connection is a connection between an approved public water system and another water source not hazardous to health but not meeting the standards of the approved public water system and not cross-connected within its system with a potentially dangerous substance.

c. Lawn Irrigation Systems

Any lawn irrigation system directly or indirectly connected to the public water system is defined as a high hazard.

d. Fire Sprinkler Systems

1. High Hazard Fire Sprinkler Systems – High hazard category fire sprinkler systems shall include, but not be limited to: antifreeze systems, foam systems, systems charged from or tied into ponds, lakes, streams, or any water source other than the approved public water supply.

2. Low Hazard Fire Sprinkler Systems – A low hazard fire sprinkler system is any fire sprinkler system not meeting the definition of a high hazard fire sprinkler system.

3. Single Family Residential Fire Suppression Systems – A flow-through or combination protection system, served through a single dual-purpose water service, designed and certified by a NICET Level IV licensed fire suppression system designer as meeting the requirements of NFPA 13.

C. Assessment of Degree of Hazard

An assessment of the degree of hazard is performed by a Cross-Connection Compliance Inspector for each Customer account. An assessment begins with identifying the account classification. Accounts are classified as Residential, Commercial, Dedicated Lawn Irrigation, or Fire Service. Often, the degree of hazard assessment can be completed based solely on the account classification. If the degree of hazard assessment cannot be completed based on the account classification, a [System Protection Questionnaire](#) will be mailed to the Customer. The returned questionnaire is then used by the Cross-Connection Compliance Inspector to complete the degree of hazard assessment. In the unlikely event the degree of hazard assessment still cannot be completed, the Cross-

Connection Compliance Inspector will contact the Customer to clarify and confirm information, or to answer any questions that remain. If necessary, a site visit may be performed.

D. System Protection

Upon completion of the degree of hazard assessment and a determination that the Customer connection presents a potential hazard to the public water system, the appropriate system protection is identified by the Cross-Connection Compliance Inspector in accordance with the following requirements:

1. High Hazard Cross-Connections – Protection shall be by an approved Reduced Pressure Principle Assembly or by Air-Gap separation.
2. Low Hazard Cross-Connections – At a minimum, an approved Double Check Valve Assembly must be installed on a low hazard cross-connection.
3. Lawn Irrigation Systems
 - a. Any lawn irrigation system directly or indirectly connected to the public water system that includes chemical injection, or is connected to another water source which is not an approved public water system – Protection shall be by an approved Reduced Pressure Principle Assembly.
 - b. Any lawn irrigation system directly or indirectly connected to the public water system that does not include chemical injection, and is not connected to another water source which is not an approved public water system – Protection shall be provided by, at a minimum, an approved Pressure Vacuum Breaker Assembly.
 - c. For applications where the required minimum 12-inch vertical separation between the Pressure Vacuum Breaker Assembly and all downstream piping cannot be maintained, protection shall be by an approved Reduced Pressure Principle Assembly. (See [Backflow Assembly Installation Guide](#) located in Appendix A)
4. Fire Sprinkler Systems
 - a. High Hazard Fire Sprinkler Systems – Protection shall be by an approved Reduced Pressure Principle Assembly.
 - b. Low Hazard Fire Sprinkler Systems – At a minimum, an approved Double Check Valve Assembly must be installed on a low hazard fire sprinkler system.

- c. Single Family Residential Fire Sprinkler Systems – No backflow prevention assembly is required for residential fire sprinkler systems served through a single dual-service water system and meeting the requirements of NFPA 13.

5. Special Circumstances

When a determination is made that a Customer's water service connection does not present a potential hazard as currently configured, but conditions exist whereby the opportunity is readily available for the configuration and resulting hazard to change, it is classified as a special circumstance. In such cases no system protection will be required, provided the Customer acknowledges by signing and dating an [Acknowledgement of Understanding](#) that the Customer agrees to contact the Cross-Connection Control Department prior to performing any reconfiguration of the water service connection, or initiating any change in water use.

Examples of special circumstances include, but are not limited to:

- a. Dedicated lawn irrigation metered service connected to an outside faucet or hose bibb only.
- b. Existing lawn irrigation system cut, capped and removed from service.

E. Notification to Install

Upon determination of the requirement for system protection, a notification letter will be mailed to the Customer identifying the size and type of backflow prevention assembly required. Included with the notification letter will be a copy of Charleston Water System's [Backflow Assembly Installation Guide](#). Installation of the backflow assembly is the Customer's responsibility and must be performed in accordance with Program requirements. Installation of the backflow prevention assembly and a request for inspection must be completed within 30 days of notification to install.

F. Inspection

Upon completion of installation, each backflow assembly must be inspected by a Charleston Water System Cross-Connection Compliance Inspector to verify installation is in accordance with Program requirements. Typically, when installed by a private contractor, the contractor will contact Charleston Water System to schedule the inspection. Regardless of who performs the installation, ultimate responsibility for ensuring an inspection is scheduled is the Customer's. To schedule an inspection, call the Backflow Inspection Request Line at 843-727-6981, or contact us by email at backflow@charlestoncpw.com. The following

information is required to schedule an inspection: Make, model, size, serial number, and physical location of the backflow prevention assembly on the property.

G. Testing

Upon completion of installation and successful inspection by Charleston Water System, testing of the backflow prevention assembly must be performed by a Charleston Water System [Approved Backflow Prevention Assembly Tester](#) (Approved Tester). Testing must also be performed when an existing assembly is replaced or returned to service after repair.

In addition to testing after installation or return to service, testing is an annual requirement.

Testing is the responsibility of the Customer. For a complete list of Charleston Water System [Approved Testers](#), please visit our website at www.charlestonwater.com or contact the Cross-Connection Control Department by telephone at 843-727-7148, or by email at backflow@charlestoncpw.com.

H. Backflow Administration Fee

A fee charged to Customers to offset the cost of maintaining a Cross-Connection Control Program. The fee is assessed annually on each backflow prevention assembly. Residential irrigation customers are exempt from this fee.

I. Failure to Comply

Failure to comply with Cross-Connection Control Program requirements may delay new water service connection or may result in discontinuance of an existing water service.

Section 2: Customer Responsibilities

A. Overview

Protection of the public water system is a shared responsibility between Charleston Water System and the Customer. Customer responsibilities for cross-connection compliance begin at the time of application for water service or whenever there is a change in water use. Examples of a change in water use include installation of a lawn irrigation system or a change in business activity at a commercial establishment. Whether requesting a new water service or notifying of a change in water use, timely and accurate information is critical to ensure proper system protection.

B. System Protection Questionnaire

If the information provided at the time of application or upon notification of a change in water use is not sufficient to assess the degree of hazard, a [System Protection Questionnaire](#) will be mailed to the Customer. It is the Customer's responsibility to complete and return the questionnaire within 14 days upon receipt.

C. Installation

Upon determination of the requirement for system protection, a notification letter will be mailed to the Customer identifying the size and type of backflow prevention assembly required. Included with the notification letter will be a copy of Charleston Water System's [Backflow Assembly Installation Guide](#).

Installation of the backflow prevention assembly is the responsibility of the Customer. However, Charleston Water System has no specific requirements for who performs the installation, provided such installation is in accordance with Program requirements. Customers are encouraged to check with local building officials for any license or permits that may be required for installation.

D. Inspection

Each backflow assembly installation must be inspected by a Charleston Water System Cross-Connection Compliance Inspector to verify installation is in accordance with Program requirements. Typically, when installed by a private contractor, the contractor will contact Charleston Water System to schedule the inspection. Regardless of who performs the installation, ultimate responsibility for ensuring an inspection is scheduled is the Customer's.

Installation of the backflow prevention assembly and a request for inspection must be completed within 30 days of the notification to install. To schedule an inspection, call the Backflow Inspection Request Line at 843-727-6981, or

contact us by email at backflow@charlestoncpw.com. The following information is required to schedule an inspection: Make, model, size, serial number, and physical location of the backflow prevention assembly on the property.

If the installation does not pass inspection, the Installer and/or Customer will be notified of the discrepancies. Once the installation passes inspection, the water service will be approved for activation.

E. Testing

Each backflow prevention assembly must be tested to ensure the assembly is operating properly. Testing is required after installation or when an existing assembly is replaced or returned to service after repair.

In addition to testing after installation or return to service, testing is an annual requirement.

Testing must be performed by a Charleston Water System [Approved Backflow Prevention Assembly Tester](#) (Approved Tester).

1. Notification to Test
 - a. After Installation - Upon successful completion of inspection by a Charleston Water System Cross-Connection Compliance Inspector, a notification letter will be mailed to the Customer identifying the requirement for backflow assembly testing.
 - b. Annually - An annual notification letter will be mailed to the Customer identifying the requirement for backflow assembly testing. Notification letters are mailed approximately 30 days prior to the test due date.
2. Approved Backflow Prevention Assembly Tester

Testing must be performed by a Charleston Water System [Approved Tester](#). An [Approved Tester](#) is an independent contractor who is certified by SC DHEC and approved by Charleston Water System to test backflow assemblies for Charleston Water System Customers. [Approved Testers](#) are trained on Program requirements and work within these requirements to facilitate accurate and consistent backflow prevention testing for our Customers.

[Approved Testers](#) are not employees of Charleston Water System. It is incumbent upon the Customer to fully investigate and satisfy themselves as to the Tester's business practices or any other areas the Customer deems necessary.

