CITY OF WILMINGTON

CROSS-CONNECTION CONTROL PROGRAM

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1. INTRODUCTION

1.1. Purpose

The purpose of this document is to outline the City of Wilmington's Cross-Connection Control Program (the "CCC Program") for all residential and commercial facilities having service connections to the public water supply. It is summarized as follows:

- Protect the public water supply from contaminants and pollutants that could backflow through the service connection(s)
- Promote the elimination of actual and/or potential cross connections between the public water supply and non-potable water systems, plumbing fixtures, and sources or systems containing substances of unknown or questionable quality.

1.2. Legality

As mandated by the Delaware Department of Health and Social Services, Division of Public Health, the City of Wilmington established the CCC Program as a continuing effort to maintain safe potable water. The City of Wilmington (the "City") shall comply with the Cross-Connection Control regulations set forth in the Delaware Administrative Code, Title 16, Section 4462, Section 21.0.

1.3. Local Ordinance

The local legal authority for the CCC Program is provided in Chapter 45 of the City Code.

2. AUTHORITY

The City of Wilmington shall be the "Authority" and the "Administrator" of the CCC Program. The CCC Program shall include:

- Establish Authority
- Local Ordinance
- Applicable Rules and Regulations
- Inspection Process and Requirements
- Approved Backflow Prevention Devices and Assemblies
- Testing Requirements of Backflow Prevention Assemblies
- Data Management
- Reporting
- Public Education and Awareness

2.1. Designated CCC Program Administrator

As required by 16 *Del. Admin. C.* § 4462, §21.2.1, "[t]he cross-connection control program shall include an individual designated by the public water system and appropriately trained and experienced in cross-connection control programs to be responsible for the program."

2.2. Inspector

The City personnel or its designated agent ("Administrator/Agent") conducting inspections on behalf of the City must be designated or approved by the City. The Administrator/Agent must meet the following American Society of Sanitary Engineer Standards ("ASSE") certification requirements:

- Meet ASSE 5120 and completed its Cross-Connection Inspector Course (40 hours)

3. INSPECTIONS

3.1. Inspection

Authorized inspectors, having proper identification, shall be permitted to enter the property and any buildings or structures at any reasonable time for the purpose of inspection for the presence or absence of cross-connections, testing, repair, and maintenance upon receiving consent from a person of suitable age. The Authority shall deny or discontinue water service if there is reason to believe a building/premises poses a potential for danger to the public and/or occupants.

3.2. Responsibility of the Owner

The Owner shall be responsible for the protection of the public water supply from contamination due to backflow through the water service connection. The Authority may require the Owner, at the Owner's sole expense, to install, alter, replace, or repair any plumbing connected to the public water system that may pose a threat to public health. Failure, refusal, or the inability on the part of the Owner to correct any deficiency or violation immediately shall be unlawful and the Authority may deny or discontinue water service to the premises. The Owner shall be responsible for the elimination of all unprotected cross-connections and to include service line protection and any connections downstream of the service line supply to the premises.

3.3. Service Line Protection Inspection

a. Existing service line connections should be reassessed/inspected at an interval of no less than every ten (10) years or if there is a change of ownership (unless the service line is protected with an approved Reduced Pressure Backflow Prevention Assembly or properly installed air gap) to determine if the existing backflow preventer/method is appropriate for the level of hazard or if service line protection is required.
b. Residential/Low Hazard service line connections should be reassessed/inspected every fifteen (15) years along with the meter replacement program.
c. New service line connections should be assessed *prior* to the introduction of the new service to determine what method of backflow protection is required.
d. Existing and/or new commercial service line backflow prevention assemblies/methods shall be Reduced Pressure Backflow Preventers or Double Check Valve. All commercial customers that are determined to be high hazard are required to have, at a minimum, a Reduced Pressure Backflow Preventers installed immediately after the water meter.
e. Failure to install backflow protection as required may result in disciplinary action from the Authority.

3.4. Inspection/Survey Forms

An *Inspection/Survey Form* shall be used in every inspection, as required, and will be filed in a location as identified in Section 3.7, along with other pertinent information accumulated. This form will be used to record both existing backflow prevention devices and any requirements for additional backflow prevention devices at the time of the inspection.

