



Water Technical Services Division - City of Kingsport -

Backflow Prevention Requirements

The Tennessee Department of Environment and Conservation's Division of Water Supply Rule 122-5-1.17(6) places the responsibility for supplying safe drinking water to all customers and for controlling cross connection hazards on the water distribution system. This law prohibits the water purveyor from installing or maintaining a water service connection to a customer where backflow hazards exist, whether actual or potential.

The City of Kingsport Board of Mayor and Alderman passed Ordinance 4296 in March of 1996 to protect the potable water supply from the possibility of contamination, due to cross connections, by isolating potential sources of contamination or pollution that could backflow into the system by means of backpressure or backsiphonage. The City of Kingsport Water Technical Services Division is responsible for the enforcement of this ordinance and has developed an extensive policy and procedures setting guidelines with which to enforce, implement, and maintain an effective Cross Connection Control Program.

Determination of Backflow Requirements

Backflow requirements vary depending on the determined degree of hazard a customer's premises poses to the system. Baseline requirements have been established for varying customer classifications and service connection type. Before finalizing our decision on the backflow assembly that will be required, an on-site inspection must be completed to determine the existing or potential degree of hazard. The results of this inspection could warrant an increase in protection. Do not have any backflow prevention assembly installed until notification of inspection results has been received. The following chart reflects baseline requirements for most customer classifications:

*all installations must meet approved installation criteria		Baseline Requirements					
		Type of Device				Location of Device	
Customer Classification	Type of Service Connection	Dual Check	Reduced Pressure Principle Assembly	Reduced Pressure Detector Assembly	Double Check Detector Assembly	with in 10' of City water tap on customer's property	On customer's property at customer's desired location prior to any branch lines
Industrial	Domestic		Required			Required	
	Irrigation		Required			Required	
	Fire- Class I and II Chemical Free				Required	Required	
	Fire- Class I and II Containing Chemicals			Required		Required	
Commercial	Domestic		Required				Required
	Irrigation		Required				Required
	Fire- Class I and II Chemical Free				Required	Required	
	Fire- Class I and II Containing Chemicals			Required		Required	
Residential	Domestic	City installed					
	Irrigation/Pool/Auxiliary Supply/etc.		Required				Required

*The City of Kingsport Water Maintenance Department began to install water meter assemblies equipped with a dual check valve in February 2004 on all new residential water service connections and as existing connections are warranted or scheduled for replacement.

**A variance can be requested if slope, obstruction, etc prevents installation within required distance and/or the premises is less than 60ft from the service connection.

***Single check valves are not approved for Backflow Prevention. Existing lines equipped with a single check valve must be upgraded to meet the requirements established under this Division.

Note: The installation of a backflow prevention assembly, dual check valve, swing/spring check valve, or pressure reducing valve will make your plumbing system a 'closed system' A closed system can create problems due to thermal expansion. Please refer to page 5 for information on thermal expansion and how to prevent damage to water heaters or other plumbing fixtures.

Surveying, Education, and Inspection

Surveying and education are two crucial methods utilized in protecting the City of Kingsport's potable water supply. The Water Technical Services Division provides material for customers with a low degree of risk, which may include an information packet, brochures, workshops, the City of Kingsport Website, Consumer Report, and the like in an effort to educate consumers on the hazards of backflow as well as common causes. A self-survey questionnaire may be included that low risk consumers are encouraged to fill out identifying some of the more common hazards. The results of these can then allow us to offer suggestions and assistance to low risk consumers.

- **On-Site Inspection-Industrial, Commercial, and Residential customers requesting irrigation service**

A City of Kingsport Water Quality Control Specialist will perform an on-site inspection of the customer's premises to locate any existing or potential cross connections on any new connection for commercial, industrial, or irrigation purposes, as well as any premises that may pose a high degree of hazard, or as warranted. During an on-site inspection, the customer will have an opportunity to be educated on cross connections, related health hazards, how to prevent backflow, and how to perform a self-survey and inspection.

An on-site inspection by a Quality Control Specialist does not guarantee that all cross connections will be identified or that they will not be created. The owner/responsible person is advised and encouraged to either self-survey or inspect at frequent intervals, or have their premises inspected by a qualified person.

