

# 2012 International Plumbing Code (amended)

## Backflow/Cross-Connection Control Requirements

### AMENDED SECTION

### NEW SECTION

#### 312.10 Installation, inspection and testing of backflow prevention assemblies, barometric loops and air gaps.

Installation, inspection and testing shall comply with Sections 312.10.1 through 312.10.3.

##### 312.10.1 Inspections.

Annual inspections shall be made of all backflow prevention assemblies, barometric loops and air gaps to determine whether they are operable, properly installed and maintained, and meet testing/code requirements. Inspections of backflow prevention devices including barometric loops and air gaps used to protect high degree of hazard cross connections shall be documented in writing and the report provided to the owner of the backflow prevention device.

##### 312.10.2 Testing.

Reduced pressure principle, double check, pressure vacuum breaker, reduced pressure detector fire protection, double check detector fire protection, and spill-resistant vacuum breaker backflow preventer assemblies shall be tested at the time of installation, immediately after repairs or relocation and at least annually. The testing procedure shall be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10.1, USC's FCCC & HR's "Manual of Cross-Connection Control", or UFL's TREEO's "Backflow Prevention – Theory and Practice". Any backflow preventer which is found to be defective shall be repaired.

##### 312.10.3 Owner Responsibilities.

The owner of the backflow prevention assemblies shall comply with the following.

- i. It shall be the duty of the owner of the backflow prevention assembly to see that these tests are made in a timely manner in accord with the frequency of field testing specified in 312.10.2 of this code.
- ii. The owner shall notify the building official, and/or water supplier (for those devices associated with containment) in advance when the tests are to be undertaken so that the building official and/or water supplier may witness the tests if so desired.
- iii. Upon completion, the owner shall provide records of such tests, repairs, overhauls, or replacements to the building official or water supplier (for those devices associated with containment). In addition, all records shall be kept by the owner of the backflow prevention device or method for at least 5 years and, upon specific request, shall be made available to the building official or water supplier.
- iv. All tests, repairs, overhauls or replacements shall be at the expense of the owner of the backflow preventer.

#### 605.3 Water service pipe.

Water service pipe shall conform to NSF 61 and shall conform to one of the standards listed in Table 605.3. Water service pipe or tubing, installed underground and outside of the structure, shall have a working pressure rating of not less than 160 psi (1100 kPa) at 73.4°F (23°C). Where the water pressure exceeds 160 psi (1100 kPa), piping material shall have a working pressure rating not less than the highest available pressure. Water service piping materials not third-party certified for water distribution shall terminate at or before the full open valve located at the entrance to the structure. All ductile iron water service piping shall be cement mortar lined in accordance with AWWA C104.

### **605.3.1 Dual check-valve-type backflow preventer.**

Dual check-valve backflow preventers installed on the water supply system shall comply with ASSE 1024 or CSA B64.6. These devices, which are commonly installed immediately downstream of water meters by water suppliers, are not approved backflow prevention devices and are only allowed to be installed when no cross connections exist downstream of the device or when all downstream cross connections are properly protected by approved backflow prevention devices, assemblies, or methods in accordance with Section 608 of this code.

### **607.3 Thermal expansion control.**

A means of controlling increased pressure caused by thermal expansion shall be provided where required in accordance with [Sections 607.3.1](#) and [607.3.2](#).

#### **607.3.1 Pressure-reducing valve.**

For water service system sizes up to and including 2 inches (51 mm), a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the pressure-reducing valve setting.

#### **607.3.2 Backflow prevention device or check valve.**

Where a backflow prevention device, check valve or other device is installed on a water supply system utilizing storage water heating equipment, a device for controlling pressure shall be installed at an accessible location between the checking device and the water heating equipment to limit thermal expansion of the water being heated to not more than 80 psi (552 kPa) static pressure at any fixture on the system. A potable water expansion tank or auxiliary relief valve set at 80 psi (552 kPa) shall be acceptable. The auxiliary relief valve shall be in addition to the water heater safety relief valve. This thermal expansion control device shall be designed and trimmed for repeated operation. The valve shall be a minimum 1/2-inch pipe size, shall be adjustable and calibrated, and shall include a tag describing its function.

