

Section 6

Cross-Connection and Backflow Prevention Program

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

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6.01 INTENT OF POLICY

The Board of Water and Sewer Commissioners of the City of Mobile (also known as the Mobile Area Water and Sewer System [MAWSS]) is responsible for maintaining a cross-connection control program that protects the public potable water supply against actual or potential contamination from cross-connection, backpressure, or back-siphonage. As a result, MAWSS has developed a Cross-Connection and Backflow Prevention Program (the “Program”) in compliance with the latest edition of the International Plumbing Code, International Fire Code, American Water Works Association (AWWA) Manual of Water Supply Practices M14, and Alabama Department of Environmental Management Regulation (ADEM) Admin., Code R. 335-7-9-03. The Program requires that all new and certain existing water service connections contain a backflow prevention device/assembly.

This policy relies on three backflow prevention methodologies: isolation, elimination, and program maintenance. **Isolating** the customer’s internal distribution system(s) or the customer’s private water system(s) from potential backflow or back-siphonage into the public water system helps maintain the safety and quality of the public potable water supply. Customers are responsible for ensuring that no contaminants or pollutants from their private plumbing enter into the public water system. The policy promotes **eliminating** cross-connections at new and existing service connections, actual or potential, between MAWSS’ public potable water system and the customer’s service connection. The policy is not intended to protect against cross-connections within the plumbing system owned by the customer. The policy also provides for the **maintenance** of a continuing program of cross-connection control with a goal to systematically and effectively prevent the contamination or pollution of MAWSS’ potable water system, and provides for discontinuance of service for violation of the policy.

Note that MAWSS will not perform cross-connection surveys on the customer’s property so this policy does not intend to protect the property occupants from internal cross-connections. Customers may elect to procure the services of a licensed plumber to perform surveys of their internal system if further protection is desired. However, MAWSS may perform surveys to determine the degree of hazard for the purpose of identifying the backflow prevention assemblies/devices as required to protect the public water supply.

6.02 DEFINITIONS

ADEM: Alabama Department of Environmental Management; <http://www.adem.state.al.us>

Auxiliary Water Supply: Any water source on or available to the premises other than that supplied by MAWSS. These auxiliary sources of water include, but are not limited to, other public water system sources or other unapproved onsite source(s) which are not under the control of MAWSS’s system, such as a well, lake, spring, river, stream, harbor, etc. Auxiliary water sources may also include graywater, rain or storm water, reclaimed waters, or recycled waters.

Backflow Preventer: An assembly, device, or method that prevents backflow.

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Backflow Prevention Assembly: Mechanical devices that are in-line performance testable and repairable with two properly located approved shutoff valves and properly located test cocks.

Backflow Prevention Device: An item that prohibits the backflow of nonpotable water into potable water supply systems. It is not performance-testable.

Backflow: The reversal of the normal flow of water caused by either back-pressure or back-siphonage.

Back-pressure: A type of backflow where the pressure is higher on the customer's premises than the incoming supply pressure from the water utility.

Back-siphonage: A type of backflow where the upstream pressure in the utility's piping system is reduced to a subatmospheric pressure. This can be caused by a water main break or flows in the water main to fight fires.

Board: The Board of Water and Sewer Commissioners of the City of Mobile.

Certified Tester and Installer: A person who is certified by an AWWA or similar program (see *Section 6.15*) and approved by MAWSS to install and field-test backflow prevention assemblies.

Cross-Connection: An actual connection or a potential connection between any part of a potable water system and any other environment that would allow substances to enter the potable water system. Those substances could include gases, liquids, or solids, such as chemicals, water products, steam, water from other sources (potable or nonpotable), or any matter that may change the quality, color or odor of the water. Bypass arrangements, jumper connections, removable sections, swivel or change-over assemblies, or any other temporary or permanent connecting arrangement through which backflow may occur are considered to be cross-connections.

Customer: A person who utilizes water from a public water system.

Degree of Hazard: The results of an assessment or evaluation of a customer's use of water in regard to the potential risk to health or an adverse effect on a potable water system.

Double Check Valve Assembly: A backflow prevention assembly consisting of two internally loaded independently operating check valves, located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. This assembly shall only be used to protect against a non-health hazard (that is, a pollutant).

Dual Check Valve (Residential): A backflow prevention device consisting of two check valves. This device is suitable for low hazard cross-connections and both back-pressure and back-siphonage conditions. This device is not testable.

Existing: Service connections that were already installed at the time the policy was adopted.

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Health Hazard: A cross-connection or potential cross-connection involving any substance, herein referred to as contaminants, that could, if introduced into the potable water supply, cause death or illness, spread disease, or have a high probability of causing such effects. These substances are listed in the Environmental Protection Agency (EPA) National Primary Drinking Water Standards.

IBC: International Building Code, latest edition

IFC: International Fire Code, latest edition

IPC: International Plumbing Code, latest edition

Irrigation Customer (for the purposes of this document): An existing residential or non-residential customer that installs a separate meter for an onsite irrigation system.

Latest Edition: Latest approved and adopted edition of the referenced code or manual.

MAWSS: The Mobile Area Water and Sewer System or Board of Water and Sewer Commissioners of the City of Mobile.

Non-Health Hazard: Any substance that generally would not be a health hazard but would constitute a nuisance or be aesthetically objectionable if introduced into the potable water supply, herein referred to as those substances listed in the EPA National Secondary Drinking Water Standards.

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

Non-Residential Customer (for the purposes of this document): Multifamily dwellings served by one master meter; retail, offices, hotels, motels, shopping centers, medical facilities, and other commercial buildings (commercial); and manufacturing or process facilities, which are engaged in producing a product (industrial).

Pollution Hazard: See non-health hazard.

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

Program: The Program developed and adopted by MAWSS and implemented in accordance with the policy described herein.

Reduced Pressure Principle Assembly: A backflow prevention assembly consisting of a mechanical, independently acting, hydraulically dependent relief valve, located between two independently operating, internally loaded check valves that are located between two tightly closing resilient-seated shutoff valves with four properly placed resilient-seated test cocks. This assembly is suitable for direct high hazard cross-connections.

Residential Customer (for the purposes of this document only): Single-family detached dwellings and multifamily complexes served by individual meters.

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Thermal Expansion: A physical property related to a water volume increase inside the pipe or water heater when water is heated. Moreover, back-pressure backflow may result if the pressure increase, caused by water expansion, is not dissipated.

Used Water: Any water supplied by MAWSS' water system to a consumer's water system after it has passed through the point of delivery and is no longer under the sanitary control of the water supplier.

Water Service Connection: The connection between MAWSS' public water distribution system main and a user's domestic water system.

Water Supplier: The owner or operator of a public water system (for example, MAWSS).

6.03 STATEMENT OF POLICY

MAWSS is responsible for evaluating and monitoring hazards inherent in supplying potable water to customers. The customer is responsible for preventing any contaminants from flowing into MAWSS's system from their plumbing system. When a hazard or potential hazard is identified, the customer is responsible for installation, testing, and certification of the approved backflow prevention device(s)/assembly(ies). To enforce this policy and to protect the public water supply from pollution or contamination resulting from a cross-connection, the following rules apply:

1. No person shall make or allow a connection to exist at any premises between pipes or conduits carrying potable water supplied by MAWSS and any pipes, conduits, or fixtures containing or carrying liquids, gas, or other substances from any other source.
2. No water service piping by any private water supply system or industrial process or water piping system owned by any person shall be connected to the public potable water system owned and operated by MAWSS.
3. The customer is responsible for ensuring that no contaminants or pollutants flow from his/her private plumbing into the public water system.
4. Non-residential customers shall notify MAWSS if use of the water changes at the premises.
5. No water service connection will be made by MAWSS until an approved backflow prevention assembly is installed and tested.
6. Any non-residential or new residential customer of MAWSS who has the potential for a cross-connection shall, at his/her own expense, install, operate, test, and maintain approved backflow prevention assembly as directed by MAWSS. Backflow prevention assembly shall be tested for effectiveness and reliability upon installation in accordance with the Program, with the customer submitting a Backflow Assembly Test Report to MAWSS for each backflow prevention assembly on the customer's premises.
7. MAWSS shall install backflow prevention assemblies for customers with meters less than

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or equal to 1 inch in diameter and the customer's water is classified as a non-health hazard.

8. The customer shall procure the services of a certified installer to install a backflow prevention assembly on water service with meters greater than 1 inch in diameter, as well as on service with meters less than or equal to 1 inch in diameter and the water use is classified as a health hazard. The customer shall also procure the services of a certified tester to test the assembly after the initial installation and at the frequency specified in this document.
9. Water service to any premises shall be disconnected by MAWSS if a backflow prevention assembly required by MAWSS is not installed, tested, and maintained; if it is found that a backflow prevention assembly has been removed or by-passed; if unprotected cross-connections exist on the premises; or there is inadequate backflow prevention at the service connection. Water service will not be restored until such conditions or defects are corrected and evidence thereof is provided to MAWSS by the customer.

6.04 NEW SERVICE CONNECTIONS

A. General

New service connections will be evaluated by MAWSS to determine the degree of hazard and the type of backflow prevention device/assembly required to protect the potable water system from actual or potential contamination or pollution. Criteria used for evaluation of residential, non-residential, and irrigation service connections are outlined in *Section 6.10, Backflow Prevention Selection Criteria* and *Section 6.11, Facilities Requiring Backflow Prevention Assemblies*. Customer shall notify MAWSS by email if the use of the water by the customer changes, as it could require a different type of backflow prevention device.

B. Residential

MAWSS shall install dual check valves for new residential service connections for meters on line sizes less than or equal to 1 inch in diameter. MAWSS shall also install dual check valves when water meters and service lines less than or equal to 1 inch in diameter are replaced for existing customers that do not have a suitable backflow prevention device already installed, per ADEM Code R. 335-7-9-03. Residential customers will not be required to test the dual check valve device.

C. Non-Residential

Non-residential customers with water meters on line sizes greater than 1 inch in diameter and/or the water use is classified as a health hazard shall install the backflow prevention assembly, as specified herein, and have the assembly tested by a certified tester at the customer's expense. For line sizes equal to or less than 1 inch in diameter and the water use is considered a non-health hazard, MAWSS shall install and test the device.

D. Irrigation

For meters on line sizes greater than 1 inch in diameter and/or water in the customer's irrigation system is classified as a health hazard, new service connections for dedicated irrigation systems shall have backflow prevention assemblies installed and tested at the

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customer's expense. Typically, a double check valve assembly will be required for irrigation, but an assembly providing greater protection, such as a reduced pressure backflow assembly, may be required depending on internal connections to the irrigation system (for example, chemical feed system). See *Section 6.10, Backflow Prevention Selection Criteria*.