For a complete list of Charleston Water System [Approved Testers](#), please visit our website at www.charlestoncpw.com or contact the Cross-Connection Control Department by telephone at 843-727-7148, or by email at backflow@charlestoncpw.com.

3. Scheduling a Test

It is the responsibility of the Customer to contact an [Approved Tester](#) to schedule a test. Tests for new installations must be completed and submitted to Charleston Water System within 10 days upon notification to test. Annual testing must be completed and submitted to Charleston Water System within 30 days upon notification to test.

Submittal of the test is the responsibility of the Tester. However, Charleston Water System highly encourages Customer's to confirm with their Tester that the test has been submitted and received by Charleston Water System.

F. Special Circumstances

When a determination is made that a Customer's water service connection does not present a potential hazard as currently configured, but conditions exist whereby the opportunity is readily available for the configuration and resulting hazard to change, it is classified as a special circumstance. In such cases no system protection will be required, provided the Customer acknowledges by signing and dating an [Acknowledgement of Understanding](#) that the Customer agrees to contact the Cross-Connection Control Department prior to performing any reconfiguration of the water service connection, or initiating any change in water use.

Examples of special circumstances include, but are not limited to:

1. Dedicated lawn irrigation metered service connected to an outside faucet or hose bibb only.
2. Existing lawn irrigation system cut, capped and removed from service.

G. Backflow Administration Fee

A fee charged to Customers to offset the cost of maintaining a Cross-Connection Control Program. The fee is assessed annually on each backflow prevention assembly. Residential irrigation customers are exempt from this fee.

H. Failure to Comply

Failure to comply with Cross-Connection Control Program requirements may delay new water service connection or may result in discontinuance of an existing water service.

Section 3: Installation and Inspection

A. Installation Overview

Proper installation of the backflow prevention assembly plays a crucial role in safeguarding the public water system by helping to ensure the assembly performs as it is intended while providing proper access for testing, maintenance and repair. To facilitate proper installation, Charleston Water System has developed installation requirements specific for each type of assembly; Double Check Valve Assembly (DCVA), Reduced Pressure Principle Assembly (RP), and Pressure Vacuum Breaker (PVB). Additionally, installation requirements have been developed for the Air-Gap method of backflow prevention, which may be used in certain circumstances in lieu of a backflow prevention assembly when approved by Charleston Water System.

B. The Installer

Installation of the backflow prevention assembly is the responsibility of the Customer. However, Charleston Water System has no specific requirements for who performs the installation, provided such installation is in accordance with Program requirements. Customers are encouraged to check with local building officials for any license or permits that may be required for installation.

C. Inspection

Each backflow assembly installation must be inspected by a Charleston Water System Cross-Connection Compliance Inspector to verify installation is in accordance with Program requirements. Typically, when installed by a private contractor, the Installer will contact Charleston Water System to schedule the inspection. Regardless of who performs the installation, ultimate responsibility for ensuring an inspection is scheduled is the Customer's.

Installation of the backflow prevention assembly and a request for inspection must be completed within 30 days of the notification to install. To schedule an inspection, call the Backflow Inspection Request Line at 843-727-6981, or contact us by email at backflow@charlestoncpw.com. The following information is required to schedule an inspection: Make, model, size, serial number, and physical location of the backflow prevention assembly on the property.

If the installation does not pass inspection, the Installer and/or customer will be notified of the discrepancies.

D. Choosing an Approved Assembly

1. Assemblies approved for installation must appear on the current list of Approved Backflow Assemblies as published by the University of Southern

California Foundation for Cross-Connection Control and Hydraulic Research; otherwise known as being “USC approved”.

2. To identify an assembly as USC approved, check the product specification sheet that comes with the assembly, or ask your plumbing supply company. For additional information concerning approved assemblies, contact the Cross-Connection Control Department by telephone at 843-727-7148, or by email at backflow@charlestoncpw.com.

E. Proper Assembly Installation

1. Assembly shall be installed in accordance with Program requirements and Charleston Water System’s [Backflow Assembly Installation Guide](#). Any request for variation must be approved by a Charleston Water System Cross-Connection Control Compliance Inspector prior to installation.
2. Assembly shall be installed on the Customer’s side of the water meter prior to any tap, tee or service connection.
3. Installed assembly shall be easily accessible for in-line maintenance and testing.
4. All shut-off valves must be physically attached to the backflow prevention assembly for unobstructed operation at the assembly.
5. Manufacturers’ nameplate, test cock, air-inlet valve, bonnet or relief valve vent openings shall not be obstructed.
6. Connections to test cocks will not be permitted. Connections include, but are not limited to hose bibbs, pipes, gauges or any other fittings. Approved freeze-protection devices with an external test cock may be installed on the last test cock only.
7. Installed assembly shall be rigid and stable. Charleston Water System reserves the right to require additional support and restraint.
8. Double Check Valve Assemblies 3/4-inch to 2-inch may be installed above ground or below ground. All other assemblies must be installed above ground.
9. Above ground installations, provide a minimum 12-inch, maximum 36-inch clearance below bottom of assembly.
10. Below ground installations, provide a minimum 6-inch clearance on all sides and top.

11. Black iron, black steel or galvanized steel pipe shall not be used in the upstream piping prior to the backflow preventer.
12. Bypass piping is not allowed unless a backflow prevention assembly of equal or greater protection is installed on the bypass.

F. Assembly Protection

Backflow assemblies are often subject to environmental conditions that place them at a high risk for damage. Risks include exposure to freezing temperatures, vehicular traffic, and theft or vandalism. When practical, Charleston Water System recommends installing the backflow assembly indoors, such as in a mechanical room. When not practical, Charleston Water System recommends the following assembly protection:

1. Freeze Protection – When installing freeze protection assembly should remain unobstructed for operation, inspection and testing. Examples of freeze protection include:
 - a. Insulated enclosures
 - b. Padded wraps
 - c. Blankets
 - d. Freeze protection valves
2. Vehicular Traffic Protection – When assemblies are placed in areas subject to damage by vehicular traffic, such as in or adjacent to roadways, driveways, or parking lots, the following protection is recommended:
 - a. Traffic-rated boxes or below-ground enclosures
 - b. Bollards
3. Theft/Vandalism – Assemblies are being stolen or vandalized more often due to the increasing prices for scrap brass and copper. Some effective deterrents to thieves or vandals are:
 - a. Screened or locking enclosures set on a concrete pad
 - b. Anchors, ties, or locks

G. Replacing or Restoring to Service

When replacing or restoring an existing assembly to service, the following procedures apply:

1. Replacing

- a. Reassessment – Prior to replacing an existing backflow assembly, contact the Cross-Connection Control Department to request a reassessment of system protection requirements. The purpose of a reassessment is to ensure system protection is in accordance with the most current Program requirements.
- b. Inspection - When an existing backflow assembly is replaced, the new assembly must be inspected by a Charleston Water System Cross-Connection Control Compliance Inspector to verify installation is in accordance with Program requirements. A request for inspection must be received within 2 days of installation.
- c. Testing – When an existing backflow assembly is replaced, the new assembly must be tested by a Charleston Water System Approved Tester. Testing must be performed within 10 days upon successful completion of inspection by a Charleston Water System Cross-Connection Compliance Inspector.

2. Restoring to Service

When an existing backflow assembly is restored to service after previously being removed service, the assembly must be tested by a Charleston Water System Approved Tester. Testing must be performed within 10 days upon restoring the assembly to service.

Section 4: Testing

A. Overview

Each backflow assembly must be tested to ensure the assembly is operating properly. Testing is required after installation or when an existing assembly is replaced or returned to service after repair.

In addition to testing after installation or return to service, testing is an annual requirement.

Testing must be performed by a Charleston Water System [Approved Backflow Prevention Assembly Tester](#).

B. Notification to Test

1. After Installation - Upon successful completion of inspection by a Charleston Water System Cross-Connection Compliance Inspector, a notification letter will be mailed to the Customer identifying the requirement for backflow assembly testing.
2. Annually - An annual notification letter will be mailed to the Customer identifying the requirement for backflow assembly testing. Notification letters are mailed approximately 30 days prior to the test due date.

C. Approved Backflow Prevention Assembly Tester

1. Overview

A Charleston Water System [Approved Backflow Prevention Assembly Tester](#) (Approved Tester) is an independent contractor who is certified by SC DHEC and approved by Charleston Water System to test backflow assemblies for Charleston Water System Customers. [Approved Testers](#) are trained on Program requirements and work within these requirements to facilitate accurate and consistent backflow prevention testing.

[Approved Testers](#) are not employees of Charleston Water System. It is incumbent upon the Customer to fully investigate and satisfy themselves as to the Tester's business practices or any other areas the Customer deems necessary.

For a complete list of Charleston Water System [Approved Testers](#), please visit our website at www.charlestoncpw.com or contact the Cross-Connection Control Department by telephone at 843-727-7148, or by email at backflow@charlestoncpw.com.