3.5. Inspection Procedures

Cross-connection control inspections shall be completed as follows:

a. Identify building to be inspected.
b. Meet on-site with facility contact/owner and explain inspection process and purpose.
c. Inspect/evaluate the status of service line protection – complete all inspection forms as required.
d. In addition to the field forms, a piping diagram or schematic of the plumbing system may be requested or required.

3.6. Request for Internal Cross-Connection Control Information

The City has the right to request specific cross-connection control information, including, but not limited to, service line protection methods, assembly test records, CCC Program information, piping drawings, etc.

3.7. Record Keeping and Data Management Software

All data obtained from the *Inspection Forms, Existing Devices Forms,* and *Requirements Forms* will be input into a data management system and held for a period of no less than ten (10) years to facilitate the CCC Program. This information will include:

- Address and location
- Owner name and contact information
- Required re-inspection frequency
- Degree of hazard classification
- List of assemblies
- Location of assemblies
- Make, model, and size of assemblies
- Testing and maintenance of assemblies
- Description of other backflow prevention devices within the facility.
    - Air gaps
    - Non-testable devices

4. BACKFLOW PREVENTION ASSEMBLIES AND DEVICES

4.1. Responsibility

Installation and maintenance of backflow prevention devices, assemblies, and methods to protect all existing cross-connections shall be the responsibility of the Owner and shall be performed at the Owner's sole expense.

4.2. Approved Backflow Prevention Assemblies and Devices

a. The City will accept backflow prevention devices, assemblies, and methods (downstream of service line protection) as recognized by the Delaware Plumbing Code and ASSE recommended protection methods for specific hazards.
b. New installation of Reduced Pressure Backflow Prevention Assemblies and Double Check Valve Assemblies intended for service line protection must conform to AWWA Standards C510 and C511.

4.3. Service Line Backflow Prevention Assembly Protection

With respect to backflow prevention assemblies installed at the service line, the City will require the following:

a. Service line protection shall be required at all high hazard properties.
b. Where service line protection is required, the Owner shall receive formal written notification detailing the requirement and instructions pertaining to the need for protection from thermal expansion.
c. Service connections to fire protection systems shall be required in accordance with the current AWWA M-14 Manual. The continued use of UL-listed alarm check valves shall be accepted on any existing connection deemed to be a low hazard by the Authority. Residential properties equipped with an internal fire protection system are required to have backflow prevention that conforms to these standards.
d. If an existing fire protection system requires a higher degree of protection than that of which is currently installed and additional or new backflow prevention devices are required that may affect the hydraulics of the system, the Owner shall receive formal written notification detailing the requirement and the Owner shall be responsible 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 system.
e. The installation of a Reduced Pressure Backflow Prevention Assembly as service line protection shall be required at high hazard facilities. Refer to list in Appendix G.
f. The installation of residential Dual Checks or Double Checks shall be required as service line protection at all residential homes which are also served by reclaimed water or where an auxiliary water system exists.
g. Backflow prevention assemblies, devices, or methods installed as service line protection shall be installed immediately downstream of the water meter and prior to the first branch line in the plumbing system.
h. New Installation of Reduced Pressure Backflow Prevention Assemblies and Double Check Valve Assemblies must conform to AWWA Standards C510 and C511.

i. The installation of Reduced Pressure Backflow Prevention Assemblies, Pressure Vacuum Breaker Assemblies, and Atmospheric Vacuum Breakers below grade or in an underground pit shall be prohibited.
j. The installation of residential Dual Checks below grade or in an underground pit shall be accepted under the following conditions:
    1. If the test cocks are plugged; or
    2. If adequate drainage is provided to maintain a normally dry location.
k. 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.

4.4. Lawn Irrigation Systems

Lawn irrigation systems which are supplied from the City water system shall be installed in accordance with the City Plumbing Code, the Delaware Plumbing Code, and the manufacturers' installation requirements.