For meters on line sizes less than or equal to 1 inch in diameter and the water use is classified as non-hazard, MAWSS shall install a double check valve assembly for new service, but testing will be performed by a certified tester at the customer's expense in accordance with *Section 6.15, Testing and Repairs of Backflow Prevention Assemblies*.

6.05 EXISTING SERVICE CONNECTIONS

A. General

Existing service connections will be evaluated by MAWSS to determine the degree of hazard and the type of backflow prevention device/assembly required to protect the potable water system from actual or potential contamination or pollution. Criteria used for evaluation of residential, non-residential, and irrigation service connections are outlined in *Section 6.10, Backflow Prevention Selection Criteria* and *Section 6.11, Facilities Requiring Backflow Prevention Assemblies*. Customer shall notify MAWSS if the use of the water by the customer changes, as it could require a different type of backflow prevention device.

B. Residential

An approved backflow prevention device, dual check valve for residential customers, shall be installed on each customer water service connection that is replaced, repaired, or relocated. If the existing residential customer water meter or service line is replaced, repaired, or relocated, MAWSS will install the dual check valve backflow prevention device. Residential customers will not be required to test the dual check valve device.

C. Non-Residential

MAWSS will send a Cross Connection Survey to those existing non-residential customers without an existing backflow prevention assembly and/or when the potential sources of backflow or the degree of hazards are unknown (see *Section 6.17, Reports and Records* and *Appendix A*). MAWSS inspectors will meet with the customer, if necessary, to assist with filling out the survey. MAWSS will evaluate the survey responses to identify actual or potential cross-connections at the service connection. If actual or potential cross-connections are identified, the MAWSS-approved backflow prevention assembly shall be installed and tested by the customer.

Refer to *Section 6.15, Testing and Repairs of Backflow Prevention Assemblies*, for additional requirements.

D. Irrigation

Double check valves previously installed by MAWSS on existing irrigation meters can remain in service. All existing backflow prevention assemblies must be tested annually by a MAWSS-approved and certified tester, hired at the customer's expense. See *Section 6.15, Testing and Repairs of Backflow Prevention Assemblies*.

6.06 RESPONSIBILITIES OF MAWSS, CUSTOMER, AND TESTER

A. MAWSS

MAWSS shall be responsible for developing, implementing and enforcing a cross-connection and backflow prevention policy to reasonably protect the public potable water distribution system from contaminants or pollutants back-flowing from customers through their public potable water service connection. MAWSS' responsibility begins at the water supply source and ends at the service connection to the customer's water system. MAWSS is not responsible for losses or damages that the customer may incur because of the installation of a backflow prevention device/assembly. MAWSS is also not responsible for preventing cross-connections within the customer's internal plumbing system.

If MAWSS decides that an approved backflow prevention device/assembly is required at the customer's water service connection for the safety of the water system, MAWSS shall provide written notice to the customer to install the specified approved backflow prevention device(s)/assembly(ies) at specific location(s) on the premises. Unless otherwise specified by MAWSS in the notice, the Customer shall install and test the backflow prevention assembly within 180 days from the time the notice is issued.

MAWSS reserves the right to discontinue service to any customer who fails to comply with this policy.

B. Customer

The customer is responsible for preventing contaminants and pollutants from his/her water systems from entering the public potable water supply. If the customer receives notice that an approved backflow prevention device(s)/assembly(ies) is required, the customer shall install such approved device(s)/assembly(ies) with the help of a certified installer, at the customer's expense. After installation, the customer shall have the device(s)/assembly(ies) tested by a certified tester, except for residential connections per *Section 6.05.C*, and the device(s)/assembly(ies) shall be maintained satisfactorily. Customer shall comply with all provisions of the Program. Failure, refusal, or inability for the customer to install, test, and maintain the backflow prevention device(s)/assembly(ies) within 180 days of receiving the notice from MAWSS shall constitute grounds for discontinuing water service to the premises until such requirements have been met. Refer to *Appendix B* for a detailed checklists of customer requirements in accordance with MAWSS policy.

C. Tester

Backflow prevention assembly testers shall be certified and have completed the required training courses as described in *Section 6.15, Testing and Repairs of Backflow Prevention Assemblies*. Tests shall be performed only by testers preapproved by MAWSS and included in their approved contractor list located on MAWSS website.

6.07 ADDITIONAL RULES FOR PROTECTION OF MAWSS WATER SUPPLY SYSTEM

The City of Mobile and the Mobile County Public Health Department have adopted the most current edition of the International Plumbing Code. Sections 608.6 and 608.13 of the Code address cross connection control and backflow prevention requirements. Section 607.3, Thermal Expansion Control, requires that thermal expansion control devices be installed in the plumbing of a building when backflow prevention devices/assemblies are installed, and thus, the customer is responsible for complying with this requirement.

Section 912.5 of the International Fire Code requires that potable water supply to automatic sprinkler and standpipe systems be protected against backflow as required by the *International Plumbing Code*.

ADEM Code R. 335-7-9-03 requires the installation of backflow prevention devices on all service connections and discontinuance of service to a customer if a suitable device is not installed or properly maintained. All new and existing buildings and homes connected to the MAWSS water supply shall have backflow prevention devices/assemblies installed. If existing buildings or homes do not currently have a backflow prevention device installed, one shall be installed in accordance with this document.

6.08 DESCRIPTION AND CAUSES OF BACKFLOW

Backflow is the undesirable reversal of flow of used water or mixtures of water and other liquids, gases, or other substances through a cross-connection and into the distribution pipes of a public potable water system or the customer’s potable water system.

A. Back-siphonage

ADEM Code R. 335-7-7.02, requires that a minimum residual pressure of 20 pounds per square inch (psi) is supplied at the water system meter under all normal operating conditions. This ensures the proper operation of fixtures and appliances, and provides a positive pressure buffer to prevent the possibility of creating a siphon with negative pressure.

Backflow from back-siphonage occurs when a subatmospheric pressure (less than 0 psig) occurs in the piping system. Typical conditions or arrangements that may cause back-siphonage include high-demand conditions, such as a fire flow; customer demand during heat-wave emergencies; pipe corrosion that significantly reduces pipe capacity; water main breaks; and service interruptions.

B. Backpressure

Water flows from high pressure to low pressure. Thus, if the water pressure of a customer’s plumbing system exceeds that of the public distribution system, backflow will occur if a backflow preventer is not installed. Common causes or sources of back pressure include pumps, elevated piping, thermal expansion, pressurized containers, and process water systems.

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Backflow prevention devices/assemblies can create a closed-piping system on the customer's premises, and thus these systems must have a means to safely accommodate or relieve the effects of excessive pressure caused by the thermal expansion of water in the system. Boilers and water heaters are sources of thermal expansion backpressure.

6.09 APPROVED BACKFLOW PREVENTION METHODS

There are five basic types of devices that can be used to correct cross-connections including double check valve assemblies, dual check valves, and reduced pressure principle assemblies. In general, all manufacturers of these devices produce them to one or more of three standards, thus ensuring the public that dependable devices are being utilized. The major standards are the American Society of Sanitary Engineers (ASSE), American Water Works Association (AWWA), and the University of California Foundation for Cross-Connection Control and Hydraulic Research. Approved backflow prevention methods are described below. Refer to *Section 6.13, Installation of Assemblies and Standard Details*, for additional details.

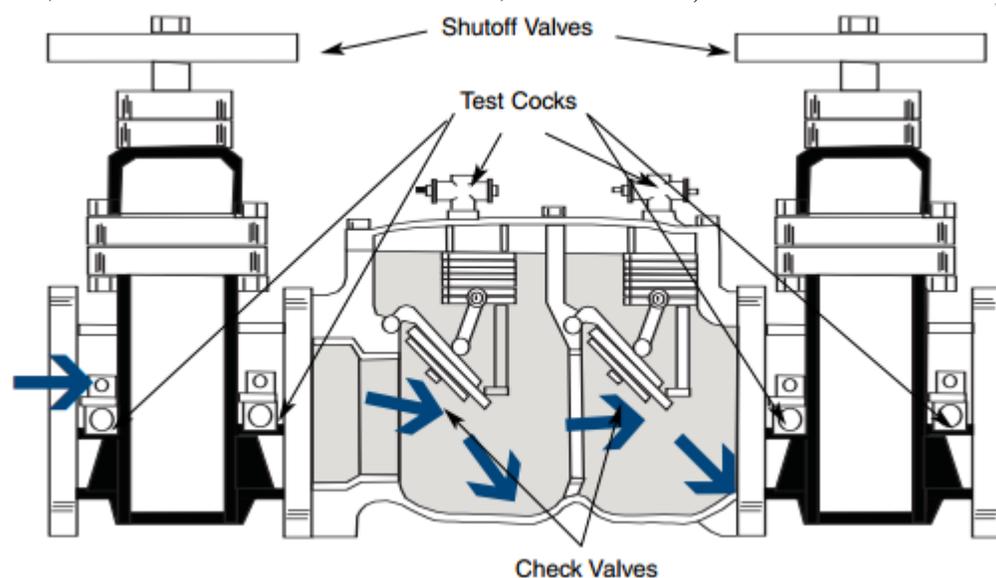
A. Double Check Valve Assemblies

All double check valve backflow prevention devices or assemblies include two single check valves coupled to act as a backup in the event that the second check valve is not working. The variations of double check valve backflow prevention devices and assemblies is discussed below.

(a) Double Check Valve Assembly (DCVA)

A double check valve assembly consists of two independently operating, approved check valves coupled within one body and furnished with four test cocks and two resilient-seated gate valves, one upstream and one downstream of the double check valve. The test cocks allow each check valve to be tested to determine if either or both check valves are inoperative or fouled by debris. Each check valve is capable of holding a minimum of 1 psi in the direction of flow of the check valve. Figure 1 shows a cross section of the double check valve assembly. A double check valve assembly may be used under continuous pressure, and protect against back-siphonage and backpressure conditions for low hazard applications. A pipeline should be thoroughly flushed before a double check valve is installed to ensure that no dirt or debris is delivered into the assembly. The double check valve assembly shall be installed where it can easily be field tested and repaired as necessary. Refer to the Double Check Valve Assembly Standard Detail in *Appendix C* for additional installation requirements.