2. Tester Requirements

Testers must maintain the following requirements to be listed as a Charleston Water System [Approved Tester](#).

a. SC DHEC Certification

Tester must hold an up-to-date backflow assembly prevention tester certification card issued by SC DHEC.

b. Charleston Water System Tester Orientation

1. Tester must attend Charleston Water System Tester Orientation. Tester Orientation is designed to inform the Tester on Charleston Water System specific policies and procedures governing its Cross-Connection Control Program. Topics of discussion include:

a. Charleston Water System's [Cross-Connection Control Program Manual](#).

b. Charleston Water System's [Backflow Assembly Installation Guide](#).

c. Charleston Water System's [Backflow Prevention Assembly Approved Field Testing Procedures](#).

d. Completing and submitting a Charleston Water System [Field Test Report](#).

e. Tester Responsibilities and Failure to Comply with Program Requirements.

2. Each Tester attending Tester Orientation must provide the following information:

a. Up-to-date backflow assembly prevention certification card issued by SC DHEC.

b. Differential pressure gauge with current Certificate of Calibration.

c. Vertical Sight Tube

d. Contact information.

3. Charleston Water System typically conducts Tester Orientation every other month, beginning in January of each year. To schedule Tester Orientation, or to receive additional information, contact the Cross-Connection Control Department by telephone at 843-727-6980, or by email at backflow@charlestoncpw.com.

c. Tester Recertification at Charleston Water System

1. Upon expiration of SC DHEC backflow assembly prevention tester certification, the Tester must successfully complete tester recertification at Charleston Water System. Successful completion shall include:
 - a. Completion of a written examination with a passing score of 70%.
 - b. Attend Charleston Water System Tester Orientation Refresher Training given as a part of Tester Recertification.
 - c. Successful demonstration of backflow assembly testing, in accordance with Charleston Water System's [Backflow Prevention Assembly Approved Field Testing Procedures](#), on an approved Reduced Pressure Principal Assembly, Double Check Valve Assembly, and a Pressure Vacuum Breaker using the Tester's own differential pressure gauge.
2. Charleston Water System conducts backflow assembly prevention tester recertification quarterly. The cost to attend is \$80.00. Inclusive in this cost is a \$50.00 recertification fee and a \$30.00 administration fee.

To schedule backflow assembly prevention tester recertification or to request additional information concerning recertification, please contact the Cross-Connection Control Department by telephone at 843-727-6980, or by email at backflow@charlestoncpw.com.

d. Equipment

1. Differential Pressure Gauge
 - a. Each Tester must have a calibrated differential pressure gauge with the following information on

record with Charleston Water System: Make, model, serial number, and current Certificate of Calibration.

- b. Certificate of Calibration shall be in conformance with ANSI 2540.1 and in accordance with manufacturer's specifications for gauge accuracy.
- c. Tests performed with gauges not on record at Charleston Water System or gauges without a current Certificate of Calibration will not be accepted.

2. Vertical Sight Tube

- a. Plastic tube designed to hold more than a 28-inch column of water.
- b. 28-inch reference must be clearly marked on the tube and the water in the tube must be visible at this mark.
- c. Fittings for connection to the test cocks.
- d. Downstream Tube (Short Tube) – Clear tubing to allow a visual of the zero reference point.

D. Testing Procedures

- 1. Backflow assembly testing shall be performed in accordance with Program requirements and Charleston Water System's [Backflow Prevention Assembly Approved Field Testing Procedures](#). Any request for variation must be approved by a Charleston Water System Cross-Connection Control Compliance Inspector prior to testing.
- 2. Tester shall confirm information provided in the Customer's testing notification letter matches assembly to be tested; Make, model, size and serial number. If information does not match, annotate on [Field Test Report](#).

E. Reporting Procedures

- 1. Completing the [Field Test Report](#)
 - a. Using the information provided in the Customer notification letter, complete the Customer information section, providing the following information:
 - 1. Test date

2. Account/Business Name, Account Number, and Account Address
 3. Assembly Make, Model, Size, and Serial Number
 4. Assembly location – Provide if different than information provided in Customer notification letter.
- b. Check box next to type of backflow prevention method being tested or inspected; PVB (Pressure Vacuum Breaker Assembly), DCVA (Double Check Valve Assembly), RP (Reduced Pressure Principle Assembly), or Air-Gap.
 - c. Record test and inspection results in accordance with [Backflow Prevention Assembly Approved Field Testing Procedures](#).
 - d. Identify and record repair and replacement information in accordance with [Backflow Prevention Assembly Approved Field Testing Procedures](#).
 - e. Provide the following Tester Information:
 1. SC DHEC Certification Number
 2. Company Name and Telephone Number
 3. Test Kit, Serial Number, and Calibration Date
 4. Sign Tester Statement
2. Submitting the [Field Test Report](#)
 - a. Fax completed report(s) with Charleston Water System [Field Test Report Fax Cover Sheet](#) to 843-579-6852 within seven (7) days of test.
 - b. Reports submitted without a Charleston Water System [Field Test Report Fax Cover Sheet](#), or reports containing errors or omissions, will not be accepted. Errors or omissions include, but are not limited to:
 1. Failure to submit within seven (7) days of performing test.
 2. Errors in test results and/or information provided.

3. Test performed with a gauge not meeting Program requirements.
 4. Test performed by a Tester not on Charleston Water System's list of [Approved Backflow Prevention Assembly Testers](#).
- c. If the report is not accepted, the Tester will be contacted and discrepancies identified. Account will remain in non-compliance until corrections are made and the report is accepted by Charleston Water System.
 - d. Multiple reports may be faxed under a single Charleston Water System [Field Test Report Fax Cover Sheet](#) provided all tests are performed by the same Tester.
 - e. Tester should maintain record of fax transmissions and cover sheets. In the event of a missed fax, the original cover sheet and fax transmittal sheet will be requested.
 - f. Faxes are reviewed daily. Report information is entered into the Cross-Connection Customer database typically within 24 hours of receipt.

F. Tester Responsibilities

As a Charleston Water System [Approved Backflow Prevention Assembly Tester](#), Charleston Water System holds such persons to a certain standard regarding testing, installation, replacement and repair of backflow prevention assemblies. Responsibilities include, but are not limited to:

1. Perform backflow assembly testing, installation, replacement and repair in accordance with Cross-Connection Control Program requirements.
2. Do not unnecessarily repair or replace backflow prevention assembly.
3. Do not repair or replace backflow assembly or perform any action which will result in additional fees charged without prior approval of the Customer.
4. When performing repairs, use only original factory parts manufactured for the assembly to be repaired.
5. When installing a backflow prevention assembly, only install assemblies approved for installation.

6. Do not circumvent, remove or alter a backflow prevention assembly in anyway without approval from Charleston Water System.
7. Do not withhold submission of the [Field Test Report](#) pending payment by the Customer.
8. Treat Customer fairly and honestly.
9. Report to Charleston Water System any instance that appears to be not in compliance with Program requirements.
10. Communicate Customer issues to Charleston Water System as soon as possible.
11. Tester has neither the responsibility nor the authority to represent Charleston Water System or to enforce Program requirements. Enforcement lies solely with Charleston Water System.

G. Failure to Comply with Program Requirements

It is the intention of Charleston Water System to provide our Customers with a list of [Approved Backflow Prevention Assembly Testers](#) that perform their responsibilities with integrity and who fully support Charleston Water System's Cross-Connection Control Program. Failure to comply with Program requirements will be considered offenses to Charleston Water System policy. Each case will be judged on its own merit. So that the integrity of our Program is not diminished, Charleston Water System reserves the right to exclude the name of Testers not fulfilling our requirements from the list of [Approved Backflow Prevention Assembly Testers](#). Additionally, certain civil penalties may apply as governed by Charleston Water System rules and regulations.

Section 5: Frequently Asked Questions

What is cross-connection?

Cross-connection is any connection between a public water system and a private water system.

Does my service require a backflow prevention assembly?

If your water service presents a potential to endanger the public water system, it may require a backflow prevention assembly. The degree of hazard and the appropriate form of backflow prevention for each cross-connection is determined by a Charleston Water System Compliance Inspector.

“What is a backflow administration fee?”

A backflow administration fee is a fee charged to Customers to offset the cost of maintaining a Cross-Connection Control Program. The fee is assessed annually on each backflow prevention assembly. Residential irrigation customers are exempt from this fee.

“I’m renting this home / commercial space. Why am I getting this letter?”

The cross-connection relationship is between Charleston Water System and the water service Customer. Property owners, landlords, property management companies, HOA’s may take on the responsibility, but any agreement between those parties and the Customer does not eliminate the Customer’s responsibility to Charleston Water System.

“I thought this would be something Charleston Water System does?”

Installing, maintaining and testing backflow prevention assemblies is the responsibility of the Customer.

“The installers / testers work for CWS, right?”

While Charleston Water System sets the Program Requirements and ensures that requirements are met, the contractors that implement the work are hired by the Customer. Installers and Testers are private contractors working for the Customer, not Charleston Water System.

“There’s already a backflow assembly on my water line? Why are you requesting that I replace it?”

Typically when a replacement is requested, the existing backflow prevention assembly is not the appropriate type for the degree of hazard your service presents. If you have questions about the assessment, feel free to call for further explanation.

“The customer before me had a backflow prevention assembly, but I don’t think I need one.”

Different Customers do present different hazards, even at the same location. If your water use is different from the last Customer, contact the Cross-Connection Control Department to schedule a re-assessment.

“I don’t use my irrigation system. Do I have to test and maintain this backflow prevention assembly?”

As long as the irrigation system is connected to the public water system the potential for backflow exists. Therefore, all backflow requirements, including annual testing, must be adhered to.