4.5. Testing of Backflow Prevention Assemblies

a. All backflow prevention assemblies located at the service line and downstream shall be tested upon installation, upon repair, upon responding to a reported backflow incident, and on an annual basis. Assemblies must be tested in accordance with applicable standards referenced within the Delaware Plumbing Code and ASSE standards. All testable backflow prevention devices installed on a residential property will be tested annually.
b. Equipment used to field test assemblies must be certified and calibrated for accuracy annually.
c. Assembly test form(s) to record test results will be maintained by the Owner and within the database management system of the Authority. The Tester will electronically submit all completed test form to the Authority as instructed.
d. The Owner shall have all assemblies tested annually by a tester having completed the 40-hour ASSE Backflow Prevention Assembly Tester Training and Certification Course. All testers must also complete a recertification exam at an interval not to exceed once every three years.
e. The City shall reserve the right to direct and administer testing of any backflow prevention assemblies installed as service line protection. All costs associated with testing and any necessary repairs of these assemblies shall be the responsibility of the Owner.
f. Failure to test assemblies and submit appropriate test forms located at the service line may result in termination of water service.

4.6. Assembly and Device Abbreviation List

Device Legend			
A.S.S.E Standard	Legend	Acronym	Testable Device
1001	Atmospheric Type Vacuum Breakers	AVB	No
1002	Anti-siphon Fill Valves (Ballcocks)	ASBC	No
1011	Hose Connection Vacuum Breaker	HBVB	No
1012	Backflow Preventer w/Intermediate Atmospheric Vent	VDCV	No
1013	Reduced Pressure Backflow Prevention Assembly	RPBP	**Yes**
1015	Double Check Valve Backflow Prevention Assembly	DCV	**Yes**
1019	Vacuum Breaker Wall Hydrants	HBIVB	No
1020	Pressure Vacuum Breaker Assembly	PVB	**Yes**
1022	Backflow Preventer for Carbonated Beverage Machine	VMBP	No
1024	Dual Check Valve Type Backflow Preventers	DC	No
1024	Residential Dual Check	RDC	Yes/No
1035	Laboratory Faucet Backflow Preventer	LFVB	No
1037	Pressurized Flushing Devices (Flushometers)	PFD	No
1047	RP Detector Backflow Prevention Assembly	RPDA	**Yes**
1048	Double Check Detector Backflow Prevention Assembly	DDCV	**Yes**
1052	Hose Connection Backflow Preventer	HCBP	No
1055	Chemical Dispensing Systems	AG	No
1056	Spill Resistant Vacuum Breaker Assembly	SVB	**Yes**
1057	Freeze Resistant Yard Hydrant W/Backflow		No
A112.1.2	Air Gap	AG	No
	Single Check Valve	SCV	No

5. NEW SERVICE INSPECTION

5.1. Procedures

All plumbing plans and permits for a proposed building shall be reviewed by the Authority, plumbing inspector, building inspector, and building contractor(s). The Authority's CCC Program and backflow prevention requirements will be reviewed with the responsible party.

5.2. Inspections

The Authority/Designated Agent conducting the cross-connection control inspection shall inspect the building for compliance with the CCC Program.

5.3. Compliance

Upon completion of the cross-connection control inspection and determination that the building complies and has met all requirements of the CCC Program, a certificate of occupancy and water service may be initiated as applicable.

5.4. Non-Compliance

If the building does not comply with the CCC Program, the Authority shall enforce the CCC Program as required. The water service and the certificate of occupancy will not be initiated until compliance is achieved and approved.

6. EMERGENCY RESPONSE PLAN

6.1. Emergency Response Plan Procedures

The City shall develop and maintain a written Emergency Response Plan (the "ERP") intended to facilitate properly responding to a backflow event. The 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; and
c. Prevent any further contamination of the distribution system.

The facilities investigation should include these steps:

a. Locate the source of contamination.
b. Isolate the source to protect the water distribution system from further contamination.
c. Determine the extent of the spread of contamination through the distribution system and provide timely, appropriate notification to the public and regulatory agencies as applicable.
d. Take corrective action to clean the contamination from the distribution system; and
e. Restore water service.

6.2. Emergency Scenarios

Common scenarios causing unintended backflow forcing execution of the ERP 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

6.3. Sample Emergency Response Plan

BACKFLOW INCIDENT REPORT FORM

There are many backflow incidents that occur that are not reported. This is usually because they are of short duration, are not detected, the customer is not aware they should be reported, or it may not be known to whom the incident should be reported. If you have any knowledge regarding incidents, please complete the form below and return it to City of Wilmington, Department of Public Works, Water Division, 800 North French Street, 6th Floor, Wilmington, DE 19801.

