

CITY UTILITIES DESIGN STANDARDS MANUAL

**Book 4
Water (W)
W8 Backflow Prevention**

June 2015

W8.01 Purpose

The purpose of this Chapter is to provide general backflow (cross connection) prevention requirements for service lines connecting to the City of Fort Wayne water distribution system. All variances from these design standards shall be approved prior to commencement of design in compliance with [Chapter GR3 - Variances](#).

“Backflow” as defined in [Chapter W1 – Acronyms and Definitions](#) is: *Flow of water or contaminants into the public water supply distribution system from a source other than the public water supply.*

1. Codes

Backflow prevention shall meet the requirements of these standards and the latest adopted versions of the following codes, whichever is more restrictive:

- Indiana Administrative Code, 327 IAC 8-10
- Indiana Building Code

2. Covered in this Chapter

- Submittals and Approvals
- Backflow Prevention Requirements
- Backflow Prevention Exemption
- Types of Backflow Prevention
- Appropriate Use of Backflow Prevention Devices
- Installation Requirements
- Inspection Requirements
- Inspection Reports
- Disconnection/Removal/Bypass

3. Covered in Other Chapters

- [Chapter MA4 - Common Materials](#)
- [Chapter MA7 - Water Materials and Testing Requirements](#)
- [Chapter W5 - Water Main Design](#)
- [Chapter W6 - Building Services](#)
- [Chapter W9 - Fire Services](#)

W8.02 Submittals and Approvals

All project submittals, approvals and permits for backflow prevention shall be per the requirements of the Department of Planning Services (DPS) and Development Services Department (DVS).

W8.03 Backflow Prevention Requirements

Backflow prevention is required for the protection of the City’s water distribution system from contamination through uncontrolled cross connections. The City of Fort Wayne has regulatory authority regarding the

control and requirements for all cross connections within the City's water distribution system.

A "cross connection" as defined in [Chapter W1 – Acronyms and Definitions](#) is *Any physical arrangement, including cross connection control devices not in working order, whereby a public water supply distribution system is directly connected, either continuously or intermittently, with any secondary source of supply, sewer, drain, conduit, pool, piping, storage reservoir, plumbing fixture, or other device which contains, or may contain, and is capable of imparting to the public water supply, contaminants, contaminated water, sewage, or other waste or liquid of unknown or unsafe quality.*

Backflow prevention is required when one or more of the following situations apply:

1. By Order of IDEM

Backflow prevention is required for proposed or existing facilities if the commissioner of IDEM so orders. This order shall be a written notification from the commissioner of IDEM in accordance with Title 327 IAC 8-10-4(d). The notice shall specify the nature of the customer activity that necessitates designation of the facility as a cross connection hazard and the date by which the facility must comply with the order.

2. By Order of City Utilities

Backflow prevention is required for proposed or existing facilities if City Utilities so orders. A notice shall be given specifying the nature of the customer activity that necessitates designation of the facility as a cross connection hazard and the date by which the facility must comply with the order.

3. New Construction

Backflow prevention shall be required for the following proposed facilities:

- Cross Connection Hazard Facilities - Backflow prevention shall be required for all proposed facilities designated as a cross connection hazard by Title 327 IAC 8-10-4(c).
- Spec Buildings - Backflow prevention shall be required for all proposed facilities with currently unknown tenants. These facilities are commonly called "spec buildings".
- Facilities with Carbonated Fountain Soft Drink Machines - Backflow prevention shall be required for all proposed facilities that plan to use carbonated soft drink machines.
- Facilities with Secondary Source of Supply - Backflow prevention shall be required for all proposed facilities that include a secondary source of supply for any use including, but not limited to, emergency use, fire prevention, irrigation or economics.
- Facilities with Fire Protection Service - Backflow prevention shall be required for all proposed facilities that plan to use fire protection service lines into the facility. This does not include those proposed

facilities that plan only the use of private, on-site or outside fire hydrants.

[Exhibit W8-1](#) Summary Checklist for Backflow Preparation Requirements is a checklist summarizing when backflow prevention is required for new construction.

4. Existing Facilities

Backflow prevention shall be required for the following existing facilities that are proposing modifications:

- Installation of Customer Service Line - Backflow prevention shall be required for all existing facilities if that facility proposes installation of a service line (new customer) and the existing (or proposed modified) facility meets the description of any of the proposed facilities listed in [Exhibit W8-1](#).
- Modifications to Customer Service Line - Backflow prevention shall be required for all existing facilities if that facility proposes modifications to their customer service line and the existing (or modified) facility meets the description of any of the proposed facilities listed in [Exhibit W8-1](#).
- Modification to Customer Service Meter - Backflow prevention shall be required for all existing facilities if that facility proposes installing additional or a larger capacity meter(s) and the existing (or modified) facility meets the description of any of the proposed facilities listed in [Exhibit W8-1](#).