Figure 1. Double Check Valve Assembly (Section)
(AWWA, *Water Transmission and Distribution, Second Edition*)

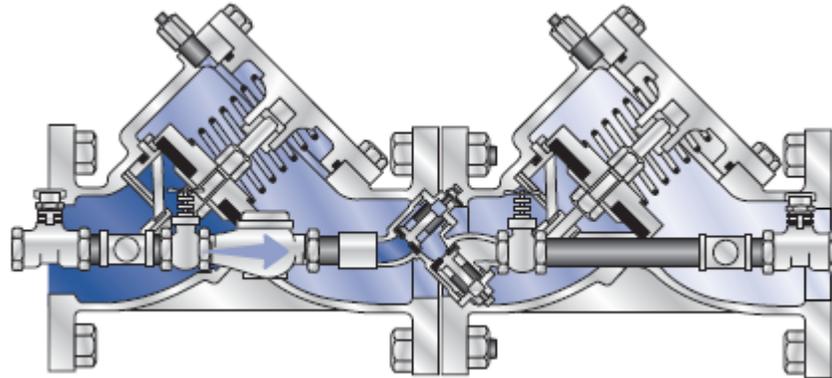


(b) Double Check Valve Detector Backflow Prevention Assembly (DCDA)

The double check valve detector backflow prevention assembly consists of a main-line double check valve with a bypass arrangement around the main-line double check valve that contains a water meter and a double check valve. A second type of double check valve detector assembly (Type II) has the bypass arrangement bypassing the second main-line check valve only, providing a shared first check valve for both the main-line and bypass arrangements. This assembly is primarily used in fire line installations to protect the potable supply and detect any water movement in the fire line. The bypass is designed to detect the first 2 gallons per minute (gpm) of flow through the assembly to show any unauthorized usage or leaks in the fire protection system. Figure 2 shows a cross section of the DCDA. This assembly can protect against backpressure and/or back-siphonage and can be used only for low hazard applications. The pipeline should be thoroughly flushed before a double check valve assembly is installed to ensure that no dirt or debris is delivered into the assembly. Refer to the Double Check Valve Detector Check Assembly Standard Detail in *Appendix C* for additional installation requirements.

Figure 2. Double Check Valve with Detector Assembly (Section)

Source: USEPA Cross-Connection Control Manual (2003)



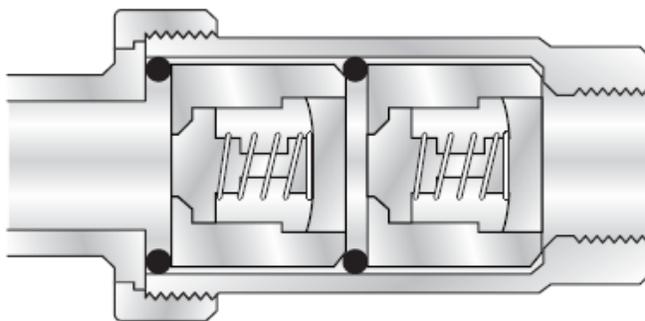
B. Residential Dual Check (RDC) Valve

The residential dual check valve contains two internally loaded, independently operating check valves to provide backpressure and back-siphonage protection for individual residences. Unlike the double check valve assembly, the residential dual check valve does not contain test cocks and gate valves. Debris or deterioration of the check components can affect both checks without an outward indication of failure. Thus, the pipeline should be thoroughly flushed before a dual check valve is installed to ensure that no dirt or debris is delivered into the device.

Figure 3 shows a cross-section of the residential dual check valve. Refer to the Residential Dual Check Valve Standard Detail in *Appendix C* for additional installation requirements.

Figure 3. Residential Dual Check Valve (Section)

Source: USEPA Cross-Connection Control Manual (2003)



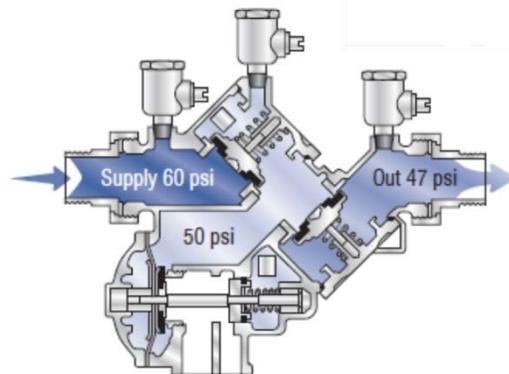
Typically, residential plumbing systems are smaller than most commercial plumbing systems. Thus, the adverse effects of thermal expansion can be greater and more immediate. As required with any closed system, thermal expansion protection that meets local plumbing code must be installed and maintained to ensure the safety and longevity of the private plumbing system. Refer to *Appendix D* for additional thermal expansion protection information.

C. Reduced-pressure Principle Backflow Prevention Assembly (RPBA)

A reduced-pressure principle backflow prevention assembly contains two internally loaded, independently acting check valves with a hydraulically operating, mechanically independent differential pressure relief valve (atmospheric vent) located below the first check valve. The pressure relief valve may periodically blow-off water, and thus, accommodations shall be provided. The check valves and the relief valve shall be located between two tightly closing, fully ported, resilient-seated shutoff valves. The “zone” between the two check valves is always kept at least 2 psi less than the supply pressure. The RPBA shall have four properly located resilient-seated test cocks. This assembly provides maximum protection against back-siphonage and backpressure conditions and can be used for both high and low hazard applications. Figure 4 shows a cross section of the reduced-pressure principle backflow prevention assembly. The pipeline should be thoroughly flushed before a reduced-pressure principle backflow assembly is installed to ensure no dirt or debris is delivered into the assembly. Refer to the Reduced Pressure Principle Backflow Prevention Assembly Standard Detail in *Appendix C* for additional installation requirements.

Figure 4. Reduced-pressure Principle Backflow Prevention Assembly (Section)

Source: USEPA Cross-Connection Control Manual (2003)



D. Reduced-pressure Principle Detector Backflow Prevention Assembly (RPDA)

The reduced-pressure principle detector backflow prevention assembly consists of a main-line reduced-pressure principle backflow prevention assembly with a bypass arrangement around the main-line reduce-pressure principle assembly that contains a water meter for detection and a reduced-pressure principle assembly. The pressure relief valves may periodically blow-off water, and thus, accommodations shall be provided. This assembly is designed for fire-protection systems in which a main-line meter is not used, but leaks or unwanted usage need to be detected. The bypass is designed to detect the first 2 gpm of flow through the assembly to show any unauthorized usage or leaks in the fire protection system. Figure 5 shows a reduced-pressure principle detector backflow prevention assembly. This assembly can protect against backpressure and/or back-siphonage and can be used for both high and low hazard applications. The pipeline should be thoroughly flushed before a reduced-pressure principle detector backflow assembly is installed to ensure no dirt or debris is delivered into the assembly. Refer to the Reduced Pressure Principle Detector Assembly Standard Detail in *Appendix C* for additional installation requirements.

Figure 5. Reduced-pressure Principle Detector Backflow Prevention Assembly (Photo)
 Source: Watts Regulator Co.



6.10 BACKFLOW PREVENTION SELECTION CRITERIA

The type of backflow prevention device/assembly required depends on the degree of hazard that exists on the customer’s premises. The degree of hazard increases as a function of both the probability that backflow will occur and the toxicity of the substance that may backflow. Table 1 presents the degree of hazards and their definitions. A low degree of hazard (non-health hazard) may include a pollutant that impacts the aesthetic qualities of potable water. A high degree of hazard (health hazard) may include acute microbial to acute chemical to chronic chemical contamination. Additionally, any water that leaves the control of the water supplier should be considered at risk for contamination.

Table 1. Potential Backflow Hazards

Degree of Hazard	Definition
Non-Health Hazard	A cross-connection or potential cross-connection involving any pollutant that if introduced into the potable water system as a result of a backflow situation may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or appearance), as listed in the EPA National Secondary Drinking Water Standards.
Health Hazard	A cross-connection or potential cross-connection involving a contaminant that could, if introduced into the potable water supply, cause death or illness, spread disease, or have a high probability of causing such effects. An example of a

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Table 1. Potential Backflow Hazards

Degree of Hazard	Definition
	contaminant would be any that is identified in the National Primary Drinking Water Standards.

In addition to the potential hazard of a cross-connection, the type of backflow (backpressure, back-siphonage, or both) that may occur is another factor to consider when selecting a backflow prevention assembly. Backpressure conditions must be considered when assessing actual or potential cross-connection conditions. Back-siphonage is evaluated primarily as a potential condition.

In assessing the degree of hazard of a cross-connection, MAWSS shall focus on the overall hazard posed by a customer’s entire plumbing system when considering a requirement for service connection protection. The type of approved backflow prevention assemblies that may be required (listed in order of increasing protection) includes: double check valve assembly or reduced pressure backflow assembly. Residential dual check valves shall also be approved for the appropriate cross-connections. The customer may choose a higher level of protection than that required by this policy. Table 2 presents backflow prevention devices/assemblies and their application for degree of hazard and type of backflow.

Table 2. Means of Backflow Prevention

Device/Assembly	Degree of Hazard			
	Non-Health Hazard		Health Hazard	
	Back-Siphonage	Back-pressure	Back-Siphonage	Back-pressure
Double check valve assembly (DCVA)	X	X		
Reduced-pressure principle assembly (RPBA)	X	X	X	X
Reduced-pressure principle detector assembly (RPDA)	X	X	X	X
Double check valve detector check assembly (DCDA)	X	X		
Residential dual check (RDC) valve device	X	X		

6.11 FACILITIES REQUIRING BACKFLOW PREVENTION ASSEMBLIES

A detailed list of facilities and their appropriate backflow prevention device/assembly is presented in *Appendix E*. Situations that are not covered in this policy shall be evaluated on a case-by-case basis, and appropriate backflow prevention shall be determined by MAWSS. If

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MAWSS determines that a premises presents a pollutant or a contaminant risk (actual or potential) to the public potable water supply system, MAWSS shall require the customer to isolate such premises through the use of appropriate backflow prevention devices.

A. Fire Protection Systems

All fire protection systems that are connected to the public potable water supply system on the property side of the potable water service shall be isolated with an approved backflow prevention assembly. The level of backflow protection shall be commensurate with the degree of hazard. The following are descriptions of those situations that determine the different fire systems hazards, and the minimum acceptable type of backflow protection required.

B. High-Hazard Fire Systems

A reduced-pressure principle backflow/detector assembly (RPDA) shall be required for high-hazard fire systems. High-hazard fire systems include those where an unapproved auxiliary water supply is connected to a fire system or is in close proximity and intended for use by fire pumper trucks. High-hazard fire systems also include those that allow chemical addition or antifreeze.

C. Low-Hazard Fire Systems

A double check valve detector assembly (DCDA) shall be required for low hazard fire systems. This category includes all fire systems not included under “High-Hazard Fire Systems”.

D. Premises Isolation

MAWSS shall require a backflow prevention assembly at the service connection to isolate an entire premises where a potential cross connection could constitute a health or non-health hazard to the public potable water supply system. MAWSS is not responsible for the prevention of cross-connections internal to the customer’s premises.

E. Health Hazard

An approved reduced-pressure principle backflow prevention assembly shall be required for customer premises that fall into the classification of an actual or potential health hazard. Example premises include hospitals, laboratories, chemical plants using water, car washing facilities, and food and beverage processing plants. Refer to *Appendix E* for a complete list of facilities and their appropriate backflow prevention device/assembly.