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.

7. EDUCATION AND AWARENESS

The CCC Program staff must have a good understanding of the program. The City shall ensure its cross-connection control staff receives proper in-the-field training as well as classroom education focusing on terminology, backflow prevention devices/assemblies, regulations, and hydraulic concepts. In addition, cross-connection control staff will be encouraged to receive continuing education to be made aware of new backflow prevention devices/assemblies, regulation changes (i.e., plumbing code updates), new water use devices that pose cross connection concerns, etc.

Furthermore, attempts to educate the public about cross-connections will be made by distributing pamphlets on common residential cross connections, providing onsite education of residents during routine inspections, providing on-line webpage specific to the CCC Program, speaking at association meetings, newspaper articles, and/or posting newsletter announcements.

Cross-connection staff shall also be available upon request to provide backflow prevention education to pertinent community officials and City employees.

APPENDIX A - FIELD FORMS

(This is A Sample form)

Cross-Connection Control Survey/Inspection Report

Facility Name		**Survey Date**	
Facility Name 2		**Survey By**	
Service Loc/Address			
Contact Name		**Contact Phone**	
Area Name		**Acct Number**	
Service Type		**Facility Status**	
Comments			

BFP/CC Info

# 1						
Location Floor			Location Room		☐ Confinement	
Equip Location					☐ UD CB 1	
Type			Location ID		☐ Freeze Protect	
Mfr			Meter #		Map Page	
Size			PT			
Model			Haz. Level		Protection Type	
Serial Num			Install Date		Status	

# 2						
Location Floor			Location Room		☐ Confinement	
Equip Location					☐ UD CB 1	
Type			Location ID		☐ Freeze Protect	
Mfr			Meter #		Map Page	
Size			PT			
Model			Haz. Level		Protection Type	
Serial Num			Install Date		Status	

# 3						
Location Floor			Location Room		☐ Confinement	
Equip Location					☐ UD CB 1	
Type			Location ID		☐ Freeze Protect	
Mfr			Meter #		Map Page	
Size			PT			
Model			Haz. Level		Protection Type	
Serial Num			Install Date		Status	

APPENDIX B - NOTICE TEMPLATES

(This is a sample Notice that can be reworded to be used as a Program Introduction or any other notice the Utility may need)

Cross Connection Control Program Inspection Notice

January 1, 2021

Sam Samples
000 Sample Drive
Sample City, FL 00000

RE: The Sam Samples Store at 111 Test Drive

Dear Mr. Samples

The Purpose of the **Sample City** Cross Connection Control Program, as defined in the local Resolution 12345, is to help eliminate possible contamination of the public water distribution system. There are two required components of the program; 1) site inspection, and 2) testing of backflow prevention assemblies.

The Sample City will be working jointly with inspectors from HydroCorp Inc. to conduct these inspections. Thank you in advance for your cooperation in this matter.

As part of this program, an inspection of your facility's internal water system is to be completed. Inspectors will be reviewing your water system for connections that could possibly contaminate the water distribution system. The inspection is tentatively scheduled for **February 1, 2021.** Our inspector will do their best to be on site this day; however, we may be on site a day or two before or after the scheduled date. The inspection must be completed during normal business hours 8:00 AM to 5:00 PM. If you need a more specific time, please call [Insert Phone Number] to arrange an appointment.

Any costs associated with the replacement, modification, installation and/or testing of backflow prevention assemblies is the responsibility of the property owner/manager and/or occupant.

You will be notified following the inspection if modification(s) and/or testing of backflow prevention assemblies are necessary. We look forward to working with you in protecting the drinking water supply. If you have any questions or concerns, please contact **[Insert Contact Information]**

APPENDIX C - TEST FORM

APPENDIX D - DEFINITIONS

Air Gap: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet conveying water or waste 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 diameter of the water supply outlet and at no time less than one (1) inch.

Approved: Accepted by the authority responsible as meeting an applicable specification stated or cited in this plan or as suitable for the proposed use.

Auxiliary Water System: Any water system on or available to the premises other than the purveyor's approved public water supply.

Backflow: The undesirable reversal of flow in a potable water distribution system as a result of a cross-connection.

Backflow Preventer: An assembly, device, or method designed to prevent backflow.