## **SECTION 608 PROTECTION OF POTABLE WATER SUPPLY**

### **608.1 General.**

A potable water supply system shall be designed, installed and maintained in such a manner so as to prevent contamination from non-potable liquids, solids or gases being introduced into the potable water supply through cross-connections or any other piping connections to the system. Backflow preventers shall conform to the applicable Standard referenced in Table 608.1. Backflow preventer applications shall conform to Table 608.1, except as specifically stated in Sections 608.2 through 608.16.27 and Sections 608.18 through 608.18.2.

**TABLE 608.1 APPLICATION OF BACKFLOW PREVENTERS**

<b>DEVICE</b>	<b>DEGREE OF HAZARD<sup>a</sup></b>	<b>APPLICATION<sup>b</sup></b>	<b>APPLICABLE STANDARDS</b>
Air gap	High or low hazard	Backsiphonage or backpressure	ASME A112.1.2
Air gap fittings for use with plumbing fixtures, appliances and appurtenances	High or low hazard	Backsiphonage or backpressure	ASME A112.1.3

DEVICE	DEGREE OF HAZARD <sup>a</sup>	APPLICATION <sup>b</sup>	APPLICABLE STANDARDS
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASSE 1002, CSA B125.3
Backflow preventer for carbonated beverage machines	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " – $\frac{3}{8}$ "	ASSE 1022
Backflow preventer with intermediate atmospheric vents	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " – $\frac{3}{4}$ "	ASSE 1012, CSA B64.3
Barometric loop	High or low hazard	Backsiphonage only	(See <a href="#">Section 608.13.4</a> )
Double check backflow prevention assembly and double check fire protection backflow prevention assembly	Low hazard	Backpressure or backsiphonage Sizes $\frac{3}{8}$ " – 16"	ASSE 1015, AWWA C510, CSA B64.5, CSA B64.5.1
Double check detector fire protection backflow prevention assemblies	Low hazard	Backpressure or backsiphonage (Fire sprinkler systems) Sizes 2" – 16"	ASSE 1048
Dual-check-valve-type backflow preventer	Low hazard	Backpressure or backsiphonage Sizes $\frac{1}{4}$ " – 1"	ASSE 1024, CSA B64.6
Hose connection backflow preventer	High or low hazard	Low head backpressure, rated working pressure, backpressure or backsiphonage Sizes $\frac{1}{2}$ " – 1"	ASSE 1052, CSA B64.2.1.1
Hose connection vacuum breaker	High or low hazard	Low head backpressure or backsiphonage Sizes $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1"	ASSE 1011, CSA B64.2, CSA B64.2.1
Laboratory faucet backflow preventer	High or low hazard	Low head backpressure and backsiphonage	ASSE 1035, CSA B64.7
Pipe-applied atmospheric-type vacuum breaker	High or low hazard	Backsiphonage only Sizes $\frac{1}{4}$ " – 4"	ASSE 1001, CSA B64.1.1
Pressure vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes $\frac{1}{2}$ " – 2"	ASSE 1020, CSA B64.1.2
Reduced pressure principle backflow prevention assembly and reduced pressure principle fire protection backflow prevention assembly	High or low hazard	Backpressure or backsiphonage Sizes $\frac{3}{8}$ " – 16"	ASSE 1013, AWWA C511, CSA B64.4, CSA B64.4.1
Reduced pressure detector fire protection backflow prevention assemblies	High or low hazard	Backsiphonage or backpressure (Fire sprinkler systems)	ASSE 1047
Spill-resistant vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes $\frac{1}{4}$ " – 2"	ASSE 1056
Vacuum breaker wall hydrants, frost-resistant, automatic draining type	High or low hazard	Low head backpressure or backsiphonage Sizes $\frac{3}{4}$ ", 1"	ASSE 1019, CSA B64.2.2

For SI: 1 inch = 25.4 mm.

a. Low hazard—See Pollution ([Section 202](#)).

High hazard—See Contamination ([Section 202](#)).

b. See Backpressure ([Section 202](#)).

See Backpressure, low head ([Section 202](#)).

See Backsiphonage ([Section 202](#)).

### **608.2 Plumbing fixtures.**

The supply lines and fittings for plumbing fixtures shall be installed so as to prevent backflow. Plumbing fixture fittings shall provide backflow protection in accordance with ASME A112.18.1/CSA B125.1.