F. Non-Health Hazard

Premises that have the potential to generate backpressure shall be isolated from the public water supply. An approved double check valve backflow prevention assembly shall be required for customer premises that fall into the classification of an actual or potential non-health hazard. Example premises include buildings that exceed 40 feet in height and multi-storied building that use booster pumps.

6.12 APPROVED BACKFLOW PREVENTION ASSEMBLIES

Approved backflow prevention assemblies shall be in compliance with the standards set forth by ANSI/AWWA C510 and C511 and the University of Southern California Foundation of Cross-Connection Control and Hydraulic Research (FCCCHR) Manual of Cross-Connection Control, Tenth Ed. A list of manufacturers and models approved by MAWSS can be found in *Appendix F*.

6.13 INSTALLATION OF ASSEMBLIES AND STANDARD DETAILS

A. General

Refer to *Appendix B, Customer Checklists*, for customer's responsibilities during the installation of backflow prevention assemblies.

All backflow prevention assemblies shall be new when installed and installed in strict accordance with manufacturer's instructions. The backflow prevention assembly shall be located in the service line immediately following the water meter and upstream of any pipes branching off of the main service line. Any other locations must be approved by MAWSS before installing the assembly. Requests for inside placement of the assembly will be considered in situations where lack of available space warrants (primarily in the Downtown area). Aesthetics shall not be considered a reason to locate the assembly anywhere other than adjacent to the meter. Sufficient access for testing and repairs shall be provided for all applications. Installation standard details for the backflow prevention assemblies and devices are included in *Appendix C*.

Backflow prevention assemblies installed on fire protection systems shall comply with the latest edition of the International Fire Code requirements or latest adopted version. All valves controlling the water supply for automatic sprinkler systems shall be electrically supervised by a listed fire alarm control unit. Alarm, supervisory, and trouble signals shall be distinctly different and shall be automatically transmitted to an approved supervising station or, when approved by the fire code official, shall sound an audible signal at a constantly attended location. Backflow prevention assembly test valves located in limited area sprinkler system supply piping shall be locked in the open position. In occupancies required to be equipped with a fire alarm system, the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated. The local fire marshal shall have jurisdiction over fire lines on premises and should be contacted for applicable codes before installing assemblies.

The customer shall procure the services of a certified contractor, pre-approved by MAWSS. A list of the contractors is provided on the MAWSS website under the Cross Connection Control Program.

Backflow prevention assemblies installed above ground and outdoors shall be equipped with the appropriate security and protected from freezing temperatures, Assembly enclosures can be utilized for freeze protection as well as aesthetics and security. Outdoor enclosures for

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backflow prevention assemblies shall comply with the freeze protection and enclosure requirements of ASSE 1060.

Below are examples of different types of methods for providing security, freeze protection, and improved aesthetics. Insulation materials for backflow prevention assemblies shall comply with ASTM standards.

Examples of Security for Backflow Prevention Devices



Double Check Valve Assembly with Secured Valves Operators



Residential Backflow Prevention Assembly with Locked Enclosure



Double Check Valve with Valve Operation Alarm Switches and Insulation

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Examples of Freeze Protection for Backflow Prevention Devices



Freeze-protected Aluminum Enclosure Over Backflow Prevention Assembly



Freeze-protected Fiberglass Enclosure Over Backflow Prevention Assembly



Double Check Valve with Pipe and Valve Insulation

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Examples of Improved Aesthetics for Backflow Prevention Devices



Faux Rocks Covering Backflow Prevention Assemblies



Bushes Screening Backflow Prevention Assembly

6.14 BACKFLOW PREVENTION ASSEMBLY REMOVAL

Approval must be obtained from MAWSS before a backflow prevention assembly is removed, relocated, or replaced. Changes to assemblies that service fire prevention systems shall also require approval of the Mobile Fire and Rescue Department (251-208-7484).

A. Removal

The use of an assembly may be discontinued and the assembly removed from service upon presentation of sufficient evidence to MAWSS to verify that a hazard no longer exists.

B. Relocation

An assembly may be relocated following confirmation by MAWSS that the relocation will continue to provide the required protection and satisfy the installation requirements. Testing and certification will be required upon relocation.

C. Replacement

An assembly may be removed and replaced provided the water use is discontinued until the replacement assembly is installed. All replacement assemblies must be approved by MAWSS and must be commensurate with the degree of hazard involved. An assembly may be removed for repair, provided the water use is discontinued until the repair is completed and the assembly is returned to service. If the water service cannot be discontinued for the time required to replace an assembly, a parallel assembly must be installed prior to the replacement.

6.15 TESTING AND REPAIRS OF BACKFLOW PREVENTION ASSEMBLIES

Refer to *Appendix B, Customer Checklists*, for customer's responsibilities during the testing of backflow prevention assemblies.

MAWSS will send a Cross Connection Survey to those existing non-residential and irrigation customers when the potential sources of backflow or the degree of hazards are unknown. The surveys will identify if the customer needs to install a backflow prevention assembly at the service connection. MAWSS will distribute non-compliance emails to inform customers that corrective action is required. If the property is not in compliance, the customer will be required to install and test a MAWSS-approved backflow prevention assembly(ies) by a certified tester within 180 days of the notice, or sooner if otherwise indicated by MAWSS. Failure to provide certification of testing within the 180 days may result in discontinuance of service.

The installed assembly shall be new. MAWSS shall be notified via email at crossconnection@mawss.com at least 1 MAWSS working day prior to the initial installation and testing of the backflow prevention assembly(ies). After the backflow prevention assembly has been tested, the tester shall submit the Backflow Assembly Test Report (see *Appendix A*) to MAWSS. The Backflow Assembly Test Report shall be emailed to MAWSS through the MAWSS Testing Software found on the MAWSS website under the Cross Connection Control Program. The customer and tester should keep the original or a copy in their records.

The customer is responsible for the cost of tests, maintenance, and/or replacement of the backflow prevention assembly. The customer is also responsible for maintaining good working condition of all backflow prevention assemblies located on premises. MAWSS shall notify the customer that testing is required 180 days prior to each test certification or recertification due date. MAWSS shall notify the customer within 14 days of the end of the 180-day period if the customer's Backflow Assembly Test Report(s) is not received. Failure to provide certification within the 180 days may result in discontinuance of service.

A. Requirements of Testing Personnel

Certified backflow prevention assembly testers shall provide proof of completion of a training course including a minimum of 32 hours as outlined by the AWWA M14 Manual. The training course shall include class room instruction, hands-on experience with various types of backflow prevention assemblies, familiarization with testing equipment from several manufacturers, and the successful completion of a written examination. The course shall be officially endorsed by AWWA or the American Backflow Prevention Association (ABPA).

In addition to the certification course requirements as outlined above, personnel testing backflow assemblies servicing fire lines and sprinkler systems must be a pre-approved, qualified inspection technician, currently on file with the State Fire Marshal's office.

Test reports will not be accepted from testing contractors who are not certified, as required herein, or from testing contractors whose certification has expired, or was not current when the test was performed.

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All test equipment shall be checked for accuracy annually, at a minimum, and calibrated, if necessary. The customer shall procure the services of a certified tester pre-approved by MAWSS. A list of contractors is provided on the MAWSS website.

B. Testing Frequency

Unless indicated otherwise, existing and newly installed backflow prevention assemblies shall be tested at the time of installation and at least annually thereafter. MAWSS may require more frequent testing in cases where there is a history of test failure or due to the degree of hazard involved.

C. Test Reports

The tester shall submit a Backflow Assembly Test Report for each backflow prevention assembly on the premises through the MAWSS Testing Software found on the MAWSS website under the Cross Connection Control Program. Refer to the Backflow Assembly Test Report in *Appendix A*.

D. Repairs

If repairs to the backflow prevention assembly(ies) are required based on test results or inspections, the customer will have 30 days from the date of the test report to make the repairs and re-test the assembly(ies). Failure to provide certification within the 30 days will result in discontinuance of service.

The water supply from MAWSS must be valved off and the customer's system isolated before repairs or replacements are performed. If the water service cannot be discontinued for the time required to repair an assembly, a parallel assembly must be installed prior to the repair or replacement. Bypassing the backflow prevention assembly is not permissible.

Repairs shall be performed by a certified repair person and tester who is pre-approved by MAWSS. A list of the contractors is provided on the MAWSS website under the Cross Connection Control Program.

6.16 INSPECTION OF BACKFLOW PREVENTION ASSEMBLIES

Authorized employees or agents for MAWSS shall be permitted to enter premises to complete the cross-connection survey with the customer, if necessary, to make inspections of connections to the potable water supply, to witness the backflow prevention assembly testing performed by a MAWSS-approved certified tester, and to inspect backflow prevention assemblies that are equipped with detection meters. Refusal to allow inspection shall constitute a violation of the Program. The customer shall install a reduced-pressure principle backflow prevention assembly (RPBA) if MAWSS is unable to inspect the existing backflow prevention assembly.

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Table 3. Summary of Backflow Prevention Assembly Installation and Testing

Customer Type	Installed By	Type	Testing Frequency	Tested By	Notes
New					
Residential	MAWSS	Residential Dual Check Valve	N/A	N/A	Installed with new meter.
Non-Residential	≤1” Meter – MAWSS >1” Meter – Certified Installer	Depends on potential hazard. If degree of hazard is unknown, install a Reduced-Pressure Principle Assembly	Annual, maybe more frequent depending on hazard	Certified tester	Customer to complete survey report regarding customer plumbing. MAWSS to witness installation and initial testing.
Irrigation	≤1” Meter – MAWSS >1” Meter – Certified Installer	Double Check Valve (may require a Reduced-Pressure Principle Assembly depending on degree of hazard)	Annual	Certified tester	Customer to complete survey report regarding customer plumbing. MAWSS to witness installation and initial testing.
Existing					
Residential	MAWSS	Residential Dual Check Valve	N/A	N/A	
Residential – New Main	MAWSS	Residential Dual Check Valve	N/A	N/A	Issue notice addressing thermal expansion of water heater
Non-Residential	If required: ≤1” Meter – MAWSS >1” Meter – Certified Installer	Depends on potential hazard	Annual, may be more frequent depending on hazard	Certified tester	Complete survey report to obtain existing backflow prevention assembly and other information. MAWSS to witness installation and initial testing. Complete test report.
Irrigation	If required: = 1” Meter – MAWSS > 1” Meter – Certified Installer	Double Check Valve	Annual	Certified tester	Complete survey report to obtain existing backflow prevention assembly and other information. MAWSS to witness installation and initial testing. Complete test report.

6.17 REPORTS AND RECORDS

The Cross-Connection Survey Report and the Backflow Assembly Test Reports for non-residential and irrigation customers can be found in *Appendix A*. The customer should keep the original or a copy of these reports in their records.

6.18 NON-COMPLIANCE WITH POLICY

As stated in *Section 6.03, Statement of Policy* and ADEM Code R. 335-7-9-05, water service will be discontinued if the customer fails to comply with this Program. MAWSS retains the authority to immediately disconnect water service if necessary to protect the public water supply.