Backflow Prevention Assembly: A mechanical backflow preventer used to prevent backward flow of contaminants or pollutants into a potable water distribution system. An assembly has a resilient seated, full flow shut-off valve before and after the backflow preventer making it testable in line.

Backflow Prevention Device: A mechanical backflow preventer without shut-off valves. Typically, these devices are not testable in the field.

Backpressure: A pressure, higher than the supply pressure, caused by a pump, elevated tank, boiler, or any other means that may cause backflow.

Backsiphonage: Backflow caused by negative or reduced pressure in the supply piping.

Contaminant: Any foreign substance (liquid, solid, or gas) that degrades the quality of water and creates a health hazard.

Cross-Connection: A connection or potential connection between any part of a potable water system and any other environment containing other substances in a manner that, under any circumstances, would allow such substances to enter the potable water system. Other substances may be gases, liquids, or solids, such as chemicals, waste products, steam, water from other sources (potable or non-potable), or any matter that may change the color or add an odor to the water.

Owner: Person or entity receiving service from the public water distribution system.

Pollutant: Any foreign substance (liquid, solid, or gas) that degrades the quality of water as to constitute a non-health hazard or impair the usefulness of the water.

Potable Water: Water that is safe for human consumption as described by the public health official having jurisdiction.

Non-Potable Water: Water that is not safe for human consumption or is of questionable quality.

Reclaimed Water: Water that, because of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is not safe for human consumption.

Service Line Protection: Installation of an approved backflow prevention device, assembly, or method at the point of service in order to confine potential contamination caused by a cross-connection within the facility where it arises; also referred to as containment.

APPENDIX E – 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 DEVICE CAN BE INSTALLED HORIZONTALLY OR VERTICALLY, REFER TO MANUFACTURER SPECIFICATIONS FOR FLOW ORIENTATION (i.e. FLOW UP OR FLOW DOWN)
2. REFER TO MANUFACTURER INSTALLATION & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
3. THIS DEVICE SHALL BE INSTALLED WITH THE RELIEF VALVE OPENING POINT A MINIMUM OF 12" ABOVE FINISHED GRADE AND A MAXIMUM OF 36" ABOVE FINISHED GRADE
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. UPON INSTALLATION PROTECTION FROM THERMAL EXPANSION MAY BE REQUIRED
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-RISING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.
10. ALL PIPING ABOVE GRADE SHALL BE THREADED BRASS, COPPER, GALVANIZED OR DUCTILE IRON

SPECIAL DESIGN NOTES:

* A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPBP'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 AUTOMATICE 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" RPBP INSTALLATION
REDUCED PRESSURE BACKFLOW PREVENTER

NOTES:

1. THE DEVICE CAN BE INSTALLED HORIZONTALLY OR VERTICALLY, REFER TO MANUFACTURER SPECIFICATIONS FOR FLOW ORIENTATION (i.e. FLOW UP OR FLOW DOWN)
2. REFER TO MANUFACTURER INSTALLATION & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
3. THIS DEVICE SHALL BE INSTALLED WITH THE RELIEF VALVE OPENING POINT A MINIMUM OF 12" ABOVE FINISHED GRADE AND A MAXIMUM OF 36" ABOVE FINISHED GRADE
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. UPON INSTALLATION PROTECTION FROM THERMAL EXPANSION MAY BE REQUIRED
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-RISING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.
10. ALL PIPING ABOVE GRADE SHALL BE THREADED BRASS, COPPER, GALVANIZED OR SCHEDULED 80 PVC

SPECIAL DESIGN NOTES:

* A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPBP'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 AUTOMATICE 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" RPBP INSTALLATION
REDUCED PRESSURE BACKFLOW PREVENTER

NOTES:

1. THE DEVICE CAN BE INSTALLED HORIZONTALLY OR VERTICALLY, REFER TO MANUFACTURER SPECIFICATIONS FOR FLOW ORIENTATION (i.e. FLOW UP OR FLOW DOWN)
2. REFER TO MANUFACTURER INSTALLATION & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
3. THIS DEVICE SHALL BE INSTALLED WITH THE RELIEF VALVE OPENING POINT A MINIMUM OF 12" ABOVE FINISHED GRADE AND A MAXIMUM OF 36" ABOVE FINISHED GRADE
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. UPON INSTALLATION PROTECTION FROM THERMAL EXPANSION MAY BE REQUIRED
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-RISING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.
10. ALL PIPING ABOVE GRADE SHALL BE THREADED BRASS, COPPER, GALVANIZED OR SCHEDULE 80 PVC

