



# Backflow Protection on Water-Based Fire Protection Systems

This publication provides information and guidelines on backflow protection for water-based fire protection systems. These guidelines are for general information only and are not intended to substitute for the advice of your own consultant, operator, or engineer.

Water purveyors, waterworks operators, fire line personnel, professional consultants, and licensed testers should be aware of these guidelines and are responsible for maintaining a current knowledge of applicable statutes, rules, and regulations. (See page 4 for [definitions](#) of several terms and abbreviations.)

## What rule requires that a backflow prevention assembly be installed on a water-based fire protection system connected to a public water system?

The requirements for backflow and back siphonage prevention on cross-connections to a public drinking water supply, including certain fire protection systems, are established under TCEQ rules for public water systems.

“No water connection from any public drinking water supply system shall be allowed to any residence or establishment where an actual or potential contamination hazard exists unless the public water facilities are protected from contamination.”

[30 TAC, Section 290.44(h)(1)]

## What authority must ensure that the requirements for backflow prevention assemblies on water-based fire protection systems are met?

The water purveyor is responsible for ensuring that these requirements are met. [30 TAC, Section 290.46(i)]

## What codes or standards specify when, where, and what type of backflow prevention assemblies are

## required on some water-based fire protection systems?

At the local level, the responsible authority must adopt or enforce one or more of the following:

- Plumbing code
- American Water Works Association Manual M14, *Recommended Practice for Backflow Prevention and Cross-Connection Control*, latest edition
- Local ordinance
- Customer service agreement used by the local water purveyor
- University of Southern California, *Manual of Cross-Connection Control*, latest edition
- American Society of Sanitary Engineering (ASSE) Series 5000

## Is a cross-connection control ordinance necessary?

Sometimes an ordinance is necessary to establish legal authority to implement a cross-connection control program. However, where a community has adopted a plumbing code, the plumbing code itself will include a cross-connection control program. Also, frequently the water purveyor’s service agreement already includes many aspects of a cross-connection control program.

## Who should be involved in adopting requirements for backflow prevention and inspections for cross-connections?

When developing and adopting rules or procedures for backflow prevention and cross-connection control, the following local groups should be included whenever possible:

- Fire department
- Health department
- Environmental department
- Building inspector
- Water purveyor

## What is the minimum recommended backflow protection for water-based fire protection systems?

**Table 1. Minimum Recommended Backflow Protection**

	<i>Type of System</i>	<i>Minimum Requirements for a New Installation</i>	<i>Minimum Requirements for an Existing System</i>
1	dry-pipe nonpressurized fire suppression system (deluge) piping open to atmosphere	none <sup>1</sup>	none <sup>1</sup>
2	dry-pipe pressurized and pre-action fire suppression systems (dry and pre-action)	double check valve assembly <sup>1</sup>	an acceptable form of directional flow <sup>2</sup> control until system is substantially altered <sup>1</sup>
3	other closed pipe fire protection system	compare with a similar configuration and use the same requirement <sup>1</sup>	compare with a similar configuration and use the same requirement for existing systems <sup>1</sup>
4	residential, single-family fire sprinkler system (separate piping from domestic system) less than 1.5 inch diameter	double check valve assembly <sup>1</sup>	
5	residential, single-family fire sprinkler system (integrated piping with domestic system) less than 1.5 inch diameter and material approved for potable water	none <sup>1</sup>	
6	wet-pipe fire sprinkler systems (wet ) or a wet standpipe hose system	double check valve assembly, double check detector assembly or air gap <sup>1</sup>	an acceptable form of directional flow control <sup>2</sup> that contains no lead until system is substantially altered—a directional flow control <sup>2</sup> containing lead should be upgraded with a double check valve assembly by a licensed sprinkler contractor.
7	any system above in which a chemical additive is used, injected, or may possibly be injected	reduced-pressure principle backflow prevention assembly or air gap	retrofit with a reduced-pressure principle backflow prevention assembly or air gap by a licensed sprinkler contractor
8	segment of system filled with a non-freezing agent (antifreeze loop)	reduced-pressure principle backflow prevention assembly where segment starts	reduced-pressure principle backflow prevention assembly where segment starts

**Source:** Compilation from the American Water Works Association (AWWA) *Recommended Practices for Backflow Prevention and Cross-Connection Control*, Manual M14, 3rd edition

<sup>1</sup> Where there is a health hazard or where chemicals are likely to be added, use the recommendations for [item number 7](#).

<sup>2</sup> An example of a directional flow control device is a listed alarm check valve, or a listed regular check valve, maintained in accordance with the requirement of the National Fire Protection Association, NFPA 25.

### When should a backflow prevention assembly be retrofitted on an existing water-based fire protection system?

- When the water supply in certain areas has been contaminated and a failure of the backflow prevention method for the fire protection system has contributed to the contamination.
- When the authority having jurisdiction to protect the potable water supply determines the existing

fire protection system does not meet the minimum requirements of the adopted code or standard.