To eliminate Program requirements, the irrigation system must be isolated from the public water system. If the irrigation system is on a separate meter, simply close the account so the meter can be locked or removed. If it is tied to your domestic water service that must remain active, you can have the irrigation system “cut and capped”. The customer must request an inspection of the “cut and cap” and sign an Acknowledgement of Understanding agreeing to notify Charleston Water System of any change to this condition.

Section 6: Definition of Terms

Accessible – Capable of being reached for testing and maintenance, when referring to a backflow prevention assembly.

Air-Gap – The unobstructed vertical distance through the free flowing discharge end of a potable water supply pipeline and an open or non-pressure receiving vessel. An “approved air-gap” shall be at least twice the diameter of the supply pipe measured vertically above the overflow rim of the receiving vessel; in no case less than 1 inch.

Approved Backflow Prevention Assembly - Assemblies “approved for installation” must appear on the current list of Approved Backflow Assemblies as published by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research; otherwise known as being “USC approved”.

Approved Tester – An independent contractor who is certified by SC DHEC and approved by Charleston Water System to test backflow assemblies for Charleston Water System Customers. Approved Testers are trained on Program requirements and work within these requirements to facilitate accurate and consistent backflow prevention testing for our Customers.

Auxiliary Water Supply – Any water supply on or available to the premises other than Charleston Water System’s public potable water supply. These auxiliary waters may include water from another purveyor’s public potable water supply or any natural source such as a well, river, stream, harbor, etc.

Assessment – An evaluation performed by a Cross-Connection Compliance Inspector to determine the degree of hazard presented by the Customer’s water use.

Backflow – The reversal of the normal direction of flow of water caused by either backpressure or backsiphonage.

Backflow Administration Fee – A fee charged to Customers to offset the cost of maintaining a Cross-Connection Control Program. The fee is assessed annually on each backflow prevention assembly. Residential irrigation Customers are exempt from this fee.

Backflow Prevention Assembly – Any effective assembly used to prevent backflow into a potable water system. The type of assembly used shall be based on the existing or potential degree of hazard and backflow condition. Assemblies approved for installation by Charleston Water System must appear on the current list of Approved Backflow Assemblies as published by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research; otherwise known as being “USC approved”.

Backpressure – Any elevation of pressure in the downstream piping system (by pump, elevation of piping, steam pressure, air pressure, etc.) above the supply pressure at the point of consideration, which would cause or tend to cause a reversal of the normal flow.

Backsiphonage – A form of backflow due to a reduction in system pressure, which causes a sub-atmospheric pressure to exist in the water distribution system.

Cross-Connection – Any actual or potential connection or structural arrangement between a public potable water system and any other source of system through which it is possible to introduce into any part of the potable water system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied.

Cross-Connection Compliance Inspector – An employee of Charleston Water System trained to implement the provisions of Charleston Water System’s Cross-Connection Control Program.

Degree of Hazard – The potential threat to public health through a cross-connection. A degree of hazard can be a “high hazard cross-connection” or a “low hazard cross-connection”.

Double Check Valve Assembly (DCVA) – An assembly composed of two independently acting, approved check valves, including tightly closing resilient seated shutoff valves attached at each end of the assembly and fitted with properly located resilient seated test cocks. This assembly shall only be used to protect against a non-health hazard.

High Hazard Cross-Connection – A connection between an approved public water system and a service or auxiliary water system which has or may have any material in the water dangerous to health, that is or may be handled under pressure, or subject to negative pressure.

High Hazard Fire Sprinkler System - High hazard category fire sprinkler systems shall include, but not be limited to: antifreeze systems, foam systems, systems charged from or tied into ponds, lakes, streams, or any water source other than the approved public water supply.

Low Hazard Cross-Connection – A connection between an approved public water system and another water source not hazardous to health but not meeting the standards of the approved public water system and not cross-connected within its system with a potentially dangerous substance.

Low Hazard Fire Sprinkler Systems – A low hazard fire sprinkler system is any fire sprinkler system not meeting the definition of a high hazard fire sprinkler system.

Non-Potable Water – Water that has not been examined, properly treated, and not approved by appropriate authorities as being safe for consumption.

Potable Water – Water which is safe for consumption by humans and other animals. It is also called drinking water, in a reference to its intended use.

Pressure Vacuum Breaker (PVB) – An assembly containing 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 properly located resilient seated test cocks and tightly closing resilient seated shutoff valves attached at each end of the assembly. This assembly is designed to protect against a non-health hazard or a health hazard under a backsiphonage condition only.

Reduced Pressure Principle Assembly (RP) – An assembly containing two independently acting approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located resilient seated test cocks and tightly closing resilient seated shutoff valves at each end of the assembly. This assembly is designed to protect against a non-health hazard or a health hazard.

Single Family Residential Fire Suppression Systems – A flow-through or combination protection system, served through a single dual-purpose water service, designed and certified by a NICET Level IV licensed fire suppression system designer as meeting the requirements of NFPA 13.

Tester Orientation – An instructional course designed to inform the Tester on Charleston Water System specific policies and procedures governing its Cross-Connection Control Program. Testers must attend to be listed as a Charleston Water System Approved Tester.



ACKNOWLEDEMENT OF UNDERSTANDING

Your current water use for the account listed below has been assessed as “no hazard”. In the event that the way you use water changes, it is your responsibility to notify Charleston Water System. Any change in water use could potentially change our degree of hazard assessment and your backflow prevention requirements.

As an acknowledgment of your understanding of this assessment and your responsibilities, please sign, date and return this form to CWS Cross-Connection Control Department within 14 days. This document is only for this account and remains in effect as long as this account is in your name and backflow requirements do not change.

Dedicated Irrigation Accounts

The dedicated irrigation classification is designed for irrigation only use, however, we have found some uses may not be subject to backflow prevention requirements. If your use of this meter meets the following requirements, backflow prevention requirements are not applicable.

- Above-ground hose bibs only
- All outside faucets or hose bibs are equipped with code required vacuum breakers
- No underground irrigation piping is present and/or connected to this service

Residential Irrigation served from Domestic Account

Customers can chose to “eliminate” backflow prevention requirements, but can only do so by eliminating the cross-connection. In order to be released from backflow requirements, your irrigation system

- Must be cut and capped / completely isolated from the CWS distribution system
- Cut/Cap must be inspected by a CWS Cross-Connection Control Inspector.

_____ *Inspection Date*

Account # _____ **Account Name** _____

Service Address: _____

I affirm, as the responsible party for the above account, I will use water from this service only as noted above. I further acknowledge that I will notify CWS if the system is altered in any way, including installation of an in-ground lawn irrigation system, additional piping or chemical additives introduced to the system, or reconnecting an irrigation system previously out of service.

Customer Signature / Date: _____

Customer Name: (print) _____

MAIL TO: Charleston Water System
Cross-Connection Control Department
P.O. Box B
Charleston, SC 29402

FAX TO: 843-579-6852
SCAN AND EMAIL TO: backflow@charlestoncpw.com

Further Questions: 843-727-7148



APPROVED FIELD TEST PROCEDURES

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DOUBLE CHECK VALVE ASSEMBLY (DCVA) DIRECTION OF FLOW TEST WITH A VERTICAL SITE TUBE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.
Observe area around the backflow preventer for leaks, damage or foreign matter.
Flush all Test Cocks (TC) starting with TC 1

Check Valve 1

Attach vertical sight tube hose to TC 2
Install short tube to TC 3
Close shutoff valve 2
Open TC 2 to fill vertical sight tube - close TC 2
Open TC 3 to fill short tube - close TC 3
Close Shutoff Valve 1
Open TC 3 to relieve disc compression
Open TC 2

While holding the bottom of the vertical sight tube level with the water level in the short downstream sight tube for two minutes, if the water holds at or above the 28" mark:

Record Check Valve 1 "Closed Tight".

If water level falls below the 28" mark on your vertical tube,
Record Check Valve 1 "Leaked" and proceed to next step.

Check Valve 2

Close TC 2 and TC 3
Move short tube from TC 3 to TC 4
Move vertical sight tube hose from TC 2 to TC 3
Open Shutoff 1 - open TC 3 to fill sight tube - close TC 3
Open TC 4 to fill short tube - close TC 4
Close Shutoff 1
Open TC 4 to relieve disc compression
Open TC 3

While holding the bottom of the vertical sight tube level with the water level in the short downstream sight tube for two minutes, if the water holds at or above the 28" mark:

Record Check Valve 2 "Closed Tight".

If water level falls below the 28" mark on your vertical tube,
Record Check Valve 2 "Leaked".

Final

Close TC's - remove brass fittings, vertical sight tube hose and short tube.
Open Customer's hose bib to flush any potential debris from line. Open shutoff 1, open shutoff.
Close Customer's hose bib.

**DOUBLE CHECK VALVE ASSEMBLY (DCVA)
DIRECTION OF FLOW TEST WITH A
3-VALVE DIFFERENTIAL PRESSURE GAUGE**

Notify Customer that water will be off temporarily.

Verify backflow assembly to be tested.

Observe area around the backflow preventer for leaks, damage or foreign matter.