SPECIAL DESIGN NOTES:

* A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPBP'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 AUTOMATICE 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 1/2" RPBP INSTALLATION

REDUCED PRESSURE BACKFLOW PREVENTER

NOTES:

1. THE DEVICE CAN BE INSTALLED HORIZONTALLY OR VERTICALLY, REFER TO MANUFACTURER SPECIFICATIONS FOR FLOW ORIENTATION (i.e. FLOW UP OR FLOW DOWN)
2. REFER TO MANUFACTURER INSTALLATION & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
3. THIS DEVICE SHALL BE INSTALLED WITH THE RELIEF VALVE OPENING POINT A MINIMUM OF 12" ABOVE FINISHED GRADE AND A MAXIMUM OF 36" ABOVE FINISHED GRADE
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. UPON INSTALLATION PROTECTION FROM THERMAL EXPANSION MAY BE REQUIRED
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-RISING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.
10. ALL PIPING ABOVE GRADE SHALL BE THREADED BRASS, COPPER, GALVANIZED OR SCHEDULE 80 PVC

SPECIAL DESIGN NOTES:

* A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL RPBP'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 AUTOMATICE 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 1/2" RPBP INSTALLATION

REDUCED PRESSURE BACKFLOW PREVENTER

NOTES:

1. THE DEVICE CAN BE INSTALLED HORIZONTALLY OR VERTICALLY, REFER TO MANUFACTURER SPECIFICATIONS FOR FLOW ORIENTATION (i.e. FLOW UP OR FLOW DOWN)
2. REFER TO MANUFACTURER INSTALLATION & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
3. THIS DEVICE SHALL BE INSTALLED A MINIMUM OF 12" ABOVE FINISHED GRADE AND A MAXIMUM OF 36" ABOVE FINISHED GRADE
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. UPON INSTALLATION PROTECTION FROM THERMAL EXPANSION MAY BE REQUIRED
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-RISING STEM GATE VALVES, STRAINER, & AIR GAP DEVICE.
10. ALL PIPING ABOVE GRADE SHALL BE THREADED BRASS, COPPER, GALVANIZED OR SCHEDULED 80 PVC

SPECIAL DESIGN NOTES:

* A STRAINER, AND A STRAINER ISOLATION VALVE SHOULD BE INSTALLED UPSTREAM OF ALL DCV's – NOTE: STRAINERS SHALL NOT BE INSTALLED ON ASSEMBLIES SERVING FIRE PROTECTION SYSTEMS
* 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 AUTOMATICE 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 1/2" – 2" DCV INSTALLATION

DOUBLE CHECK VALVE ASSEMBLY

NOTES:

1. THE DEVICE MUST BE INSTALLED SO THAT THE CRITICAL LEVEL IS 12" ABOVE THE HIGHEST POINT IN DOWNSTREAM PIPING.
2. ALL PIPING DONWSTREAM 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 & MAINTNENANCE 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

NOTES:

1. THE DEVICE MUST BE INSTALLED SO THAT THE CRITICAL LEVEL IS 12" ABOVE THE HIGHEST POINT IN DOWNSTREAM PIPING.
2. ALL PIPING DONWSTREAM OF THE SVB 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 & MAINTNENANCE 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

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 DONWSTREAM 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 & MAINTNENANCE INSTRUCTIONS FOR ADDITIONAL DETAILS.
6. WHEN ORDERING SPECIFY; SIZE & INLET/OUTLET CONNECTION.

TYPICAL AVB INSTALLATION

ATMOSPHERIC VACUUM BREAKER

(13) Chlorine dioxide	Summary of CT values for each day as described in subsection 20.21.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in subsection 20.14.
(14) Ozone	Summary of CT values for each day as described in subsection 20.21	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in subsection 20.14.
(15) UV	(1) Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date in subsection 20.14.
	(2) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in subsection 20.21.4.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in subsection 20.14.