5. Existing Facilities with a Cross Connection

Backflow prevention shall be required for all existing facilities where a cross connection has occurred.

W8.04 Backflow Prevention Exemption

Backflow prevention that has been required by any of section W8.03 Backflow Prevention Requirements of this Chapter may only be granted an exemption of backflow prevention requirements or a lessening of backflow prevention requirements with approval from IDEM and the City. IDEM approval shall be per Title 327 IAC 8-10-4(e). City approval shall be per a variance submitted in compliance with [Chapter GR3 - Variances](#).

W8.05 Types of Backflow Prevention

Backflow prevention devices that are approved for use shall meet the requirements per section MA7.10 of [Chapter MA7 - Water Materials and Testing Requirements](#). Isolation valves are not acceptable for backflow prevention and are not approved devices for use in backflow prevention. The following are types of approved devices for use in backflow prevention:

1. Air Gap (AG)

Air gaps (AG) are acceptable devices for backflow prevention. A representative sketch of these devices is presented in Standard Drawing [W-30](#) Air Gap – Backflow Prevention.

An AG is the unobstructed vertical distance through a free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood level rim of the receptacle.

The discharge pipe of an AG shall terminate per one of the following:

- A minimum of two (2) pipe diameters of the discharge pipe or 6-inches, whichever is the lesser, above the maximum recorded flood level or above the flood level rim of the receiving vessel, whichever is higher.
- A minimum of three (3) pipe diameters of the discharge pipe or 6-inches, whichever is the lesser, above the maximum recorded flood level or above the flood level rim of the receiving vessel, whichever is higher where:
 - a side wall, rib, or similar obstruction is spaced closer than three (3) pipe diameters from the piping affecting the AG or
 - two (2) intersecting walls are located closer than four (4) pipe diameters from the piping affecting the AG
- The minimum AG separation shall be 1-inch.

2. Atmospheric Vacuum Breaker (AVB)

Atmospheric Vacuum Breakers (AVB) are acceptable devices for backflow prevention for only specified types of cross connection hazards as discussed in section W8.06 Appropriate Use of Backflow Prevention Devices of this Chapter. A representative sketch of this device is shown in Standard Drawing [W-31](#) Atmospheric Vacuum Breaker Backflow Preventer.

All AVBs shall meet the following requirements:

- Contain an air inlet valve, a check seat, and an air port.
- Installed as near as possible to the cross connection hazard.
- Positioned not less than 6-inches from the base of the AVB down to the flood level rim of the receptacle.
- Installed at a location that allows access to the device for maintenance or replacement from floor or ground level without the use of a ladder or similar temporary apparatus.
- Located in an area not subject to flooding, excessive heat, or freezing.

3. Pressure Vacuum Breaker (PVB)

Pressure Vacuum Breakers (PVB) are acceptable devices for backflow prevention for only specified types of cross connection hazards as

discussed in section W8.06 Appropriate Use of Backflow Prevention Devices of this Chapter. A representative sketch of this device is shown in Standard Drawing [W-32](#) Pressure Vacuum Breaker Backflow Preventer.

All PVBs shall meet the following requirements:

- Contain an internally loaded check valve and an internally loaded air inlet valve.
- Installed with shut-off valves and test cocks located at each end of the assembly.
- Installed as near as possible to the cross connection hazard.
- Positioned not less than 6-inches from the base of the PVB down to the flood level rim of the receptacle and not less than 12-inches from the centerline of the PVB outlet to the highest outlet, whichever is greater.
- Installed at a location that allows access to the device for maintenance and testing from floor or ground level without the use of a ladder or similar temporary apparatus.
- Located in an area not subject to flooding, excessive heat, or freezing.
- Installed between two (2) tightly closing shut-off valves with its center or datum point a minimum of 12-inches above the following:
 - Floor level
 - The highest downstream piping or shut-off valve
 - The highest downstream overflow rim or discharge point

4. Double Check Valves (DC)

Double Check Valves (DC) are acceptable devices for backflow prevention for only specified types of cross connection hazards as discussed in section W8.06 Appropriate Use of Backflow Prevention Devices of this Chapter. A representative sketch of this device is shown in Standard Drawing [W-33](#) Double Check Valve Backflow Preventer.

All DCs shall meet the following requirements:

- Consist of two (2) tightly closing shut-off valves surrounding two (2) independent acting check valves.
- Contain four (4) test cocks; one (1) upstream of the four (4) valves and one (1) in between each of the four (4) check and shut-off valves.
- Installed at a location that allows access to the device for maintenance and testing from floor level or ground level without the use of a ladder or similar temporary apparatus.
- Located in an area not subject to flooding, excessive heat, or freezing.