### **608.3 Devices, appurtenances, appliances and apparatus.**

Devices, appurtenances, appliances and apparatus intended to serve some special function, such as sterilization, distillation, processing, cooling, or storage of ice or foods, and that connect to the water supply system, shall be provided with protection against backflow and contamination of the water supply system. Water pumps, filters, softeners, tanks and other appliances and devices that handle or treat potable water shall be protected against contamination.

#### **608.3.1 Special equipment, water supply protection.**

The water supply for hospital fixtures shall be protected against backflow with a reduced pressure principle backflow prevention assembly, an atmospheric or spill-resistant vacuum breaker assembly, or an air gap. Vacuum breakers for bedpan washer hoses shall not be located less than 5 feet (1524 mm) above the floor. Vacuum breakers for hose connections in health care or laboratory areas shall not be less than 6 feet (1829 mm) above the floor.

### **608.4 Water service piping/Containment to protect potable water supplies.**

Water service piping shall be protected in accordance with Sections 603.2. Containment to protect potable water supplies shall be achieved in accordance with 608.18 through 608.18.2.

### **608.5 Chemicals and other substances.**

Chemicals and other substances that produce either toxic conditions, taste, odor or discoloration in a potable water system shall not be introduced into, or utilized in, such systems.

### **608.6 Cross-connection control.**

Cross connections shall be prohibited, except where approved backflow prevention devices, assemblies, or methods are installed to protect the potable water supply. A dual check valve type backflow preventer (i.e., device meeting ASSE 1024 or CSA B64.6 with two spring loaded, independently operating check valves without tightly closing shut-off valves or test cocks which is commonly installed immediately downstream of water meters by water suppliers) is not an approved backflow prevention device when a known cross connection exists downstream of the device. These devices are only allowed to be installed when no cross connections exist downstream of the device or when all downstream cross connections are properly protected by approved backflow prevention devices, assemblies, or methods.

#### **608.6.1 Private water supplies.**

Cross connections between a private water supply and a potable public supply shall be prohibited.

### **608.7 Valves and outlets prohibited below grade.**

Potable water outlets and combination stop-and-waste valves shall not be installed underground or below grade. Freezeproof yard hydrants that drain the riser into the ground are considered to be stop-and-waste valves.

**Exception:** Freeze-proof yard hydrants that drain the riser into the ground shall be permitted to be installed, provided that the potable water supply to such hydrants is protected upstream of the hydrants in accordance with [Section 608](#) and the hydrants are permanently identified as nonpotable outlets by *approved* signage that reads as follows: "Caution, Nonpotable Water. Do Not Drink.&rdquo;

**608.8 Identification of nonpotable water.**

Where nonpotable water systems are installed, the piping conveying the nonpotable water shall be identified either by color marking or metal tags in accordance with Sections 608.8.1 through 608.8.3. All nonpotable water outlets such as hose connections, open ended pipes, and faucets shall be identified at the point of use for each outlet with the words, "Nonpotable—not safe for drinking." The words shall be indelibly printed on a tag or sign constructed of corrosion-resistant waterproof material or shall be indelibly printed on the fixture. The letters of the words shall be not less than 0.5 inches (12.7 mm) in height and in colors in contrast to the background on which they are applied.

**Exception:** Overall Exception to this Section (§608.8 of this code). Pursuant to R.S. 40:4.12, industrial-type facilities listed therein shall not be required to comply with this section (§608.8 of this code) provided that such facilities have a potable water distribution identification plan in conformity with the requirements of R.S. 40:4.12. The required formal cross-connection control survey of the facility referenced in R.S. 40:4.12 shall be performed by an individual holding a valid cross-connection control surveyor certificate issued under the requirements of ASSE 5120, or other individuals holding a surveyor certificate from a nationally recognized backflow certification organization approved by the state health officer.

**608.8.1 Information.**

Pipe identification shall include the contents of the piping system and an arrow indicating the direction of flow. Hazardous piping systems shall also contain information addressing the nature of the hazard. Pipe identification shall be repeated at intervals not exceeding 25 feet (7620 mm) and at each point where the piping passes through a wall, floor or roof. Lettering shall be readily observable within the room or space where the piping is located.

**608.8.2 Color.**

The color of the pipe identification shall be discernable and consistent throughout the building. The color purple shall be used to identify reclaimed, rain and gray water distribution systems.

**608.8.3 Size.**

The size of the background color field and lettering shall comply with Table 608.8.3.