If the Quality Control Specialist performing the inspection determines the present or potential hazard is of a higher degree than our baseline requirements, an assembly providing greater protection may be required.

To schedule an on-site inspection of premises and/or plumbing plans or request any information, self-survey questionnaires, etc, please call one of our Water Quality Control Specialists at (423)229-9454.

*Where the use of water is critical to the continuation of normal operations or protection of life, property, or equipment, duplicate units will be required to avoid the necessity of discontinuing water service to test or repair a backflow prevention device.

- **Residential Customers applying for a domestic service connection**

Residential customers applying for a domestic water service connection will be required to schedule an on-site inspection if one of the following conditions exists. Please Do Not Install a backflow prevention assembly prior to completion of this inspection. In many cases an air gap separation can be achieved and a backflow assembly is not required.

1. **Auxiliary water supply (Well, spring line, etc)**

If an auxiliary water supply is present it will need to be disconnected from the plumbing system immediately and an Auxiliary Water Supply Agreement Form will need to be signed. This form states that the auxiliary water supply will be disconnected. If the customer chooses not to disconnect the auxiliary supply a backflow prevention assembly will be required. A City of Kingsport Water Quality Control Specialist will annually inspect the separation method to ensure connection of the auxiliary supply and the plumbing system has not been reestablished.

2. **Swimming Pool, Hot Tub, Sauna, etc. An air gap separation between the vessel being filled and the supply has to be achieved either by means of an air gap or an approved backflow prevention assembly.**

3. **Photo, Chemical, Medical, or Other Lab Facilities**

Any in home use of photographic chemicals, other process chemicals, or medical or biological lab supplies could cause contamination due to an unprotected cross connection. A backflow prevention assembly will be required in these cases unless an approved air gap can be achieved.

Existing Water Service Connection

The City of Kingsport Water Quality Control Specialist will inspect existing water service connections as scheduled or warranted for unprotected cross connections.

If, upon completion of this inspection, a backflow prevention assembly is required, notification will be sent to the owner/responsible person of the premises depicting the backflow assembly to be installed and the location required. The backflow prevention assembly will need to be installed, per installation criteria, within sixty (60) days of receiving this notification. Failure to install the required backflow prevention assembly inside the specified time will result in termination of water service to the unprotected premises.

Installation Requirements

*only persons holding a current Certificate of Competency issued by the State of Tennessee or the Tennessee Association of Utility Districts shall install, repair, replace, or test a Backflow Prevention Assembly installed for the purpose of protecting the City of Kingsport's Public Water Distribution System.

MINIMUM INSTALLATION REQUIREMENTS are underlined, all others are suggestions or items to consider:

- A. RP assemblies should never be subject to flooding; therefore should:
1. Never be located in a pit or other area subject to flooding
 2. Avoid piped drains for enclosures housing the units whenever possible. Provision should be made for discharging water (maximum design discharge) directly through the wall of the enclosure housing the unit at a slightly higher elevation than surrounding ground level or maximum flood level. If a drain is to be considered, a representative of the City of Kingsport's Water Technical Services Division is to be consulted on the construction and will become part of any and all future inspections of the assembly.
 3. The lowest part of the relief valve discharge port should be a minimum of 12 inches above either:
 1. The ground
 2. Top of the opening(s) in enclosure wall
 3. Maximum flood level

Whichever is highest, in order to prevent any part of the assembly from becoming submerged.

B. All new backflow prevention assemblies being installed in Tennessee for the protection of a public water system should be included on the latest listing of "Approved Backflow Prevention Assemblies" maintained by the Division of Water Supply, listed as Approved by the University of Southern California's Foundation for Cross-Connection Control and Hydraulic Research, and the City of Kingsport.