6.19 REFERENCES

The following manuals can be consulted for additional information:

- AWWA M14 Manual (*Fourth Edition*)
- USEPA Cross-Connection Control Manual (*2003*)
- University of Southern California FCCCHR Manual of Cross-Connection Control (*Tenth Edition*).

The following codes, which are referenced herein, can also be consulted for additional information:

- International Building Code, Sections 607 and 608
- International Fire Code, Section 912
- Alabama Department of Environmental Management, Section 335-7-9-03
- American Society of Safety Engineers, Standard 1060

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APPENDIX A – FORMS

Cross-Connection Survey Report

Backflow Assembly Test Report



Cross-Connection Survey Report

Date: _____

Name of Company, Corporation, Business: _____

Address: _____

Name of Contact: _____

Type of Use: Industrial _____ Commercial _____ Irrigation _____ Other _____

Location of Service: _____

Size of Service: _____ Inch Metered? Yes No

Require non-interrupted water service? Yes No

1. Is there another source of water to the property other than the service connection to the public potable supply (that is, a private well, lake, stream, river, pond, etc.)? Yes No
2. Is there an irrigation system on the property? Yes No
3. Are there any facilities (such as booster pump, elevated tank, etc.) to increase the water pressure above the supply pressure presently provided by the potable supply? Yes No
4. Are any toxic or non-toxic chemicals used in the operation? Yes No
5. Are any ejectors, aspirators, or pumps used in the operation? Yes No
6. Are there any water supply lines submerged in tanks, vats, etc.? Yes No
7. Are there any backflow prevention devices installed in any part of the piping? Yes No
8. Is there a fire stand-pipe or fire sprinkler system installed in the building separate from the potable supply? Yes No

*DETAILED DESCRIPTIONS: _____

COMMENTS: _____

To be filled out by MAWSS:

Degree of Hazard: High Low

Type of Device recommended for containment: RPBA DCVA None
RPDA DCDA PUB



BACKFLOW ASSEMBLY TEST REPORT

- NEW
- EXISTING
- REMOVED
- REPLACEMENT

PROPERTY OWNER: _____ PHONE: _____

MAILING ADDRESS: _____
 CITY _____ STATE _____ ZIP _____

ASSEMBLY ADDRESS: _____

- RPBA DCVA RPDA DCDA PUB

SIZE: _____ MAKE: _____ MODEL: _____

WATER PURVEYOR: _____ SERIAL NUMBER: _____

ASSEMBLY LOCATION: _____

INITIAL TEST RESULTS	REDUCED PRESSURE ASSEMBLY		INITIAL TEST PASSED <input type="checkbox"/> FAILED <input type="checkbox"/>
	#1 CHECK PRESS DROP _____ (A) RELIEF VALVE OPENED AT _____ (B) <small>MIN 2 PSID</small> BUFFER A - B = _____ <small>MIN 3 PSID</small> RELIEF VALVE PASS <input type="checkbox"/> FAIL <input type="checkbox"/>	DOUBLE CHECK	DATE: _____ SYSTEM PSI _____
COMMENTS, REPAIRS, AND/OR PARTS			
TEST AFTER REPAIRS	REDUCED PRESSURE ASSEMBLY		AFTER REPAIRS
	#1 CHECK PRESS DROP _____ (A) RELIEF VALVE OPENED _____ (B) <small>MIN 2 PSID</small> BUFFER A - B = _____ <small>MIN 3 PSID</small>	DOUBLE CHECK	DATE: _____ PASSED <input type="checkbox"/>

IN COMPLETING AND SUBMITTING THIS TEST REPORT, THE TESTER CERTIFIES THAT THE ASSEMBLY HAS BEEN TESTED AND MAINTAINED IN ACCORDANCE WITH ALL APPLICABLE RULES AND REGULATIONS OF THE WATER SYSTEM, AND STATE REGULATIONS

GAUGE CALIBRATION DATE _____ DETECTOR METER READING _____

TESTER SIGNATURE _____

CERT # _____

TESTER'S NAME PRINTED _____

GAUGE # _____

TESTER'S ADDRESS _____

PHONE # _____

COMPANY NAME _____

SERVICE RESTORED

REPORT RECEIVED BY _____ (REPRESENTATIVE OF OWNER)

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APPENDIX B – CUSTOMER CHECKLISTS

New Residential Customer Checklist

New Non-Residential (Commercial, Multi-Family, and Industrial) Customer Checklist

New Irrigation Customer Checklist

Existing Residential Customer Checklist

Existing Non-Residential (Commercial, Multi-Family, and Industrial) Customer Checklist

Existing Irrigation Customer Checklist

New Residential Customers

Installation – Backflow Prevention Device

- Coordinate new service with MAWSS.
- MAWSS to install Backflow Prevention Assembly.

Additional Notes:

Review MAWSS Thermal Expansion Modifications Brochure before installing the backflow prevention device.

New Non-Residential Customers (Commercial, Multi-Family, and Industrial)

Cross-Connection Survey

To be completed prior to public use of new service connection, if requested by MAWSS:

- Complete Cross-Connection Survey received by mail or email from MAWSS.
- Return the completed Cross-Connection Survey electronically to MAWSS within 30 days. Maintain original or copy for personal records.

Installation – Backflow Prevention Assembly – for Meters ≤ 1 " and Classified as Non-Health Hazard

- Contact MAWSS by email when customer's plumbing system is ready for installation of backflow prevention assembly.
- MAWSS to install backflow prevention assembly.

Installation – Backflow Prevention Assembly – for Meters > 1 " or Classified as Health Hazard

- Hire certified installer to install a new MAWSS-approved backflow prevention assembly as specified by MAWSS.
- Contact MAWSS by email after installation of backflow prevention assembly and when customer is ready for service tap.
- MAWSS to make service tap set and lock-out water meter (water service will not be available until backflow prevention assembly has been tested and approved).
- Customer to assist MAWSS, if necessary, to obtain data regarding the backflow prevention assembly. MAWSS to log backflow prevention data into customer's account database.

Testing – Backflow Prevention Assembly

- Contact MAWSS by email at least 24 hours before testing is to occur. MAWSS to unlock water meter and observe test.
- Test the backflow prevention assembly for proper installation and performance using a certified tester within 14 days after MAWSS installs the service tap and water meter (may be same individual who installed the assembly if individual is also certified to install BFP assemblies).
- Certified tester to complete the Backflow Assembly Test Report and submit to MAWSS electronically.
- MAWSS to provide water service after test results have been reviewed and approved by MAWSS.
- For future testing requirements, refer to Existing Non-Residential Customer Checklist.

Additional Notes:

A list of certified installers/testers approved by MAWSS is provided on the MAWSS website.

Review MAWSS Thermal Expansion Modifications Brochure before installing the backflow prevention device.

MAWSS Email Address: crossconnection@mawss.com

New Irrigation Customers

Cross-Connection Survey

To be completed prior to public use of new service connection, if requested by MAWSS:

- Complete Cross-Connection Survey received by email or mail from MAWSS.
- Return the completed Cross-Connection Survey electronically to MAWSS within 30 days. Maintain original or copy for personal records.

Installation – Backflow Prevention Assembly – For Meters ≤ 1 " and Classified as Non-Health Hazard

- Contact MAWSS by email when customer's plumbing system is ready for installation of backflow prevention assembly.
- MAWSS to install backflow prevention assembly.

Installation – Backflow Prevention Assembly – For Meters > 1 " or Classified as Health Hazard

- Hire certified installer to install a new MAWSS-approved backflow prevention assembly as specified by MAWSS.
- Contact MAWSS by email after installation of backflow prevention assembly and when customer is ready for service tap.
- MAWSS to make service tap set and lock-out water meter (water service will not be available until backflow prevention assembly has been tested and approved).
- Customer to assist MAWSS, if necessary, to obtain data regarding the backflow prevention assembly. MAWSS to log backflow prevention data into customer's account database.

Testing – Backflow Prevention Assembly

- Contact MAWSS by email at least 24 hours before testing is to occur. MAWSS to unlock water meter and observe test.
- Customer to test the backflow prevention assembly for proper installation and performance using a certified tester within 14 days after MAWSS installs the service tap and water meter (may be same individual who installed the assembly if individual is also certified to install BFP assemblies).
- Certified tester to complete the Backflow Assembly Test Report and submit to MAWSS electronically.
- MAWSS to provide water service after test results have been reviewed and approved by MAWSS.
- For future testing requirements, refer to Existing Irrigation Customer Checklist.

Additional Notes:

A list of certified installers/testers approved by MAWSS is provided on MAWSS the website.

MAWSS Email Address: crossconnection@mawss.com

Existing Residential Customers

- Comply with the requirements of the Cross-Connection and Backflow Prevention Program.
- MAWSS will install or relocate backflow prevention assembly when water meter and service line are replaced.

Existing Non-Residential Customers (Commercial, Multi-Family, and Industrial)

Cross-Connection Survey

- Complete Cross-Connection Survey if requested by MAWSS.
- Return the completed Cross-Connection Survey electronically to MAWSS within 30 days. Maintain original or copy for personal records.

Installation – Backflow Prevention Assembly

If customer receives Non-Compliance notice from MAWSS:

- Meter is ≤ 1 " and Classified as Non-Health Hazard: MAWSS will install backflow prevention assembly.
- Meter is > 1 " or Classified as Health Hazard: Hire certified installer to install a MAWSS-approved backflow prevention assembly as indicated in the Non-Compliance notice. Install backflow assembly within 180 days of notice of Non-Compliance. Notify MAWSS by email at least 24 hours before assembly is tested.

Testing – Backflow Prevention Assembly

- For testing of newly installed assemblies, notify MAWSS by email at least 24 hours before assembly is tested. MAWSS to observe testing.
- Test the backflow prevention assembly for proper installation and performance using a certified tester (may be same individual who installed the assembly if individual is also certified to install backflow prevention assemblies).
- Certified tester to complete the Backflow Assembly Test Report.
- Submit the Backflow Assembly Test Report to MAWSS electronically. Keep original or copy for personal records.
- Repeat backflow prevention assembly testing when instructed by MAWSS. This will be annually, or more frequently due to degree of hazard. Customer will have 180 days to complete the Backflow Assembly Test Report and return to MAWSS electronically.

Repair – Backflow Prevention Assembly

If testing of the backflow prevention assembly indicates that repairs are required:

- Unless assembly is installed by MAWSS, hire certified repair technician to repair the backflow prevention assembly. Customer will have 30 days from the Backflow Assembly Test Report completion date to complete the repairs.
- Re-test the backflow prevention assembly using a certified tester and forward the updated Backflow Assembly Test Report to MAWSS electronically.

Additional Notes:

A list of certified installers/testers approved by MAWSS is provided on the MAWSS website.