### What issues or concerns should be addressed when retrofitting?

- Retroactive requirements for backflow prevention assemblies on existing water-based fire protection sprinkler systems may render the system's water supply pressure and capacity inadequate.
- NFPA 13, a fire sprinkler installation standard that is published by the National Fire Protection Association and was adopted by the State Fire

Marshal's Office (28 TAC, Section 34.707), states in part as follows:

“8.17.4.6.2 Retroactive Installation. When backflow prevention devices are to be retroactively installed on existing systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modifications to accommodate the additional friction loss, shall be completed as a part of the installation.”

- Consult with the local fire department and a registered sprinkler contractor before requiring a change.

### **Who is allowed to test backflow prevention assemblies on a water-based fire protection system?**

A licensed backflow prevention assembly tester may test and repair assemblies on a fire protection sprinkler system only if they are permanently employed by a fire sprinkler contractor registered through the State Fire Marshal's Office. [30 TAC, Section 290.44(h)(4)(a)(ii)] The Texas Insurance Code requires that any person performing maintenance on any part of the overhead or underground piping of a fire sprinkler system, including backflow prevention assemblies, must be employed by a registered fire sprinkler contractor unless exempted in the sprinkler licensing law.

One exception is that an employee of the property owner, who is a licensed backflow prevention assembly tester, may test an assembly located on the employer's property if authorized by the property owner and the employer takes full responsibility for the required fire protection measures during the test or repair and the responsibility for the correct restoration of the fire protection system. An employee of a registered fire sprinkler contractor performing the required testing of a backflow prevention assembly must be a licensed backflow prevention assembly tester. Exceptions to fire protection sprinkler system regulations are found in Article 5.43-3 of the Texas Insurance Code, administered by the Texas State Fire Marshall's Office.

### **What are the required and recommended testing procedures for backflow prevention assemblies on a water-based fire protection system?**

TCEQ rules establish testing procedures for a backflow prevention assembly on a connection to a public water supply:

“All backflow prevention assemblies that are required according to this section and associated table located in §290.47(i) of this title shall be tested upon installation by a recognized backflow prevention assembly tester and certified to be operating within specifications. Backflow prevention assemblies which are installed to provide protection against health hazards must also be tested and certified to be operating within specifications at least annually by a recognized backflow prevention assembly tester. [30 TAC, Section 290.44(h)(4)]

### **Are there any requirements when the water supply to a water-based fire protection system is interrupted or disconnected?**

When a person employed by a registered fire sprinkler contractor interrupts the water supply for a fire protection system, that person at a minimum should follow the requirements of the Texas Insurance Code, Article 5.43-3; Title 28, Chapter 34, Subchapter G of the Texas Administrative Code; and the most recent edition of NFPA 25, *Inspection, Testing and Maintenance of Water-Based Fire Protection Systems*, which provide directives concerning:

- the notification of the appropriate authorities,
- the notification of the monitoring stations, and
- the requirements to deploy a fire watch during a period in which the building is left unprotected.

## Definitions

**Contamination**—The presence of any foreign substance (organic, inorganic, radiological, or biological) in water which tends to degrade its quality so as to constitute a health hazard or impair the usefulness of the water. [30 TAC, Section 290.38(15)]

**Cross-Connection**—A physical connection between a public water system and either another supply of unknown or questionable quality, any source which may contain contaminating or polluting substances, or any source of water treated to a lesser degree in the treatment process. [30 TAC, Section 290.38(16)]

**Health Hazard**—A cross-connection, potential contamination hazard, or other situation involving any substance that could cause death, illness, spread of disease, or has a high probability of causing such effects if introduced into the potable drinking water supply. [30 TAC, Section 290.38(28)]

**NFPA**—National Fire Protection Association

**Recognized (Licensed) Backflow Prevention**

**Assembly Tester**—A backflow prevention assembly tester who has completed a TCEQ-approved course and passed a TCEQ-approved examination on cross-connection control and backflow prevention assembly testing. [30 TAC, Section 290.44(h)(4)(A)]

**TAC**—Texas Administrative Code

**Water purveyor**—The owner or operator of a public water system. [American Water Works Association Manual M14, 3rd edition]

## For additional information on this topic, please contact:

**American Society of Sanitary Engineering (ASSE)**  
901 Canterbury, Suite A  
Westlake, OH 44145  
440-835-3040

**American Water Works Association**  
6666 West Quincy Ave.  
Denver, CO 80235-3098  
800-366-0107

## Foundation for Cross-Connection Control and Hydraulic Research

University of Southern California  
KAP-200 University Park MC-2531  
Los Angeles, CA 90089-2531  
866-545-6340

## National Fire Protection Association

1 Battery March Park  
P.O. Box 9101  
Quincy, MA 02269  
800-344-3555

## State Fire Marshal's Office

Texas Department of Insurance  
333 Guadalupe  
P.O. Box 149221, MC 108-FM  
Austin, TX 78714  
512-305-7900

## Texas Commission on Environmental Quality

Cross-Connection Control Program  
Public Drinking Water Section, MC-155  
P.O. Box 13087  
Austin, TX 78711  
512-239-4691