- C. Assemblies should be installed where the units can be easily tested and repaired.
1. Installation of assemblies must retain a minimum of six inch clearance from all walls.
 2. Assemblies installed in stationery enclosures should have at least a 2 ft. clearance on each side of the assembly to facilitate testing and servicing. Adequate drainage must be provided. Enclosures with access panels are preferred but not required and are allowed variance to the 2 ft. clearance requirement.
 3. Assemblies should not be installed higher than 4 ft. (48in) from the floor/ground to the center line of the assembly unless safe permanent access is provided for testing and servicing.
 4. Assemblies shall be installed a minimum of 12" above floor level.
 5. All backflow assembly installations shall meet all Confined Space Requirements of OSHA/TOSHA.
 6. Double Check Valve Assemblies will only be considered an acceptable means of protection in 'retro-fit' installations on existing, otherwise unequipped businesses known to the City of Kingsport, by means of a Cross Connection Inspection, to pose only a Low Degree of Hazard, on metered fire protection lines (Class I-III), and for internal usage by the City of Kingsport in specific instances.
 7. All Assemblies installed for the purpose of Fire Protection shall be NFPA approved and are further subject to approval by the City of Kingsport Fire Marshal.
 8. Dual Check Valves are approved for Residential use only. Please note that future surveys and inspections may warrant an increase in protection.

D. Pipelines altered or installed should be thoroughly flushed to remove foreign material and debris prior to the installation of an assembly. A strainer should be added on the inlet side of the assembly before installation. Assemblies installed on dedicated fire protection lines will be allowed variance to this requirement. Should a customer prefer a strainer be installed on a dedicated fire protection line, approval will be subject to NFPA verification and a ruling from the City of Kingsport Fire Marshal.

- E. Installation of backflow prevention assemblies will not allow any unprotected or uninspected connections in front of the backflow prevention assembly.
- F. Backflow preventers should be installed with unions and isolation valves on both ends of the assembly to allow removal of the assembly for repair or replacement.
- G. Provisions shall be made to protect the assemblies from freezing. Insulating materials shall not restrict the relief valve discharge or accessibility to test cocks or name plate of the unit. All enclosures housing Reduced Pressure Principle Assemblies shall be of a design that will provide for adequate draining of the relief valve.
- H. The relief valve of an RP shall never be plugged, restricted, subject to submersion, or solidly piped to a drain, ditch or pump. Rigidly secured, manufacturer approved air-gap baskets may be used to direct discharges away from the unit so long as an approved air-gap separation (Please see Line 'Q' of this listing) is provided at the relief valve discharge and again at the discharge end of the drainpipe. An adequate area drain is recommended to handle the maximum relief valve flow to prevent flooding.
- I. The test cocks, valve stems, or name plates shall not be painted or removed. Their accessibility and operation of legibility shall not be hampered nor the relief valve discharge passage be restricted by insulation or other coverings.
- J. The assemblies shall be installed in an approved position as listed in the Latest Approved List and special supports added if needed. Horizontally mounted assemblies are preferred. Please call to verify an assembly is approved for Vertical installation prior to installing the assembly.
- K. For applications where water temperatures exceed 110°F (43°C) only approved hot water devices are to be used.
- L. Prior to completing the installation, temperature pressure relief valves on heating vessels (water heaters, etc.) should be properly installed and in good working condition. If needed, a thermal expansion tank, or other thermal expansion control device, should be installed.
- M. No unprotected bypasses or connections are to be made between the assembly and meter.
- N. Assemblies placed on Fire Lines are to be installed with OS&Y valves. No 'Butterfly' valves or other appurtenance that could interfere with flow are to be installed on Fire Lines.
- (1) Where jockey (low volume-high pressure) pumps are utilized to maintain elevated pressure, as in a fire protection system, the discharge of the pump shall be on the downstream side of any backflow prevention device. Where the supply for the jockey pump is taken from the upstream supply side of the backflow prevention device, an assembly of the same type as required on the main fire line shall be installed on the supply line.
 - (2) Fixed position, high volume fire pumps shall be equipped with a suction limiting control to modulate the pump if the residual line pressure reaches 20 psi. Such pumps should draw from an on-site reservoir fed by several supply lines. If any of the supply lines have a source other than the public water supply, all supply lines must have air gap discharges into the reservoir.
- O. Backflow prevention assemblies installed for seasonal irrigation purposes are allowed to be taken out during freezing weather and reinstalled every season. Please notify a Water Quality Control Specialist prior to removing or reinstalling an assembly as retesting will need to be performed.
- P. Fire Hydrant drains shall not be connected to any sanitary sewer, nor shall any fire hydrant be installed in such a manner as to allow backflow through the drain.
- Q. Certain hazards may be prevented by means of "air-gap separation". Contact a Water Quality Control Specialist prior to employing this method, as the Air-gap must be inspected and approved. An Air-gap must be rigidly installed, and maintained.
1. Must be at least twice the internal diameter of the supply line. Installations near vertical walls may increase this requirement.
 2. Shall be inspected annually by a representative of this Division.
 3. Shall never be altered in any way that could create an actual or potential cross connection.
 4. Any alteration or repair to an approved Air-gap separation will negate the approval granted by this Division. The Air-gap separation must be re-inspected following any repair or alteration. Please call a Water Quality Control Specialist should a situation requiring repair or alteration arise.
- R. **The City of Kingsport recommends installing Reduced Pressure Principle Assemblies outside, in an enclosure, and in an area not subject to flooding. These assemblies are designed to discharge in a potential backflow situation and may cause water damage.**