Flush all Test Cocks (TC) starting with TC 1

Check Valve 1

Install short tube on TC 3

Attach high hose to TC 2

Open TC 3 to fill short tube - close TC 3

Open TC 2 slowly - open high "A" and vent "C" to expel air from gauge and BFP

Close vent "C"

Close shutoff 2 - close shutoff 1

Open TC 3 - TC 2 must remain open

While holding gauge diaphragm and the open end of the low hose (if attached to the gauge) level with the water level in the short downstream sight tube, observe gauge.

If gauge needle holds at 1.0 psi or greater at the water level in the short downstream tube for 2 minutes:

Record Check Valve 1 "Closed Tight".

If gauge needle drops below 1.0 psi at the water level in the short downstream sight tube:

Record Check Valve 1 "Leaked" and proceed with next step.

Check Valve 2

Close TC 2 and TC 3

Move short tube from TC 3 to TC 4

Move high hose from TC 2 to TC 3 - open shutoff 1

Open TC 4 to fill short tube - close TC 4

Open TC 3 slowly - open vent "C" to expel air from gauge and BFP

Close vent "C"

Close shutoff 1

Open TC 4 - TC 3 must remain open

While holding gauge diaphragm and the open end of the low hose (if attached to the gauge) level with the water level in the short downstream sight tube, observe gauge.

If gauge needle holds 1.0 psi or greater at the water level in the short downstream tube for 2 minutes:

Record Check Valve 2 "Closed Tight".

If gauge needle drops below 1.0 psi at the water level in the short downstream sight tube:

Record Check Valve 2 "Leaked".

Final

Close TC's - remove high hose and brass fittings.

Open Customer's hose bib to flush any potential debris from line.

Open shutoff 1, open shutoff 2.

Close Customer's hose bib.

DOUBLE CHECK VALVE ASSEMBLY (DCVA) DIRECTION OF FLOW TEST WITH A 5-VALVE DIFFERENTIAL PRESSURE GAUGE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.
Observe area around the backflow preventer for leaks, damage or foreign matter.
Flush all Test Cocks (TC) starting with TC 1

Check Valve 1

Install short tube on TC 3
Attach high hose to TC 2
Open TC 3 to fill short tube - close TC 3
Slowly open TC 2 - open high bleed to expel air from gauge and BFP - close high bleed
Close shutoff 2 - close shutoff 1,
Open TC 3, TC 2 must remain open
While holding gauge diaphragm and the open end of the low hose (if attached to the gauge) level with the water level in the short downstream sight tube, observe gauge.
If gauge needle reads 1.0 psi or greater for 2 minutes:
Record Check Valve 1 "Closed Tight".
If gauge needle drops below 1.0 psi at the water level in the short downstream tube:
Record Check Valve 1 "Leaked" and proceed to the next step.

Check Valve 2

Close TC 2 and TC 3
Move short tube from TC 3 to TC 4
Move high hose from TC 2 to TC 3 - open shutoff 1
Open TC 4 to fill short tube - close TC 4
Open TC 3 slowly - open high bleed to expel air from gauge and BFP - close high bleed
Close shutoff 1.
Open TC 4 - TC 3 must remain open
While holding gauge diaphragm and the open end of the low hose (if attached to the gauge) level with the water level in the short downstream sight tube, observe gauge.
If gauge needle holds 1.0 psi or greater at the water level in the short downstream tube for 2 minutes:
Record Check Valve 2 "Closed Tight".
If gauge needle drops below 1.0 psi at the water level in the short downstream tube:
Record Check Valve 2 "Leaked".

Final

Close TC's - remove high hose and brass fittings.
Open Customer's hose bib to flush any potential debris from line.
Open shutoff 1, open shutoff 2.
Close Customer's hose bib.

PRESSURE VACUUM BREAKER (PVB) DIRECTION OF FLOW TEST WITH A 3-VALVE DIFFERENTIAL PRESSURE GAUGE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.
Observe area around the backflow preventer for leaks, damage or foreign matter.
Flush all Test Cocks (TC) starting with TC 1

Prep

Remove canopy
Install fittings

Air Inlet Valve

Attach high hose to TC 2
Open TC 2 very slowly
Open "A" and vent "C" to expel air from gauge and PVB
(Expelled water can be used to clean air-inlet area.)
Close vent "C" - close shutoff 2 - close shutoff 1
With gauge diaphragm and the open end of the low hose (if attached to the gauge)
level with TC 2 and/or the area between the check and air-inlet valve.
Place finger on top of inlet valve, very slowly open vent "C" until gauge needle
begins to fall.
Observe gauge needle the moment you feel the air-inlet valve open,
Record this numerical value in air-inlet section of the report form.
(Reading must be 1.0 psi or greater.)
If the air-inlet valve fails to open or opens at value lower than 1.0 psi:
Record the Air-inlet as "Did Not Open" and continue
Close vent "C"

Check Valve

Close TC 2-remove high hose from TC 2 - open shutoff 1
Attach high hose to TC 1 - open TC 1 very slowly
Open vent "C" to expel air from gauge and PVB.
High "A" is already open from the air-inlet test
Close vent "C" - close shutoff 1
Open TC 2
With gauge diaphragm and the open end of the low hose (if attached to the gauge)
level with TC 2 and/or the area between the check and air-inlet valve.
Observe when water stops running from TC 2
Record the numerical value the check valve held tight.
(Reading must be 1.0 psi or greater.)
If the gauge needle fails to hold at or above 1.0 psi,
Record the Check Valve as leaked.

Final

Close both TC's, Remove all equipment
Replace canopy, Open shutoff 1
Slowly open shutoff 2

PRESSURE VACUUM BREAKER (PVB) DIRECTION OF FLOW TEST WITH A 5-VALVE DIFFERENTIAL PRESSURE GAUGE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.
Observe area around the backflow preventer for leaks, damage or foreign matter.
Flush all Test Cocks (TC) starting with TC 1

Prep

Remove canopy
Flush TC's
Install fittings

Air Inlet Valve

Attach high hose to TC 2
Open TC 2 very slowly
Open high bleed valve to expel air from gauge and PVB
(Expelled water can be used to clean air-inlet area.)
Close high bleed valve - close shutoff 2 - close shutoff 1
While holding gauge diaphragm and the open end of the low hose (if attached to the gauge) level with TC 2 and/or the area between the check and air-inlet valve, Place finger on top of inlet valve and very slowly open vent "C" until gauge needle begins to drop.
Observe gauge needle the moment you feel the air-inlet valve open,
Record the numerical value on air-inlet section of the report form.
(Reading must be 1.0 psi or greater.)
If the air-inlet valve fails to open or opens at value lower than 1.0 psi,
Record the Air-inlet as "Did Not Open" and continue
Close high bleed valve

Check Valve

Close TC 2-remove high hose from TC 2 - open shutoff 1
Attach high hose to TC 1 - open TC 1 very slowly
Open high bleed valve to expel air from gauge and PVB
High "A" is already open from the air-inlet test
Close high bleed valve - close shutoff 1
Open TC 2
With gauge diaphragm and the open end of the low hose (if attached to the gauge) level with TC 2 and/or the area between the check and air-inlet valve.
Observe when water stops running from TC 2
Record the numerical value the check valve held tight.
(Reading must be 1.0 psi or greater.)
If the gauge needle fails to hold at or above 1.0 psi,
Record the Check Valve as leaked.

Final

Close both TC's, Remove all equipment
Replace canopy, Open shutoff 1
Slowly open shutoff 2

REDUCED PRESSURE PRINCIPLE ASSEMBLY (RP) DIFFERENTIAL PRESSURE TEST WITH A 3-VALVE DIFFERENTIAL PRESSURE GAUGE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.

Observe area around the backflow preventer for leaks, damage or foreign matter.

Page 1 of 2

Test 1-Check Valve 1 Apparent Differential Pressure

Close shutoff 2 - flush all TC's correctly (open 4, 3, 2, 1 - close 1, 2, 3, 4)

Close "A", "B", "C" on test kit

High hose to TC 2- low hose to TC 3 - open TC 3 slowly

Open "C" then "B" to bleed air from low side thru vent hose

Slowly open TC 2 - partially open "A" to bleed air from high side thru vent hose

Close "A", "B", then "C"

Observe this apparent differential pressure to be at least 5.0 psi or greater.

Record Check Valve 1 as "Closed tight"

If the apparent differential pressure is below 5.0 psi

Record Check Valve 1 as "Leaked"

Test 2-Relief Valve Opening

With hand under relief valve vent

Open "A" – Slowly open "B" only until gauge needle begins to drop - leave "B" in that position.

Observe the instant water is vented – (Value must be 2.0 psi or greater.)

Record This Numerical Value as the Relief Valve Differential Pressure

Close "B"

Note: If gauge needle drops only slightly and relief valve fails to open, or opening "B" more than "slightly" is needed to cause the needle to drop, then shutoff 2 is probably leaking.

Test #3-Check Valve 2 Closed tight Against Backpressure

Vent hose to TC 4 - open "C"

Bleed air from vent hose by loosening hose connection at TC 4; re-tighten hose connection at TC 4

Reset gauge to a static condition by loosening low hose at TC 3; re-tighten low hose connection at TC 3

Open TC 4 (gauge needle may fall slightly due to disc compression).

Note: If gauge needle falls and the RV opens, Check Valve 2 may not be leaking at all. Disc compression may have caused Check Valve 2 to compress, decreasing the differential pressure in the "zone". To verify, reset gauge to a static condition by loosening low hose at TC 3; re-tighten low hose connection at TC 3.