**TABLE 608.8.3 SIZE OF PIPE IDENTIFICATION**

<b>PIPE DIAMETER (inches)</b>	<b>LENGTH BACKGROUND COLOR FIELD (inches)</b>	<b>SIZE OF LETTERS (inches)</b>
$3/4$ to $1 1/4$	8	0.5
$1 1/2$ to 2	8	0.75
$2 1/2$ to 6	12	1.25
8 to 10	24	2.5
over 10	32	3.5

For SI: 1 inch = 25.4 mm.

**608.9 Reutilization prohibited.**

Water utilized for the cooling of equipment or other processes shall not be returned to the potable water system. Such water shall be discharged into a drainage system through an *air gap* or shall be utilized for nonpotable purposes.

**608.10 Reuse of piping.**

Piping that has been utilized for any purpose other than conveying potable water shall not be utilized for conveying potable water.

**608.11 Painting of water tanks.**

The interior surface of a potable water tank shall not be lined, painted or repaired with any material that changes the taste, odor, color or potability of the water supply when the tank is placed in, or returned to, service.

**608.12 Pumps and other appliances.**

Water pumps, filters, softeners, tanks and other devices that handle or treat potable water shall be protected against contamination.

**608.13 Backflow protection.**

Means of protection against backflow shall be provided in accordance with [Sections 608.13.1](#) through [608.13.9](#).

**608.13.1 Air gap.**

The minimum required *air gap* shall be measured vertically from the lowest end of a potable water outlet to the *flood level rim* of the fixture or receptacle into which such potable water outlet discharges. Air gaps shall comply with ASME A112.1.2 and *air gap* fittings shall comply with ASME A112.1.3.

**608.13.2 Reduced pressure principle backflow prevention assemblies.**

Reduced pressure principle backflow prevention assemblies shall conform to ASSE 1013, AWWA C511, CSA B64.4 or CSA B64.4.1. Reduced pressure detector assembly backflow preventers shall conform to ASSE 1047. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by *air gap* and shall be prevented from being submerged.

**608.13.3 Backflow preventer with intermediate atmospheric vent.**

Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CSA B64.3. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by *air gap* and shall be prevented from being submerged.

**608.13.4 Barometric loop.**

Barometric loops shall precede the point of connection and shall extend vertically to a height of 35 feet (10 668 mm). A barometric loop shall only be utilized as an atmospheric-type or pressure-type vacuum breaker.

**608.13.5 Pressure vacuum breaker assemblies.**

Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. These assemblies are designed for installation under continuous pressure conditions where the critical level is installed at the required height. Pressure vacuum breaker assemblies shall not be installed in locations where spillage could cause damage to the structure.

**608.13.6 Atmospheric-type vacuum breakers.**

Pipe-applied atmospheric-type vacuum breakers shall conform to ASSE 1001 or CSA B64.1.1. Hose-connection vacuum breakers shall conform to ASSE 1011, ASSE 1019, ASSE 1035, ASSE 1052, CSA B64.2, CSA B64.2.1, CSA B64.2.1.1, CSA B64.2.2 or CSA B64.7. These devices shall operate under normal atmospheric pressure when the critical level is installed at the required height.

**608.13.7 Double check-valve assemblies.**

Double check-valve assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double-detector check-valve assemblies shall conform to ASSE 1048. These devices shall be capable of operating under continuous pressure conditions.

**608.13.8 Spill-resistant pressure vacuum breaker assemblies.**

Spill-resistant pressure vacuum breaker assemblies shall conform to ASSE 1056 or CSA B64.1.3. These assemblies are designed for installation under continuous-pressure conditions where the critical level is installed at the required height.

**608.13.9 Chemical dispenser backflow devices.**

Back-flow devices for chemical dispensers shall comply with ASSE 1055 or shall be equipped with an *air gap* fitting.

**608.14 Location of backflow preventers.**

Access shall be provided to backflow preventers as specified by the manufacturer’s instructions for the required testing, maintenance and repair. A minimum of 1-foot of clearance shall be provided between the lowest portion of the assembly and grade or platform. Elevated installations exceeding 5-feet above grade(g) shall be provided with a suitably located permanent platform capable of supporting the installer, tester, or repairer. Reduced pressure principal type backflow preventers, and other types of backflow preventers with atmospheric ports and/or test cocks (e.g., atmospheric type vacuum breakers, double check valve assemblies, pressure type vacuum breaker assemblies, etc.), shall not be installed below grade (in vaults or pits) where the potential for a relief valve, an atmospheric port, or a test cock being submerged exists.