20.23 Recordkeeping requirements

20.23.1 Systems must keep results from the initial round of source water monitoring under subsection 20.2.1 and the second round of source water monitoring under subsection 20.2.2 until 3 years after bin classification under subsection 20.11 for filtered systems or determination of the mean *Cryptosporidium* level under subsection 20.11 for unfiltered systems for the particular round of monitoring.

20.23.2 Systems must keep any notification to the Division that they will not conduct source water monitoring due to meeting the criteria of subsection 20.2.4 for 3 years.

20.23.3 Systems must keep the results of treatment monitoring associated with microbial toolbox options under subsections 20.17 through 20.21 and with uncovered finished water reservoirs under subsection 20.15, as applicable, for 3 years.

20.24 Requirements to respond to significant deficiencies identified in sanitary surveys performed by the Division.

20.24.1 A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

20.24.2 For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the Division determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

20.24.3 For sanitary surveys performed by the Division, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

20.24.4 Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by the Division, or if there is no approved schedule, according to the schedule reported under subsection 20.24.3 if such deficiencies are within the control of the system.

20 DE Reg. 555 (01/01/17)
20 DE Reg. 808 (04/01/17)
24 DE Reg. 794 (02/01/21)

21.0 Cross-Connection Control

21.1 Cross-connection control requirements and prohibitions.

21.1.1 No public water system shall install or maintain a water service connection to any premises where actual or potential cross-connections to a public water system exist unless such actual or potential cross-

connections are eliminated or controlled to the satisfaction of the owner of the public water system and the Division.

21.1.2 No public water system shall install or maintain any connection whereby water from an auxiliary water system may enter a public water system unless the auxiliary water supply and the method of connection and use of such system has been approved by the owner of the public water system and the Division.

21.1.3 In accordance with subsection 1.12.1.4, public water systems shall maintain acceptable water pressure throughout the distribution system so that the risk of backflow is reduced.

21.1.4 If a cross-connection exists or backflow occurs at a consumer's water system, the public water system may discontinue service to the consumer and water service shall not be restored until the deficiencies have been corrected.

21.2 Cross-connection control programs.

21.2.1 A public water system shall develop a plan for a comprehensive cross-connection control program for the elimination, prevention, and control of cross-connections appropriate to the number of service connections, size of the distribution system, and type of customers. The cross-connection control program shall include an individual designated by the public water system and appropriately trained and experienced in cross-connection control programs to be responsible for the program.

21.2.2 A cross-connection control program shall include an inventory and records of testing, repairs, and maintenance of all backflow prevention assemblies, and backflow elimination methods.

21.2.3 A cross-connection control program shall include appropriate policies to complete assessments of customer premises for potential cross-connections, to establish hazard criteria to classify customer premises consistent with Table 1, and to determine the degree of hazard and adequacy of existing preventive measures.

Table 1 Backflow Prevention Assembly Types Required for Service Line Containment	
Premise - Degree of Hazard	
High Hazard	Low Hazard
Air Gap	Air Gap
Reduced Pressure Principle Back-flow Prevention Assembly	Reduced Pressure Principle Backflow Prevention Assembly
-	Double Check Valve Assembly

21.2.4 An approved backflow prevention assembly or backflow elimination method shall be installed at premises where the following conditions exist in a location intended to prevent backflow into the distribution system:

21.2.4.1 Premises having an auxiliary water system;

21.2.4.2 Premises types that are deemed by the public water system or the Division to represent a health or high hazard to the public water system, to include but not be limited to:

- Agricultural facilities (e.g., farms, dairies)

- Beverage bottling plants
- Car washes
- Chemical plants
- Dry cleaners (on site processing)
- Film processing plants
- Food processing plants
- Laboratories
- Medical facilities
- Metal plating industries
- Mortuaries
- Petroleum processing or storage plants
- Piers, marinas, docks and waterfront facilities
- Radioactive material processing plants
- Wastewater treatment facilities

21.2.4.3 Premises having internal cross-connections that, in the judgment of the public water system, are not correctable or are impractical to determine if cross-connections exist due to intricate plumbing arrangements;

21.2.4.4 Premises where because of security requirements or other prohibitions, it is impossible to complete a cross-connection control survey; or

21.2.4.5 Premises having a history of cross-connections being established or reestablished.

21.2.5 In lieu of assessments and installation of backflow prevention assemblies at customer premises deemed low hazard, a public water system may implement a public education program.