If gauge needle remains steady and water does not drip from the relief valve, then

Record Check Valve 2 as "Closed tight"

If the gauge needle falls and the relief valve opens:

Record Check Valve 2 as "Leaked"

REDUCED PRESSURE PRINCIPLE ASSEMBLY (RP)
DIFFERENTIAL PRESSURE TEST WITH A
3-VALVE DIFFERENTIAL PRESSURE GAUGE

Page 2 of 2

Test 4 - Check the condition of Shutoff 2

To positively verify the condition of shutoff 2, with "A" and "C" still open, close TC 2.

If shutoff 2 is leaking, gauge needle will fall to 0.0 psi, but the relief valve will not open. If gauge needle rises, then shutoff 2 is leaking and there is backpressure in the Customers system. Be prepared to close vent by-pass valve.

Record the condition of Shutoff Valve 2.

Test 5 - Differential Pressure of Check Valve 1

Open TC 2 - close TC 4-close "A" - disconnect vent hose from TC 4 (vent hose no longer used)

Open "B" to bleed air thru vent hose (This releases disc compression and resets gauge to static.) Close "B"

Observe the differential pressure to be at least 5.0 psi or greater

Record This Numerical Value as the "Differential Pressure of Check Valve 1"

Test 6 - Differential Pressure of Check Valve 2

Close TC 2 and TC 3

High hose to TC 3 - low hose to TC 4

Open "A" and "B" to bleed any residual pressure thru vent hose ("C" is already open from test #3 above.)

Close "A", then "B"

Open TC 4 - open "B" to bleed air on low side thru vent hose

Open TC 3 - open "A" to bleed air on high side thru vent hose - close "A" first, then "B"

Observe the differential pressure to be at least 1.0 psi or greater

Record this numerical value as the "Differential Pressure of Check Valve 2"

Final

Close all TC's.

Remove all fittings and hoses.

Open Customer's hose bib.

Open shutoff 2 slowly to restore system supply.

Close Customer's hose bib.

REDUCED PRESSURE PRINCIPLE ASSEMBLY (RP) DIFFERENTIAL PRESSURE TEST WITH A 5-VALVE DIFFERENTIAL PRESSURE GAUGE

Notify Customer that water will be off temporarily.
Verify backflow assembly to be tested.

Observe area around the backflow preventer for leaks, damage or foreign matter.

Page 1 of 2

Test 1 – Check Valve 1 Apparent Differential Pressure

Close shutoff 2 – flush all TC's in this order (open 4, 3, 2, 1 – close 1, 2, 3, 4)

Attach high hose to TC 2 – low hose to TC 3

Slowly open TC 3, then open low bleed valve

Slowly open TC 2, then open high bleed valve

Close high bleed valve, close low bleed valve

If the apparent differential pressure is at least 5.0 psi or greater,

Record Check Valve 1 as “Closed tight”

If the apparent differential pressure is below 5.0 psi

Record Check Valve 1 as “Leaked”

Test 2 – Relief Valve Opening

With your hand under the relief valve vent

Open high control valve 1 full turn

Slowly open low control valve until needle on gauge begins to drop (no more than ¼ turn)

Observe the instant water is vented

Note: If gauge needle drops only slightly and relief valve fails to open, or opening low control valve more than 1/4 turn is needed to cause the needle to drop, then shutoff 2 is probably leaking.

Record reading as the Relief Valve Differential Pressure

(Value must be at least 2.0 psi or greater.)

Test 3 – Check Valve 2 Closed Tight Against Backpressure

Slightly open by-pass/vent valve – attach by-pass/vent hose to TC 4

Close by-pass/vent valve – open TC 4

Reset gauge by opening low bleed valve to pin gauge – close low bleed valve

Open by-pass (vent) valve 1 turn (gauge may decrease slightly due to disc compression).

Note: If gauge needle falls and the RV opens, check valve 2 may not be leaking at all. Disc compression may have caused check valve 2 to compress, decreasing the differential pressure in the “zone”. To verify, reset gauge by opening then closing low bleed valve.

If gauge needle holds steady, and water does not drip from relief valve vent, then

Record Check Valve 2 closed tight

REDUCED PRESSURE PRINCIPLE ASSEMBLY (RP)
DIFFERENTIAL PRESSURE TEST WITH A
5-VALVE DIFFERENTIAL PRESSURE GAUGE

Page 2 of 2

Test 4 – To Verify Condition of Shutoff 2

To positively verify the condition of shutoff 2, with vent valve still open, close TC 2.

Note: If shutoff 2 is leaking, the gauge will fall to 0.0 psi, but the relief valve will not open. If gauge needle rises, then shutoff 2 is leaking and there is backpressure in the Customers system. If shutoff 2 is leaking, values for the RV and both check valves are inaccurate. Be prepared to close vent by-pass control valve.

Record the condition of Shutoff Valve 2.

Test 5 – Differential Pressure of Check Valve 1

Open TC 2

Reset gauge to relieve disc compression by opening low bleed valve

Close low bleed valve

Observe gauge

Record reading as the Differential Pressure of Check Valve 1

(Reading must be 5.0 psi or greater)

Test 6 – Differential Pressure of Check Valve 2

Close all TC's – close by-pass/vent valve

Remove by-pass/vent hose from TC 4 (by-pass hose is no longer used)

Move low hose to TC 4 – move high hose to TC 3

Open TC 4, open low bleed valve – Open TC 3, open high bleed valve

Close high bleed valve first, then slowly close low bleed valve

Observe the gauge

Record the reading as the Differential Pressure of Check Valve 2

(Reading must be 1.0 psi or greater)

Final

Close all TC's

Remove all hoses and fittings

Open Customer's hose bib

Open shutoff slowly to restore system supply

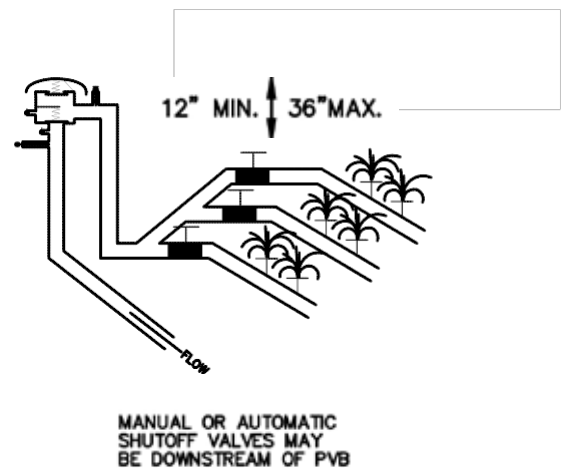
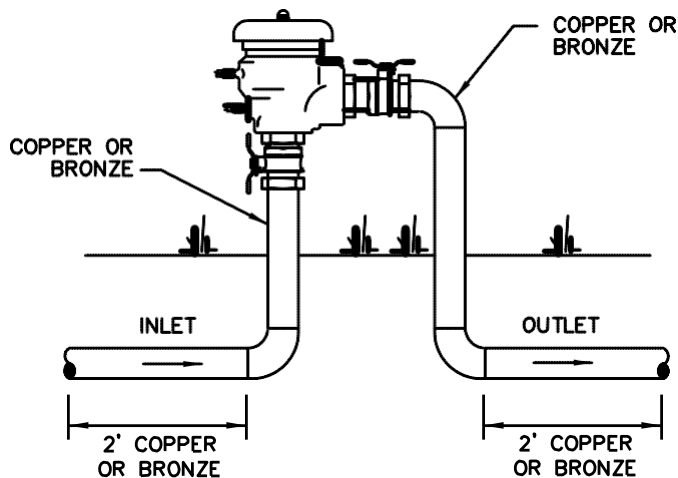
Close Customer's hose bib

BACKFLOW PREVENTION ASSEMBLY INSTALLATION GUIDE

PRESSURE VACUUM BREAKER (PVB)

This insert serves as a guidance document for the installation of backflow prevention assemblies within the Charleston Water System (CWS) service area. All installations must be inspected and approved by CWS. Contact CWS within two days of installation to request an inspection.

- Install assembly on customer's side of the water meter prior to any branch, tee or service connection.
- Install assembly in accordance with manufacturer's recommendations.
- Assembly shall be installed vertically, above ground, at least 12" but no more than 36" higher than the highest downstream irrigation head, hose bib or piping. Provide minimum 6" clearance on all sides of assembly.
- Installed assembly shall be easily accessible for in-line maintenance and testing.
- No fertilizers, herbicides, pesticides, or other substances shall be introduced into a lawn irrigation system protected by a pressure vacuum breaker.
- No material shall restrict or interfere with the proper operation of the air inlet valve.
- Provide minimum 2' of copper or bronze piping on inlet and outlet side of assembly.
- Black iron, black steel or galvanized steel pipe shall not be used in the upstream piping.
- Installed assembly shall be rigid and stable. CWS reserves the right to require additional support and restraint.
- CWS highly recommends freeze protection, such as insulated enclosures or padded wraps, for all above ground assemblies.
- For assemblies exposed to vehicular traffic, a traffic-grade enclosure box or protective bollards are recommended.