**608.14.1 Outdoor enclosures for backflow prevention devices.**

Outdoor enclosures for backflow prevention devices shall comply with ASSE 1060.

**608.14.2 Protection of backflow preventers.**

Backflow preventers subjected to freezing temperatures shall protected from freezing by heat, insulation or both; or as otherwise recommended by the manufacturer.

**608.14.2.1 Relief port piping.**

The termination of the piping from the relief port or *air gap* fitting of a backflow preventer shall discharge to an *approved* indirect waste receptor or to the outdoors where it will not cause damage or create a nuisance.

**608.15 Protection of potable water outlets.**

All potable water openings and outlets shall be protected against backflow in accordance with [Section 608.15.1](#), [608.15.2](#), [608.15.3](#), [608.15.4](#), [608.15.4.1](#) or [608.15.4.2](#).

**608.15.1 Protection by air gap.**

Openings and outlets shall be protected by an *air gap* between the opening and the fixture *flood level rim* as specified in Table 608.15.1. Openings and outlets equipped for hose connection shall be protected by means other than an *air gap*.

**TABLE 608.15.1 MINIMUM REQUIRED AIR GAPS**

FIXTURE	MINIMUM AIR GAP	
	Away from a wall <sup>a</sup> (inches)	Close to a wall (inches)
Lavatories and other fixtures with effective opening not greater than 1/2 inch	1	1 1/2

in diameter		
Sink, laundry trays, gooseneck back faucets and other fixtures with effective openings not greater than $\frac{3}{4}$ inch in diameter	1 $\frac{1}{2}$	2 $\frac{1}{2}$
Over-rim bath fillers and other fixtures with effective openings not greater than 1 inch in diameter	2	3
Drinking water fountains, single orifice not greater than $\frac{7}{16}$ inch in diameter or multiple orifices with a total area of 0.150 square inch (area of circle $\frac{7}{16}$ inch in diameter)	1	1 $\frac{1}{2}$
Effective openings greater than 1 inch	Two times the diameter of the effective opening	Three times the diameter of the effective opening

For SI: 1 inch = 25.4 mm.

a. Applicable where walls or obstructions are spaced from the nearest inside-edge of the spout opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the diameter of the effective opening for two intersecting walls.

**608.15.2 Protection by reduced pressure principle backflow prevention assembly.**

Openings and outlets shall be protected by a reduced pressure principle backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly on potable water supplies.

**608.15.3 Protection by a backflow preventer with intermediate atmospheric vent.**

Openings and outlets shall be protected by a backflow preventer with an intermediate atmospheric vent.

**608.15.4 Protection by a vacuum breaker.**

Openings and outlets shall be protected by atmospheric-type or pressure-type vacuum breakers. The critical level of atmospheric type vacuum breakers shall be installed not less than 6 inches (152 mm) above all downstream piping and not less than 6 inches (152 mm) above the flood-level rim of the fixture receptor or device served. Shutoff or control valves shall not be installed downstream from an atmospheric vacuum breaker. Atmospheric vacuum breakers including, but not limited to, hose bibb vacuum breakers shall not be subjected to continuous water pressure. The critical level of pressure type vacuum breakers shall be installed not less than 12 inches (305 mm) above all downstream piping and not less than 12 inches (305 mm) above the flood-level rim of the fixture receptor or device served. Fill valves shall be set in accordance with Section 425.3.1. Vacuum breakers shall not be installed under exhaust hoods or similar locations that will contain toxic fumes or vapors.

**608.15.4.1 Deck-mounted and integral vacuum breakers.**

*Approved* deck-mounted or equipment-mounted vacuum breakers and faucets with integral atmospheric vacuum breakers or spill-resistant vacuum breaker assemblies shall be installed in accordance with the manufacturer's instructions and the requirements for labeling with the critical level not less than 1 inch (25 mm) above the *flood level rim*.

**608.15.4.2 Hose connections.**

Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection shall be protected against backflow by an atmospheric-type or pressure-type vacuum breaker installed in accordance with Section 608.15.4, or by a permanently attached hose connection vacuum breaker in which

the highest point of usage is less than 10 feet above the hose connection vacuum breaker. Hose bib vacuum breakers shall not be subjected to continuous water pressure.