Review MAWSS Thermal Expansion Modifications Brochure before installing the backflow prevention device.

MAWSS Email Address: crossconnection@mawss.com

Existing Irrigation Customers

Cross-Connection Survey

To be completed at initial implementation of the Cross-Connection and Backflow Prevention Program:

- Complete Cross-Connection Survey received by mail or email from MAWSS.
- Return the completed Cross-Connection Survey electronically to MAWSS within 30 days. Customer should keep original or copy for personal records.

Installation – Backflow Prevention Assembly

If customer receives Non-Compliance notice from MAWSS:

- Meter is ≤ 1 " and Classified as Non-Health Hazard: MAWSS will install backflow prevention assembly.
- Meter is > 1 " or Classified as Health Hazard: Hire certified installer to install a MAWSS-approved backflow prevention assembly as indicated in the Non-Compliance notice. Install backflow assembly within 180 days of notice of Non-Compliance. Notify MAWSS by email at least 24 hours before assembly is tested.

Testing – Backflow Prevention Assembly

To be completed after initial installation and annually thereafter (or more frequent if warranted by degree of hazard):

- For testing of newly installed assemblies, contact MAWSS by email at least 24 hours before testing is to occur. MAWSS to observe testing.
- Test the backflow prevention assembly for proper installation and performance using a certified tester (may be same individual who installed the device if they are also certified to install backflow prevention devices).
- Certified tester to complete the Backflow Assembly Test Report.
- Submit the Backflow Assembly Test Report to MAWSS electronically. Keep original or copy for personal records.
- Repeat backflow prevention assembly testing when instructed by MAWSS. This will be annually, or more frequent due to degree of hazard. Customer will have 180 days to complete the Backflow Assembly Test Report and return to MAWSS electronically.

Repair – Backflow Prevention Assembly

If testing of the backflow prevention assembly indicates that repairs are required:

- Unless backflow prevention assembly was installed by MAWSS, hire certified repair technician to repair the backflow prevention assembly. Customer will have 30 days from the Backflow Assembly Test Report completion date to complete the repairs.
- Re-test the backflow prevention assembly using a certified tester and forward the updated Backflow Assembly Test Report to MAWSS electronically.

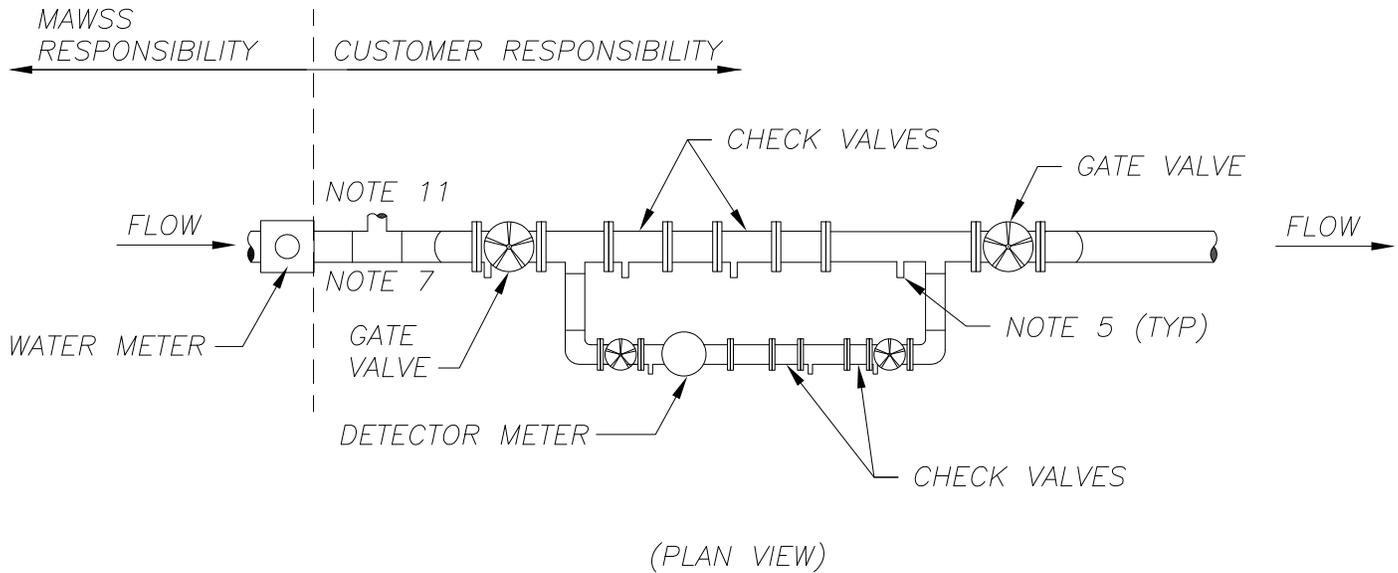
Additional Notes:

A list of certified installers/testers approved by MAWSS is provided on the MAWSS website.

MAWSS Email Address: crossconnection@mawss.com

APPENDIX C – STANDARD DETAILS

APPLICABLE STANDARDS
ASSE 1048



INSTALLATION NOTES:

1. ACCESS TO ALL ASSEMBLIES SHALL BE UNOBSTRUCTED FOR THE PURPOSE OF REPAIR AND MAINTENANCE.
2. BACKFLOW DEVICE SHALL BE INSTALLED A MINIMUM OF 12 INCHES ABOVE FLOOD PLAIN.
3. MATERIAL SHALL COMPLY WITH THE SAFE DRINKING WATER ACT.
4. HORIZONTAL INSTALLATION IS PREFERRED.
5. LOCATION OF 4 REQUIRED TEST COCKS ON MAINLINE AND 3 TEST COCKS ON BYPASS.
6. BACKFLOW DEVICE TEST COCKS SHALL BE THREADED AND PLUGGED.
7. BACKFLOW DEVICE SHALL BE LOCATED AT WATER METER OR PROPERTY LINE. IF SUFFICIENT SPACE IS NOT AVAILABLE AT PROPERTY LINE, THE DEVICE CAN BE LOCATED INSIDE A STRUCTURE WITH PRIOR APPROVAL FROM MAWSS. SUFFICIENT ACCESS FOR TESTING AND REPAIR SHALL BE PROVIDED.
8. BACKFLOW DEVICE AND ABOVE GROUND PIPING SHALL BE PROTECTED FROM FREEZING TEMPERATURES.
9. FOR SECTION VIEW OF REDUCED PRESSURE ASSEMBLY, SEE DCVA DETAIL.
10. REFER TO INTERNATIONAL FIRE CODE, 2012, FOR MONITORING REQUIREMENTS.
11. ADDITIONAL SERVICES AND CORRESPONDING METERS AND BACKFLOW DEVICES MAY BE REQUIRED. REFER TO APPLICABLE STANDARD DETAIL(S).

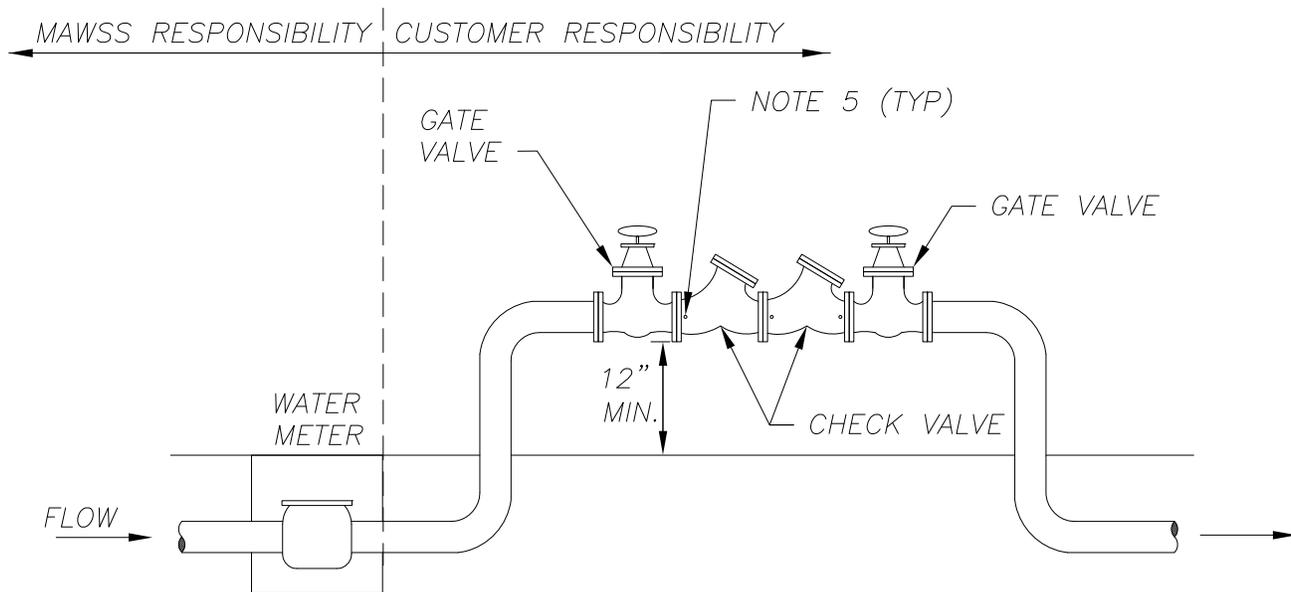
DOUBLE CHECK DETECTOR
BACKFLOW PREVENTION ASSEMBLY (DCDA)

APPLICABLE STANDARDS

ASSE 1013

AWWA C511

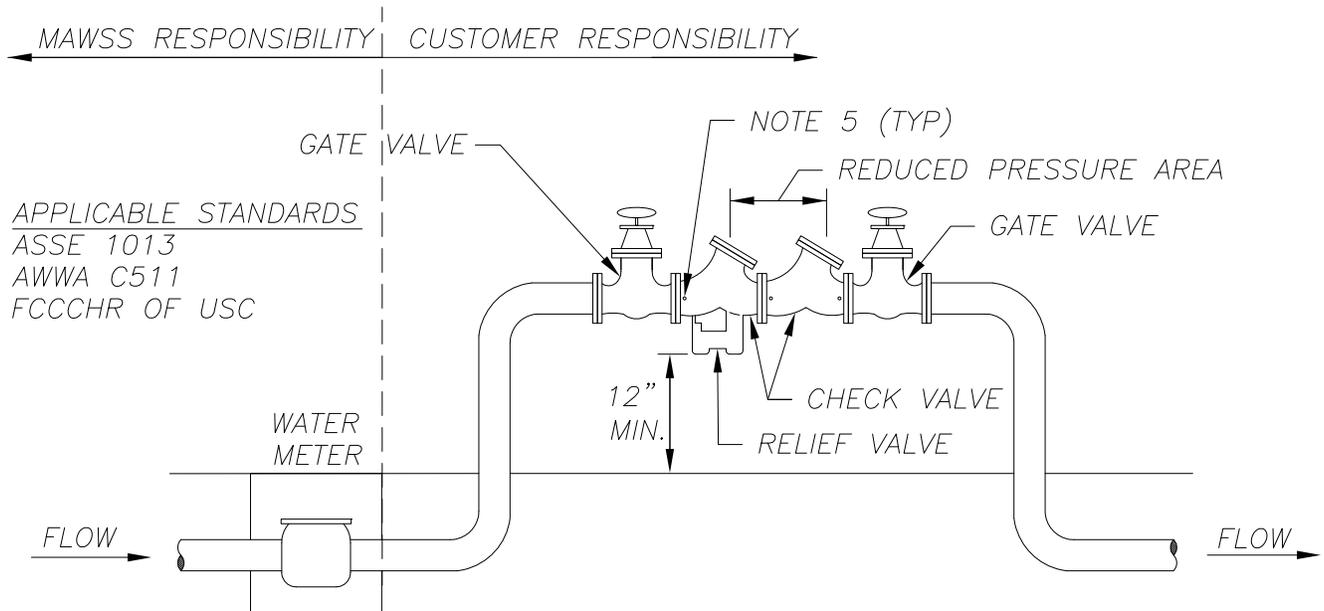
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INSTALLATION NOTES:

1. ACCESS TO ALL ASSEMBLIES SHALL BE UNOBSTRUCTED FOR THE PURPOSE OF REPAIR AND MAINTENANCE.
2. BACKFLOW DEVICE SHALL BE INSTALLED A MINIMUM OF 12 INCHES ABOVE FLOOD PLAIN.
3. SCHEDULE 80 PVC OR COPPER PIPE PERMITTED. NO GALVANIZED PIPE ALLOWED.
4. HORIZONTAL INSTALLATIONS IS PREFERRED.
5. LOCATION OF 4 REQUIRED TEST COCKS.
6. FOR NON-FIRE LINES, A STRAINER IS RECOMMENDED AND MAY BE INSTALLED UPSTREAM OF THE DEVICE TO PREVENT FOULING FROM DEBRIS. NO STRAINER IS TO BE USED ON A FIRE LINE WITHOUT FIRE MARSHALL APPROVAL.
7. THE BACKFLOW DEVICE TEST COCKS SHALL BE THREADED AND PLUGGED.
8. BACKFLOW DEVICE SHALL BE LOCATED NO MORE THAN 25 FEET FROM THE POINT OF DELIVERY WITHOUT WRITTEN PERMISSION FROM MAWSS.
9. BACKFLOW DEVICE AND ABOVE GROUND PIPING SHALL BE PROTECTED FROM FREEZING TEMPERATURES.

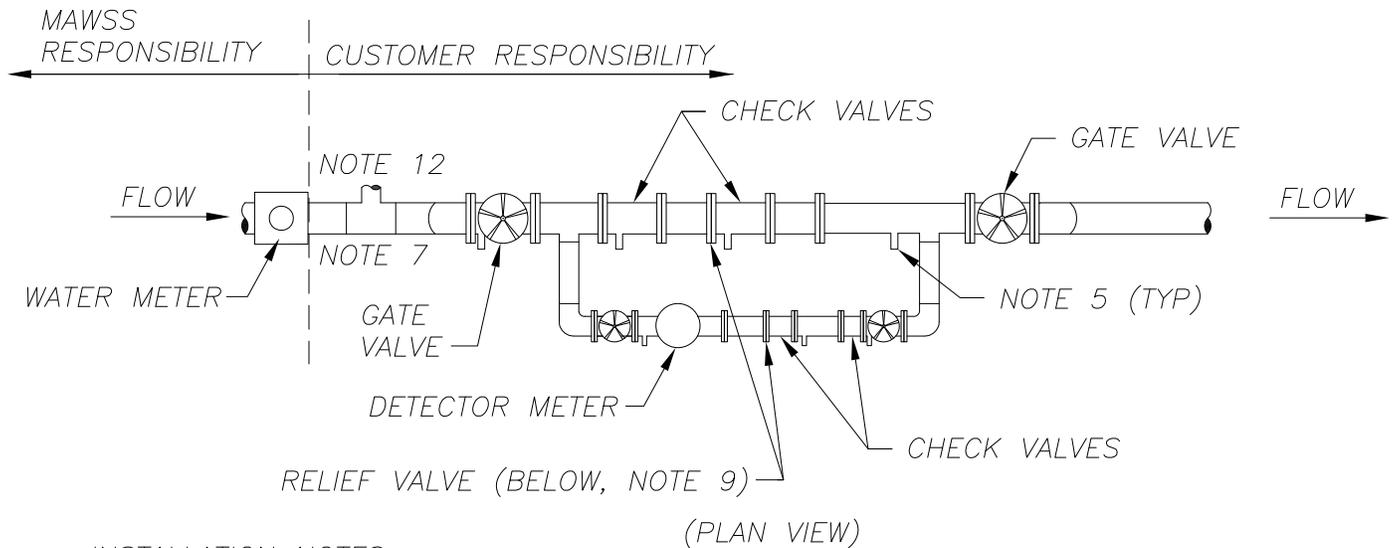
DOUBLE CHECK VALVE ASSEMBLY (DCVA)



INSTALLATION NOTES:

1. ACCESS TO ALL ASSEMBLIES SHALL BE UNOBSTRUCTED FOR THE PURPOSE OF REPAIR AND MAINTENANCE.
2. RELIEF VALVE SHALL BE INSTALLED A MINIMUM OF 12 INCHES ABOVE FLOOD PLAIN.
3. SCHEDULE 80 PVC OR COPPER PIPE PERMITTED. NO GALVANIZED PIPE ALLOWED.
4. HORIZONTAL INSTALLATIONS ONLY.
5. LOCATION OF 4 REQUIRED TEST COCKS.
6. FOR NON-FIRE LINES, A STRAINER IS RECOMMENDED AND MAY BE INSTALLED UPSTREAM OF THE DEVICE TO PREVENT FOULING FROM DEBRIS. NO STRAINER IS TO BE USED ON A FIRE LINE WITHOUT FIRE MARSHALL APPROVAL.
7. THE BACKFLOW DEVICE TEST COCKS SHALL BE THREADED AND PLUGGED.
8. BACKFLOW DEVICE SHALL BE LOCATED NO MORE THAN 25 FEET FROM THE POINT OF DELIVERY WITHOUT WRITTEN PERMISSION FROM MAWSS.
9. BACKFLOW DEVICE AND ABOVE GROUND PIPING SHALL BE PROTECTED FROM FREEZING TEMPERATURES.

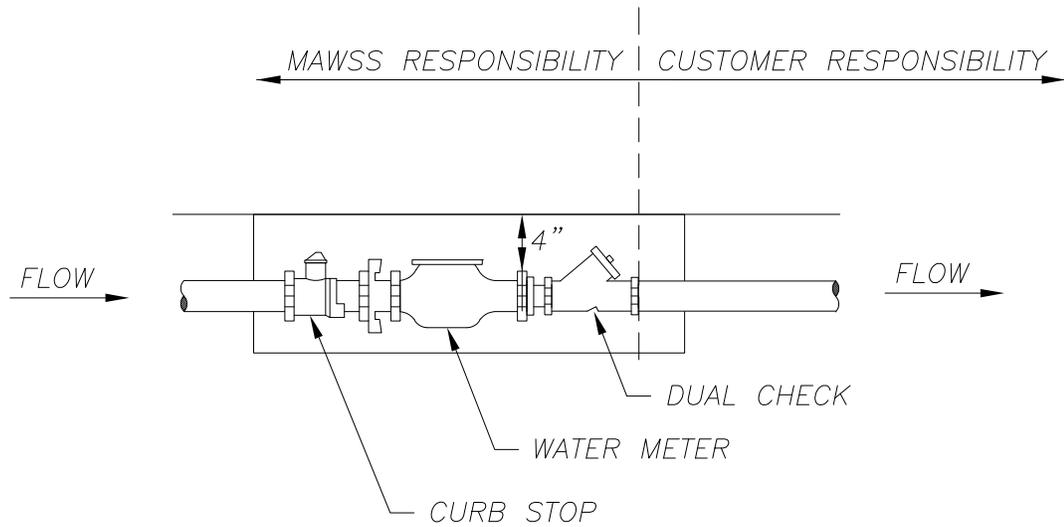
**REDUCED PRESSURE PRINCIPLE BACKFLOW
PREVENTION ASSEMBLY (RPBA)**



INSTALLATION NOTES:

1. ACCESS TO ALL ASSEMBLIES SHALL BE UNOBSTRUCTED FOR THE PURPOSE OF REPAIR AND MAINTENANCE.
2. RELIEF VALVE SHALL BE INSTALLED A MINIMUM OF 12 INCHES ABOVE FLOOD PLAIN.
3. MATERIALS SHALL COMPLY WITH THE SAFE DRINKING WATER ACT.
4. HORIZONTAL INSTALLATIONS ONLY.
5. LOCATION OF 4 REQUIRED TEST COCKS ON MAINLINE AND 3 TEST COCKS ON BYPASS.
6. BACKFLOW DEVICE TEST COCKS SHALL BE THREADED AND PLUGGED.
7. BACKFLOW DEVICE SHALL BE LOCATED AT WATER METER OR PROPERTY LINE. IF SUFFICIENT SPACE IS NOT AVAILABLE AT PROPERTY LINE, THE DEVICE CAN BE LOCATED INSIDE A STRUCTURE WITH PRIOR APPROVAL FROM MAWSS. SUFFICIENT ACCESS FOR TESTING AND REPAIR SHALL BE PROVIDED.
8. BACKFLOW DEVICE AND ABOVE GROUND PIPING SHALL BE PROTECTED FROM FREEZING TEMPERATURES.
9. RELIEF VALVE MAY PERIODICALLY DISCHARGE WATER. DRAIN SIZED TO HANDLE FLOWS SHALL BE PROVIDED.
10. FOR SECTION VIEW OF REDUCED PRESSURE ASSEMBLY, SEE RPBA DETAIL.
11. REFER TO INTERNATIONAL FIRE CODE, 2012, FOR MONITORING REQUIREMENTS.
12. ADDITIONAL SERVICES AND CORRESPONDING METERS AND BACKFLOW DEVICES MAY BE REQUIRED. REFER TO APPLICABLE STANDARD DETAIL(S).