21.2.5.1 The public education program shall include, at minimum:

21.2.5.1.1 Causes and dangers of backflow and cross-connections, including health effects;

21.2.5.1.2 Information on how to identify actual and potential cross-connections;

21.2.5.1.3 Preventive measures to reduce or eliminate cross-connection and backflow risks; and

21.2.5.1.4 Information on reporting suspected cross-connections to the public water system.

21.3 Corrections and protective devices.

21.3.1 Backflow prevention assemblies shall conform to the standards of the American Society of Sanitary Engineering (ASSE), the American Water Works Association (AWWA), and the American Society of Mechanical Engineers (ASME).

21.4 Cross-connection control records and reporting.

21.4.1 All backflow prevention assembly test records which document the test results of assemblies designed to protect the public water system shall be retained on file for a period of no less than 10 years.

21.4.2 All cross-connection control survey records which document results from the monitoring of cross-connections shall be retained on file for a period of no less than 10 years.

21.5 Violations.

21.5.1 The following items shall be deemed to be violations of these regulations:

21.5.1.1 Failure to develop and implement a comprehensive cross-connection control program in accordance with subsection 21.2 of this regulation within three years of the effective date of these regulations;

21.5.1.2 Failure to implement the cross-connection control program as prescribed; and

21.5.1.3 Failure to maintain all backflow prevention assembly test records on file for at least 10 years.

21.6 Penalty Clause. Any person who neglects or fails to comply with these regulations shall be subject to penalty as provided in 16 **Del.C.** §122(3)c.

5 DE Reg. 2121 (05/01/02)
9 DE Reg. 999 (12/01/05)
15 DE Reg. 73 (07/01/12)
17 DE Reg. 439 (10/01/13)
19 DE Reg. 517 (12/01/15)
20 DE Reg. 555 (01/01/17)
20 DE Reg. 808 (04/01/17)

APPENDIX G – LIST OF HIGH HAZARD FACILITIES

All high hazard facilities shall have an approved Reduced Pressure Principle Assembly (ASSE 1013) as a minimum containment assembly.

High hazard facilities include, but are not limited to:

1. Medical Facilities
    - Hospitals
    - Clinics
    - Laboratories
    - Veterinary
    - Nursing/Convalescent
    - Physical therapy/radiographic
    - Morgues/Mortuaries/Autopsy/Embalming/Funeral Homes
    - Dental Offices

2. Treatment Plants/Pump Stations
    - Municipal/Industrial/Storm
    - Sewage/Pumping Stations/Waste Dump Stations

3. Commercial/Manufacturing/Storage
    - Automotive/Aircraft/Watercraft
    - Breweries/Distilleries/Beverage bottling
    - Chemical (manufacturing, use, storage, treatment, disposal)
    - Car Wash
    - Dairies and cold storage
    - Dry cleaners
    - Exterminators
    - Lawn Care companies
    - Metals manufacturing/handling (cleaning, processing, refining, fabricating, plating)
    - Paper and paper products
    - Petroleum or gas processing/storage
    - Photographic film processing
    - Power plants/facilities
    - Premises where access is restricted
    - Radioactive materials/substance (processing/handling/treatment/disposal)
    - Rubber plants (natural and synthetic)
    - Sand, gravel, concrete and asphalt plants/facilities
    - Technical schools, colleges, universities
    - Solar heating systems (direct and auxiliary)
    - Swimming pools
    - Temporary services
    - Waterfront facilities (docks, marinas, etc.)
    - Food processing (manufacturing, canning, packaging)

4. Buildings
    - With five or more stories above ground
    - With sewage ejectors/pumps
    - With water booster pumps and/or water storage tanks
    - With irrigation systems
    - Supermarkets/grocery (wholesale/retail)
    - Restaurants
    - Schools, research facilities, any building with a laboratory
    - Buildings with dedicated/combined fire service with any single or combination of features; fire pumps, storage tanks, private hydrants and fire department connections (FDC's)
    - Warehouses used for the storage of hazardous materials
    - Factories
    - Shopping Malls
    - With known soil and/or groundwater contamination
    - Swimming Pools