Double Check Valves may be installed within a pit upon prior approval from the City.

5. Reduced Pressure Principle Backflow Preventer (RP)

Reduced Pressure Principle Backflow Preventers (RP) are acceptable devices for backflow prevention. A representative sketch of this device is shown in Standard Drawing [W-34](#) Reduced Pressure Principle Backflow Preventer.

All RPs shall meet the following requirements:

- Consist of two (2) tightly closing shut-off valves surrounding two (2) independently acting pressure reducing check valves.
- Consist of two (2) independently acting pressure reducing check valves shall surround an automatic pressure differential relief valve and four (4) test cocks; one (1) upstream of the five (5) valves and one (1) between each of the four (4) check and shut-off valves.
- Located to effectively divide the structure into three (3) chambers.
- Reduced pressure in each downstream chamber allowing the pressure differential relief valve to vent the center chamber to atmosphere should either or both check valves malfunction.
- Installed with no additional piping affixed to the pressure differential relief valve port, and with the pressure differential relief valve port a minimum of 12-inches and maximum of 60-inches above floor level.
- Installed at a location where any leakage from the pressure differential relief valve port may be observed or noted.
- Installed at a location that allows access to the device for maintenance and testing from floor level or ground level without the use of a ladder or similar temporary apparatus.
- Located in an area not subject to flooding, excessive heat, or freezing.

W8.06 Appropriate Use of Backflow Prevention Devices

The effective prevention of cross connecting is highly dependent on the use of the appropriate backflow prevention device for the hazard. Air Gap (AG) backflow prevention devices and Reduced Pressure Principle Backflow Preventers (RP) are appropriate for all cross connection hazards.

[Exhibit W8-2](#) provides a guideline for the appropriate backflow prevention device to use with facilities that have a cross connection hazard. [Exhibit W8-3](#) provides a guideline for the appropriate backflow prevention device to be used for fixtures with a cross connection control hazard.

Facilities shall construct an AG or install a RP or a DC assembly on the customer service line to each of the following:

- Tanks used only to store water from the public water supply for fire suppression that are constructed to maintain the bacteriological quality of the water.
- Secondary sources of supply that:
 - use well water as the only private source of supply;

- are constructed to maintain the bacteriological quality of the water,
- produce, without treatment, water meeting the drinking water quality standards.

Facilities shall construct an AG or install a RP on the facility service line to or into a facility having a secondary source of supply of a type other than those identified that is used for only fire suppression. No secondary source of supply of a type other than those identified above shall be physically connected on the facility service line to or into the facility.

Facilities shall construct an AG, or install a RP or PVB on the water line connecting the public water supply to any subsurface land irrigation system.

Any other situation not already discussed or presented in [Exhibit W8-1](#) or [Exhibit W8-2](#) but requiring backflow prevention shall require an AG or RP.

W8.07 Installation Requirements

Backflow prevention devices shall be installed per the requirements discussed below.

1. Location

- Backflow prevention devices shall be installed on the customer side of the service meter.
- Backflow prevention devices shall be installed after the meter (on 5/8-inch through 1-inch services) or after the meter bypass line (on 1 ½-inch or larger services).
- Pit, chamber, manhole or other below grade installation of backflow prevention devices is prohibited with the exception of DC.
- Backflow prevention devices shall be installed at a height between 12-inches and 60-inches above the finished floor elevation with the exception of DC in a pit, chamber, manhole or other below grade installation.

2. Multiple Services

When two (2) or more piping systems are used for water in a building or industrial plant, extreme care should be taken not to interconnect the systems. There may be a potable water system and systems carrying lesser quality water such as fire protection. To help prevent the possibility of the two systems being interconnected, pipes should be identified adequately by legends and color coding.

W8.08 Inspection Requirements

All backflow prevention devices shall be inspected at the time of installation and results shall be presented to City Utilities. To ensure that the backflow prevention devices are maintained in working order, the backflow prevention devices shall be inspected as follows:

- AG – Intervals not exceeding one (1) year
- RP – Intervals not exceeding one (1) year
- DC – Intervals not exceeding one (1) year
- PVB – Intervals not exceeding one (1) year
- AVB – No inspection requirement
- All cross connection control device inspectors shall be registered with IDEM.

W8.09 Inspection Reporting

Inspection results reporting shall be the responsibility of the facility owner. This includes insuring that the following cross connection control device inspector responsibility is completed:

All required inspection results shall be submitted by the cross connection control device inspector to the customer possessing the backflow prevention device (tenant), facility owner, City Utilities, and, if requested, IDEM within 30 days of the inspection or test.

W8.10 Disconnection/Removal/Bypass

Disconnection/removal/bypass of backflow protection shall not be allowed without prior approval per section W8.04 Backflow Prevention Exemption of this Chapter.