For questions concerning the installation, placement of your assembly or to request an inspection, contact CWS by phone at 843-727-7148, by fax at 843-579-6852, or by email at backflow@charlestoncpw.com. For additional information on CWS's Cross-Connection Control Program and a complete list of approved testers, please visit our website at www.charlestonwater.com.

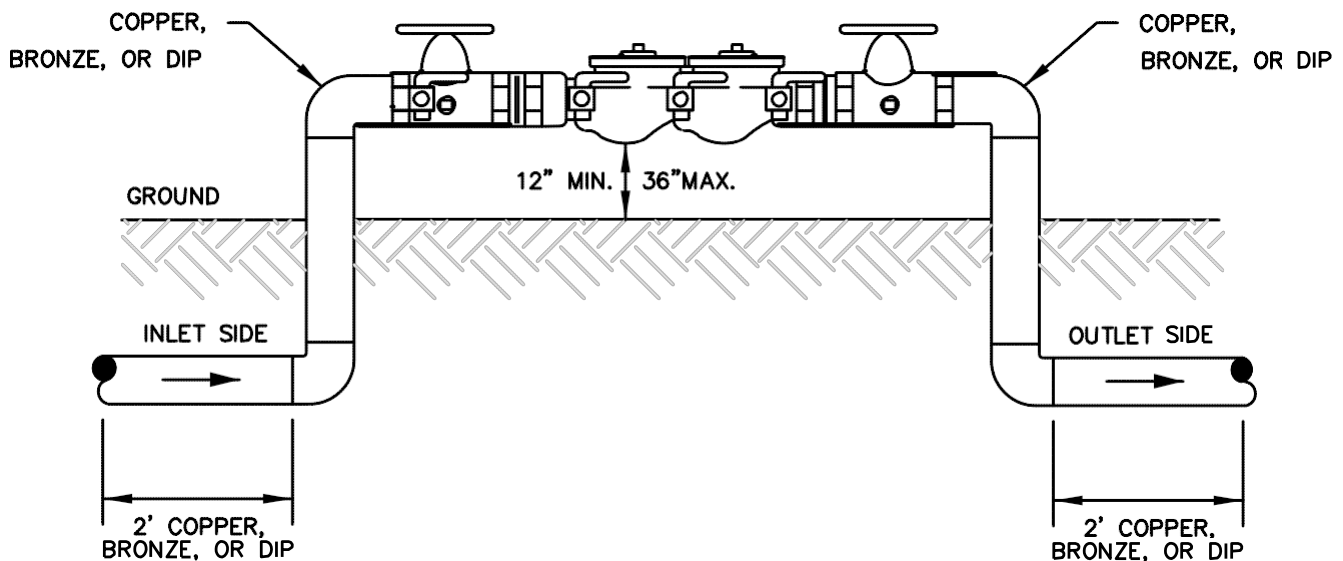
BACKFLOW PREVENTION ASSEMBLY INSTALLATION GUIDE

DOUBLE CHECK VALVE ASSEMBLY (DCVA)

Above-Ground Installation

This insert serves as a guidance document for the installation of backflow prevention assemblies within the Charleston Water System (CWS) service area. All installations must be inspected and approved by CWS. Contact CWS within two days of installation to request an inspection.

- Install assembly on customer's side of the water meter prior to any branch, tee or service connection.
- Install assembly in accordance with manufacturer's recommendations.
- Assemblies ¾" – 2" may be installed above ground or below ground (See Below-Ground Installation). Assemblies larger than 2" must be installed above ground. Provide minimum 6" clearance on all sides of assembly.
- Installed assembly shall be easily accessible for in-line maintenance and testing.
- Provide minimum 12" maximum 36" clearance between bottom of assembly and ground.
- Provide minimum 2' of copper, bronze or ductile iron piping on inlet and outlet side of assembly.
- Black iron, black steel or galvanized steel pipe shall not be used in the upstream piping.
- Installed assembly shall be rigid and stable. CWS reserves the right to require additional support and restraint.
- CWS highly recommends freeze protection, such as insulated enclosures or padded wraps, for all above ground assemblies.
- For assemblies exposed to vehicular traffic, a traffic-grade enclosure box or protective bollards are recommended.



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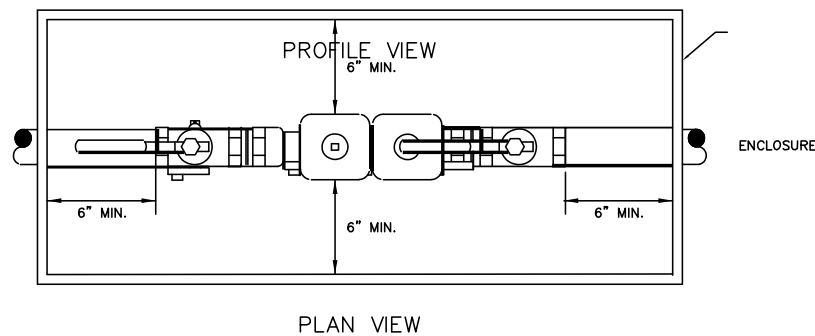
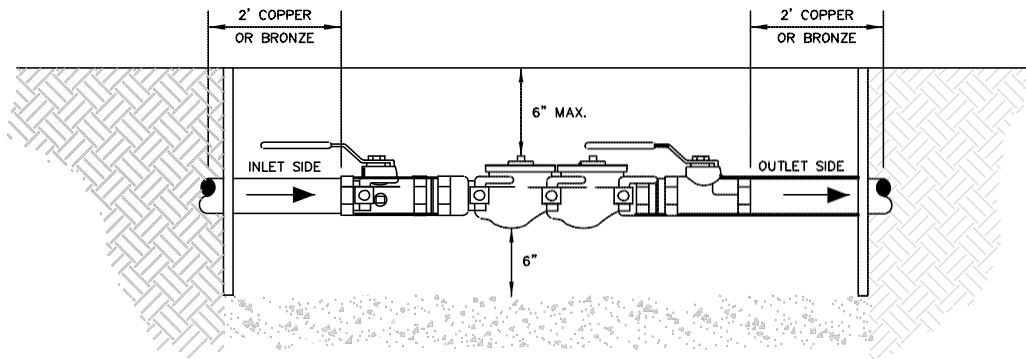
BACKFLOW PREVENTION ASSEMBLY INSTALLATION GUIDE

DOUBLE CHECK VALVE ASSEMBLY (DCVA)

(3/4" – 2") Below Ground Installation

This insert serves as a guidance document for the installation of backflow prevention assemblies within the Charleston Water System (CWS) service area. All installations must be inspected and approved by CWS. Contact CWS within two days of installation to request an inspection.

- Install assembly on customer's side of the water meter prior to any branch, tee or service connection.
- Install assembly in accordance with manufacturer's recommendations.
- Assemblies 3/4" – 2" may be installed below ground or above ground (See Above-Ground Installation). Assemblies larger than 2" must be installed above ground.
- Below-ground installations shall be installed using an acceptable enclosure box with top.
- Installed assembly shall be easily accessible for in-line maintenance and testing.
- Provide minimum 6" clearance on all sides of assembly.
- Provide minimum 2' of copper or bronze piping on inlet and outlet side of assembly.
- Black iron, black steel or galvanized steel pipe shall not be used in the upstream piping.
- Installed assembly shall be rigid and stable. CWS reserves the right to require additional support and restraint.
- For assemblies exposed to vehicular traffic, a traffic-grade enclosure box or protective bollards are recommended.



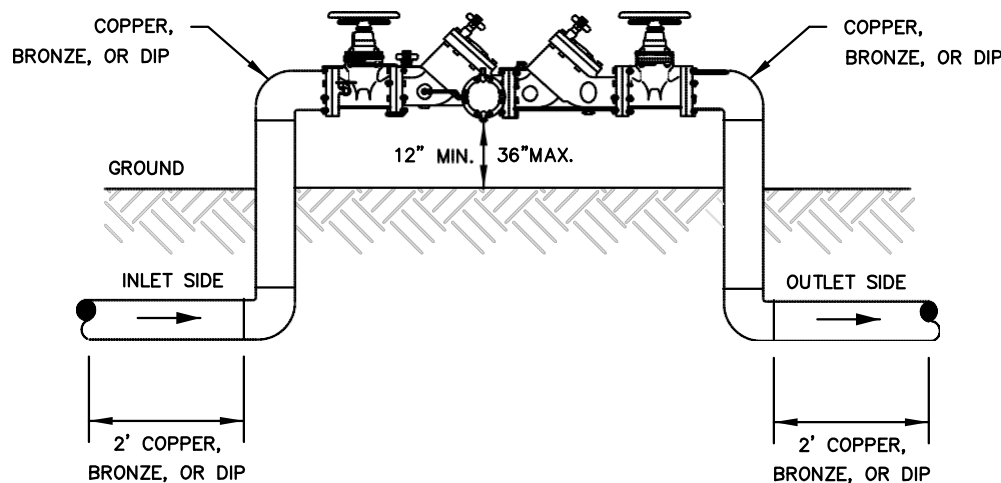
For questions concerning the installation, placement of your assembly or to request an inspection, contact CWS by phone at 843-727-7148, by fax at 843-579-6852, or by email at backflow@charlestoncpw.com. For additional information on CWS's Cross-Connection Control Program and a complete list of approved testers, please visit our website at www.charlestonwater.com.