Existing assemblies not meeting the minimum requirements above, with the exception of being installed in an area that may allow flooding of the assembly, may be allowed variances by the City of Kingsport Water Technical Services Division, however, no variance may be allowed that will compromise the protection of the assembly or potentially allow contaminants be introduced into the distribution system. Documentation of allowed variances will be recorded and entered into the Tokay database and hard copies will be kept on file as well.

Maintenance and Testing of Backflow Prevention Assemblies

The Water Quality Control Specialist will test all backflow prevention assemblies upon installation and annually at no charge to the consumer. This is to ensure every assembly has been properly installed, maintained, and has not been altered.

In the event an assembly fails a test, a Notification of Failure will be sent to the owner/responsible person. Any failed assembly will need to be repaired or replaced within thirty, (30), days of receiving Notification of Failure by a person certified by the State of Tennessee or TAUD as Competent in the area of Backflow Prevention, and at the owner/responsible person's expense. The failure to repair or replace any failed backflow prevention assembly will result in termination of water service.

Thermal Expansion

The installation of a backflow prevention assembly, dual check valve, swing or spring check valve, or pressure reducing valve will make a customer's plumbing system a 'closed system', thus preventing heated and expanded water from being pushed back into the public water system.

The water heater in your home/business goes through a 'recovery' process every time hot water is used. This process can occur several times over the course of a day, depending on how often hot water is demanded. As the hot water is used, it is replaced with cold water and the water heater begins heating the water to the desired temperature setting. This recovery process creates a condition known as 'Thermal Expansion'; as water heats it expands. Given that water is an incompressible liquid, it must expand by any means available. This means is typically a T&P or 'pop-off' valve on your water heater, which are designed to relieve excessive pressure caused by temperature within the heater enclosure. This T&P or 'pop-off' valve is actually an emergency relief valve, and therefore not intended to compensate pressure increases created from thermal expansion.

Prior to the installation of a residential dual check valve or backflow prevention assembly, the public water system had provided a 'cushion' which absorbed the pressure build-up from thermal expansion due to your water heater. This reverse movement of flow, or Backflow from an unmonitored source, is prohibited by both State and Federal regulations, thus the need for a dual check valve to be installed on every new residential domestic connection and existing connection as scheduled or warranted.

Thermal Expansion can easily be contained by the use of a Thermal Expansion Tank, or other Thermal Expansion Relief Device. These products are available from most plumbing supply stores. Some of the more common manufacturers of these are Watts, FebCo, Wilkins, Amitrol, and Apollo. If you have difficulty in locating a supplier, please call a Water Quality Control Specialist for assistance.

Failure to address this problem within your private premises may result in serious damage to your water heater, plumbing fixtures, as well as any problem normally associated with water damage. Thermal Expansion can cause washer lines to leak as well. The City of Kingsport Water Technical Services Division Is Not Responsible for any damage to private property due to Thermal Expansion

Water Technical Services Division: (423)229-9454

www.publicworks.kingsporttn.gov/water-qc