**REDUCED PRESSURE PRINCIPLE DETECTOR
BACKFLOW PREVENTION ASSEMBLY (RPDA)**



INSTALLATION NOTES:

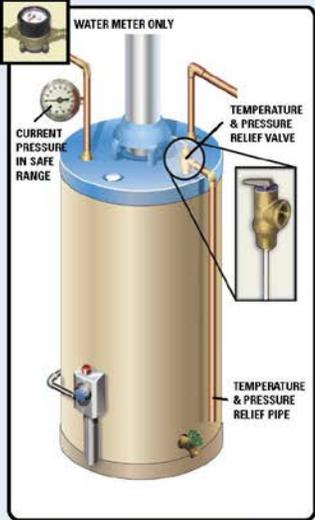
1. ACCESS TO ALL ASSEMBLIES SHALL BE UNOBSTRUCTED FOR THE PURPOSE OF REPAIR AND MAINTENANCE.
2. DEVICE MUST HAVE UNION TYPE FITTING ON DISCHARGE SIDE.
3. PIPELINE SHOULD BE FLUSHED BEFORE A DUAL CHECK IS INSTALLED TO ENSURE NO DIRT OR DEBRIS IS DELIVERED INTO THE DEVICE.
4. DUAL CHECK VALVE IS APPLICABLE ONLY ON LOW HAZARD, DOMESTIC INSTALLATION.
5. DEVICE SHALL BE INSTALLED IMMEDIATELY DOWNSTREAM OF THE WATER METER.

RESIDENTIAL DUAL CHECK (RDC)

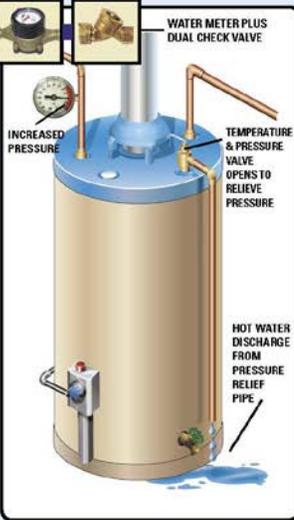
APPENDIX D – THERMAL EXPANSION PROTECTION



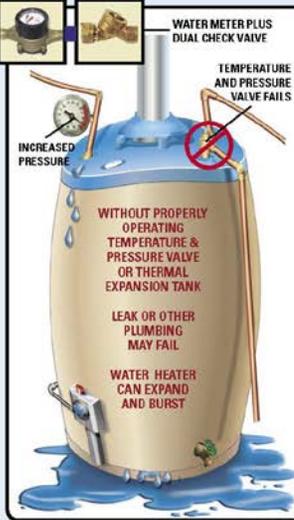
Thermal Expansion Modifications



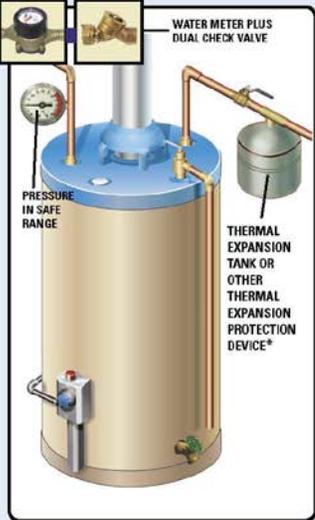
CURRENT CONFIGURATION



**DUAL CHECK VALVE
INSTALLED AT METER**



**DUAL CHECK VALVE
WITHOUT
THERMAL EXPANSION TANK
TEMPERATURE AND PRESSURE
RELIEF VALVE FAILS**



**DUAL CHECK VALVE AND
THERMAL EXPANSION TANK
INSTALLED**

* THE PLUMBING CODE REQUIRES INSTALLATION OF A THERMAL EXPANSION PROTECTION (T.E.P.) DEVICE IF A DUAL CHECK VALVE IS INSTALLED AT THE METER. THE TEMPERATURE & PRESSURE VALVE CAN FAIL RESULTING IN PLUMBING DAMAGE IF NO T.E.P. DEVICE IS INSTALLED.

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

APPENDIX E – FACILITIES REQUIRING BACKFLOW PREVENTION

Customer Categories and Backflow Prevention Type

Category	Type	Degree of Hazard
Aircraft and missile plants	RPBA	High
Automotive plants	RPBA	High
Auxiliary Water	RPBA DCVA	High Low
Car wash	RPBA	High
Chemical plants; oil and gas production or transmission properties; dye works; film laboratories; plating facilities; manufacturing	RPBA	High
Dairies and cold storage plants	RPBA DCVA	High Low
Fire protection systems	RPBA DCVA	High Low
Food-processing and beverage-bottling facilities	RPBA	High
Hospital	RPBA	High
Mortuary; medical centers; medical, dental, and veterinary clinics	RPBA DCVA	High Low
Irrigation system ¹	DCVA	Low
Laboratory	RPBA	High
Marine Facilities and Dockside Watering Points	RPBA	High
Radioactive material processing plants	RPBA	High
Residential Water Services	RDC	Low
Sewage treatment plants and sewage lift stations	RPBA	High
Schools and colleges	RPBA DCVA	High Low
Water-Hauling Equipment	RPBA	High

Notes:

RPBA=Reduced Pressure Principle Backflow Assembly

RPDA=Reduced Pressure Principle Detector Backflow Assembly

DCVA=Double Check Valve Assembly

DCDA=Double Check Detector Assembly

RDC=Residential Dual Check Valve Device

¹Typically a double check valve assembly will be required for irrigation, but an assembly providing greater protection, such as a reduced pressure backflow assembly, may be required depending on internal connections to the irrigation system (for example, chemical feed system).

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

APPENDIX F – APPROVED BACKFLOW PREVENTERS

Double Check Valve Assembly

Manufacturer	Meter Size	Model No.
Ames	½", ¾", 1"	2000 B
Ames	1.25"	2000 B
Ames	1.5", 2"	2000 B
Ames	¾"	200 BM3
Ames	4"	2000 CIV
Ames	6", 8", 10"	2000 CIV
Cla- Val	¾"	DC6LB
Cla- Val	2.5", 3", 4", 6"	DC8VW
Cla- Val	8"	DC8VW
Cla- Val	10"	DC8VW
Cla- Val	2.5", 3", 4", 6"	DC8VY
Cla- Val	8"	DC8VY
Cla- Val	10"	DC8VY
Cla- Val	4", 6"	DC8LW
Cla- Val	4", 6"	DC8LY
Conbraco	½"	½ DC
Conbraco	2.5"	2 ½ DC
Conbraco	3"	3 DC
Conbraco	4"	4 DC
Conbraco	6"	6 DC
Febco	¾"	805 YB
Febco	½", ¾", 1"	850
Febco	1.25", 1.5", 2"	850
Febco	2.5", 3"	850
Febco	4", 6", 8"	850
Febco	1/2", ¾", 1"	850 U
Febco	1.25", 1.5", 2"	850 U
Febco	2.5", 3", 4", 6"	870 V
Febco	8", 10"	870 V
Watts	2-1/2", 3"	007
Watts	½"	007 QT
Watts	1"	007 M1QT

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

Double Check Valve Assembly

Manufacturer	Meter Size	Model No.
Watts	2"	007 M1QT
Watts	¾"	007 M2QT
Watts	1-1/4"	007 M2QT
Watts	1-1/2"	007 M2QT
Watts	1-1/4"	007 M2PCQT
Watts	¾"	007 M3QT
Watts	½"	U007 QT
Watts	1"	ss007 M1QT
Watts	½", ¾"	ss007 M3QT
Watts	4"	709
Watts	6", 8", 10"	709
Watts	½", ¾"	775 QT
Watts	1"	775 QT
Watts	1.25", 1.5"	775 QT
Wilkins	4", 6", 8"	950
Wilkins	4", 6"	950 G
Wilkins	¾"	950 XL
Wilkins	¾"	950 XLD
Wilkins	4"	350
Wilkins	6"	350
Wilkins	6"	350 G

Double Check Valve Detector Assembly

Manufacturer	Meter Size	Model No.
Ames	2"	3000 B w/ Ames ½ 2000 B Watts 007QT ½"
Ames	4"	3000 CIV w/ Ames ½ 2000 B, Watts 007QT ½"
Ames	6", 8", 10"	3000 CIV w/ Ames ½ 2000 B, Watts 007QT ½"
Cla-Val	4", 6"	DD8LY w/ Cla-Val DC6LB

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

Double Check Valve Detector Assembly

Manufacturer	Meter Size	Model No.
Cla- Val	2-1/2", 3", 4", 6"	DD8VY w/ Cla-Val DC6LB
Cla- Val	8"	DD8VY w/ Cla-Val DC6LB
Cla- Val	10"	DD8VY w/ Cla-Val DC6LB
Febco	2-1/2", 3"	856 w/ Febco 850 YB
Febco	4", 6"	856 w/ Febco 850 YB
Febco	8"	856 w/ Febco 850 YB
Febco	2-1/2", 3", 4", 6"	876 V w/ Febco 850 YB
Febco	8"	876 V w/ Febco 850 YB
Febco	10"	876 V w/ Febco 850 YB
Watts	2"	007 DCDA w/ Watts 007QT
Watts	2-1/2"	007 DCDA w/ Watts 007M2QT
Watts	4"	709 DCDA w/ Watts 007QT
Watts	6", 8", 10"	709 DCDA w/ Watts 007QT
Wilkins	4"	350 DA w/ Wilkins 950XLD
Wilkins	6"	350 DA w/ Wilkins 950XLD
Wilkins	6"	350 DAG w/ Wilkins 950XLD
Wilkins	2-1/2", 3", 6"	950 DA w/ Wilkins 950XL
Wilkins	4", 8"	950 DA w/ Wilkins 950XL
Wilkins	4"	950 DAG w/ Wilkins 950XL
Wilkins	6"	950 DAG w/ Wilkins 950XL

SECTION 6 - CROSS-CONNECTION AND BACKFLOW PREVENTION PROGRAM

Updated 01/24/17

Reduced-Pressure Principle Assembly

Manufacturer	Model No.	Meter Size
Wilkins	375, 475 & 475V	2-1/2" – 6"
Wilkins	975XL	1/4" - 1/2"
Wilkins	975XL	3/4"-2"
Wilkins	975	2-1/2"-10"
Ames	4000ss & 5000ss 7	2-1/2"-6
Ames	4000ss & 5000ss	2-1/2"-6
Conbraco	40-200	1/4"-2"
Conbraco	40-100DCV	2-1/2"-4"
Conbraco	40-200RPZ	2-1/2"-4"
Conbraco	RPZ	2-1/2"-10"
Febco	805 & 825Y	3/4"-2"
Febco	860 & 880	2-1/2"-10"
Watts Series	009	1/4"-2"
Watts Series	009	2"-1/2"-3"
Watts Series	909	3/4"-2"
Watts Series	909	2"-1/2"-10"
Flomatic	RPZ	3/4"-2"
Flomatic	RPZII	1/2", 3/4", 1-1/2"
Flomatic	RPZ	2-1/2"-8"
Cla-Val	RP-2	3/4" & 1"
Cla-Val	D-2	1-1/4" & 2"
Cla-Val	3081, 3081EX, and 3084	2"-10"