BACKFLOW PREVENTION ASSEMBLY INSTALLATION GUIDE

REDUCED PRESSURE ASSEMBLY (RP)

This insert serves as a guidance document for the installation of backflow prevention assemblies within the Charleston Water System (CWS) service area. All installations must be inspected and approved by CWS. Contact CWS within two days of installation to request an inspection.

- Install assembly on customer's side of the water meter prior to any branch, tee or service connection.
- Install assembly in accordance with manufacturer's recommendations.
- Assembly must be installed above ground.
- Installed assembly shall be easily accessible for in-line maintenance and testing.
- Provide minimum 12" maximum 36" clearance between relief valve vent and finished grade.
- Relief valve vent shall never become submerged.
- No material shall obstruct the relief valve opening preventing venting to the atmosphere.
- For interior installations where water exiting the relief valve vent is required to be channeled to the atmosphere or to a floor drain, provide relief valve drain funnel with approved air gap.
- Provide minimum 2' of copper, bronze or ductile iron piping on inlet and outlet side of assembly.
- Black iron, black steel or galvanized steel pipe shall not be used in the upstream piping.
- Installed assembly shall be rigid and stable. CWS reserves the right to require additional support and restraint.
- If an above-ground enclosure is used, provide minimum 6" clearance on all sides. Provide two drain holes, equal in size to the relieve valve vent opening, at the base of the enclosure.
- CWS highly recommends freeze protection, such as insulated enclosures or padded wraps, for all above ground assemblies.
- For assemblies exposed to vehicular traffic, a traffic-grade enclosure box or protective bollards are recommended.



For questions concerning the installation, placement of your assembly or to request an inspection, contact CWS by phone at 843-727-7148, by fax at 843-579-6852, or by email at backflow@charlestoncpw.com. For additional information on CWS's Cross-Connection Control Program and a complete list of approved testers, please visit our website at www.charlestonwater.com.



FIELD TEST REPORT

FILL OUT COMPLETELY AND SUBMIT WITHIN SEVEN (7) DAYS OF TESTING.

Test Date _____ Account Name/Business Name _____

Account # _____ Address _____

Assembly Make _____ Model # _____ Size _____ Serial # _____

Assembly Location _____

PVB DCVA
 RP AIR-GAP

Reduced Pressure Principle Assembly				
Double Check Valve Assembly			PVB	
Initial Test	Check Valve # 1 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/> Differential Pressure Held Tight at _____ psi	Check Valve # 2 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/> Differential Pressure Held Tight at _____ psi	Relief Valve Differential Pressure _____ psi Shut Off Valve # 2 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/>	Air Inlet Opened at _____ psi Did not open <input type="checkbox"/> Check Valve Held Tight at _____ psi Leaked <input type="checkbox"/>
	Repairs			
Final Test	Check Valve # 1 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/> Differential Pressure Held Tight at _____ psi	Check Valve # 2 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/> Differential Pressure Held Tight at _____ psi	Relief Valve Differential Pressure _____ psi Shut Off Valve # 2 Leaked <input type="checkbox"/> Closed Tight <input type="checkbox"/>	Air Inlet Opened at _____ psi Did not open <input type="checkbox"/> Check Valve Held Tight at _____ psi Leaked <input type="checkbox"/>

Comments:

Initial Test	Tested By (<i>print</i>) _____ Date _____ Time _____
	Test used: Direction of Flow <input type="checkbox"/> Differential Pressure <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/>
Repairs	Repaired By (<i>print</i>) _____ Date _____
	Replaced Y or N , Removed Assembly: Make _____ Model _____ S/N _____
Final Test	Tested By (<i>print</i>) _____ Date _____ Time _____
	Test used: Direction of Flow <input type="checkbox"/> Differential Pressure <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/>

DHEC Cert # _____ Company Name _____ Phone # _____

Test Kit Serial # _____ Calibration Date _____

Tester Statement

I am a certified South Carolina DHEC tester, approved by CWS to perform the required tests on backflow prevention assemblies. All materials used in repair or replacement of this assembly are original manufacturers' parts. I have provided a copy of this report to the customer and I am responsible for sending the original (passing or failing) to CWS Cross-Connection Control Department within seven (7) days of testing the assembly. I hereby certify that all work noted here was performed by myself, _____ and the information is correct.

(signature)



To: Charleston Water System
Cross-Connection Control Department
FAX: 843-579-6852
EMAIL: backflow@charlestoncpw.com

Date: _____

of Sheets (including cover)

Attn: _____

From: Company Name: _____
Contact Name: _____
Phone #: _____
Fax #: _____
Email Address: _____

Tests must be submitted within seven (7) days of the test date. All forms submitted must be filled out accurately and completely. Testers not on the approved tester list or in compliance with the CWS Program cannot perform tests. Tests will be reviewed and entered within 48 hours of receipt. There is no reason to call for verification until after that time period. If tests are not acceptable, you will be contacted by a Cross-Connection Compliance Inspector.

Enter an identifying mark (account #, address, customer name or assembly serial number) for each test being transmitted. Make every attempt to keep tests in order of list. Fax is limited to 30 sheets. For submittals for more than 29 tests, break submittal into two transmittals. On accounts with multiple assemblies, each assembly should have a line . . . one line for each test!

- | | | |
|----------|----------|----------|
| 1 _____ | 11 _____ | 21 _____ |
| 2 _____ | 12 _____ | 22 _____ |
| 3 _____ | 13 _____ | 23 _____ |
| 4 _____ | 14 _____ | 24 _____ |
| 5 _____ | 15 _____ | 25 _____ |
| 6 _____ | 16 _____ | 26 _____ |
| 7 _____ | 17 _____ | 27 _____ |
| 8 _____ | 18 _____ | 28 _____ |
| 9 _____ | 19 _____ | 29 _____ |
| 10 _____ | 20 _____ | |

Comments:

SYSTEM PROTECTION QUESTIONNAIRE

To assist us in assessing your backflow prevention requirements for this account, please fill out and check all applicable fields. Return both sides of this form to the address or fax listed above within 14 days of the date of the enclosed letter.

PERSON COMPLETING THIS QUESTIONNAIRE

NAME (PRINT) _____
 TITLE _____
 CONTACT PHONE #'S _____
 EMAIL ADDRESS: _____

"I hereby certify that all information furnished on this form is complete and correct to the best of my knowledge. I further understand that incomplete or inaccurate information may result in additional backflow prevention requirements that may not be necessary. I also understand that as the water service customer or their representative, I am the responsible party for the information provided."

SIGNATURE

ACCOUNT INFORMATION

CWS ACCOUNT # _____
 NAME ON ACCOUNT _____
 BUSINESS NAME (if different) _____
 SERVICE ADDRESS _____
 CITY / STATE / ZIP _____

TYPE OF WATER SERVICE

- Residential Commercial / Industrial
 Irrigation System Fire Sprinkler System

BACKFLOW PREVENTION ASSEMBLY ALREADY INSTALLED?

- No Don't Know? Yes If Yes, What Type?
 Pressure Vacuum Breaker Double Check Valve Assembly
 Reduced Pressure Principle Assembly Air Gap

IRRIGATION SYSTEMS

- In-ground lawn sprinkler Decorative fountain, waterfall, pond, etc.
 Injection or aspiration of chemicals Hose bib only
 Elevated piping/tubing for porches, window sills, terraces, hanging planters, etc. Pool, spa, hot tub
 Alternate water source (i.e. well, rain water collection system, recycled water, etc.)

Provide contact information for your irrigation contractor:

Name / Company _____
 Phone # _____
 Address _____

FIRE SUPPRESSION SYSTEMS

- Water Only System Chemicals Added to System (i.e. anti-freeze, Foamite, etc.)

Provide contact information for your fire service contractor:

Name / Company _____
 Phone # _____
 Address _____

**CHARLESTON WATER SYSTEM
BACKFLOW PREVENTION QUESTIONNAIRE**

Check and fill in all applicable fields. Return completed form within 14 days as instructed on Page 1.

COMMERCIAL SERVICES

- Retail Type: _____
Number of Units Served by the Meter: _____
Additional Unit Types: _____
- Industrial/Manufacturing Type: _____
- Warehouse Type: _____
- Medical List Equipment: _____
- Dental List Equipment/Type of Chairs: _____
- Laboratories Type: _____
- Morgue / Mortuary _____
- Waterfront Facilities (i.e. dock, marina, etc.) _____
- Auto Sales/Repair _____
- Vehicle Washing On-Site? Yes No
- Veterinary Office / Pet Groomer _____
- Restaurant _____
- Manicure / Pedicure / Spa Pedicure Chairs? Yes No Type: _____
- Church Baptismal Pool? Yes No
- School Science Lab? Yes No
- Apartments # of Floors _____
- Hotel/Motel # of Floors _____

GENERAL QUESTIONS

- Multiple stories? Number: _____
- Is there restricted access to this property / facility? Yes No
- Recirculating Water System (boiler, chiller, cooling tower, reservoirs, etc.?) Explain / List below:

- Chemicals added, injected or aspirated into system: (film processer, sanitizer, pool, x-ray, etc.?) Explain / List below:

Additional Comments: _____

Provide contact information for your plumbing contractor:

Name / Company _____
Phone # _____
Address _____

Contact CWS Cross-Connection Control Department if you have any questions:
Phone: 843-727-7148 Fax: 843-579-6852 email: backflow@charlestoncpw.com