**Exceptions:**

1. This section shall not apply to water heater and boiler drain valves that are provided with hose connection threads and that are intended only for tank or vessel draining.
2. This section shall not apply to water supply valves intended for connection of clothes washing machines where backflow prevention is otherwise provided or is integral with the machine.

**608.16 Connections to the potable water system.**

Connections to the potable water system shall conform to Sections 608.16.1 through 608.16.27. These Sections (608.16.1-608.16.27) are not inclusive of all potential contamination sources which may need fixture isolation protection. For potential contamination sources not listed in Sections 608.16.1 through 608.16.27, backflow prevention methods or devices shall be utilized in accordance with Table B1 of CAN/CSA B64.10-1994. When a potential contamination source and its associated backflow prevention method or device is not identified in this code or Table B1 of CAN/CSA B64.10-1994, backflow prevention methods or devices shall be utilized as directed by the building official.

**608.16.1 Beverage dispensers.**

The water supply connection to beverage dispensers shall be protected against backflow by a backflow preventer conforming to ASSE 1022 or by an *air gap*. The portion of the backflow preventer device downstream from the second check valve and the piping downstream therefrom shall not be affected by carbon dioxide gas.

**608.16.2 Connections to boilers.**

The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where conditioning chemicals are introduced into the system, the potable water connection shall be protected by an *air gap* or a reduced pressure principle backflow preventer, complying with ASSE 1013, CSA B64.4 or AWWA C511.

**608.16.3 Heat exchangers.**

Heat exchangers utilizing an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An *air gap* open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

**608.16.4 Connections to automatic fire sprinkler systems and standpipe systems.**

The potable water supply to automatic fire sprinkler and standpipe systems shall be protected against backflow by a double check backflow prevention assembly, a double check fire protection backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly.

**Exceptions:**

1. Where systems are installed as a portion of the water distribution system in accordance with the requirements of this code and are not provided with a fire department connection, isolation of the water supply system shall not be required.
2. Isolation of the water distribution system is not required for deluge, preaction or dry pipe systems.

**608.16.4.1 Additives or nonpotable source.**

Where systems under continuous pressure contain chemical additives or antifreeze, or where systems are connected to a nonpotable secondary water supply, the potable water supply shall be protected against backflow by a reduced pressure principle backflow

prevention assembly or a reduced pressure principle fire protection backflow prevention assembly. Where chemical additives or antifreeze are added to only a portion of an automatic fire sprinkler or standpipe system, the reduced pressure principle backflow prevention assembly or the reduced pressure principle fire protection backflow prevention assembly shall be permitted to be located so as to isolate that portion of the system. Where systems are not under continuous pressure, the potable water supply shall be protected against backflow by an air gap or an atmospheric vacuum breaker conforming to ASSE 1001 or CSA B64.1.1.

#### **608.16.5 Connections to lawn irrigation systems.**

The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric vacuum breaker, a pressure vacuum breaker assembly or a reduced pressure principle backflow prevention assembly. Shutoff or control valves shall not be installed downstream from an atmospheric vacuum breaker. When an irrigation/lawn sprinkler system is provided with separate zones, the potable water supply shall be protected by a pressure vacuum breaker or reduced pressure principal backflow prevention assembly. Atmospheric vacuum breakers shall be installed at least 6 inches (152 mm) above the highest point of usage (i.e., 6 inches (152 mm) above all downstream piping or highest sprinkler head). Pressure type vacuum breakers shall be installed at least 12 inches (305 mm) above the highest point of usage (i.e., 12 inches (305 mm) above all downstream piping and the highest sprinkler head). Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a reduced pressure principle backflow prevention assembly.

#### **608.16.6 Connections subject to backpressure.**

Where a potable water connection is made to a nonpotable line, fixture, tank, vat, pump or other equipment subject to high- hazard back-pressure, the potable water connection shall be protected by a reduced pressure principle backflow prevention assembly.

#### **608.16.7 Chemical dispensers.**

Where chemical dispensers connect to the potable water distribution system, the water supply system shall be protected against backflow in accordance with [Section 608.13.1](#), [608.13.2](#), [608.13.5](#), [608.13.6](#), [608.13.8](#) or [608.13.9](#).

#### **608.16.8 Portable cleaning equipment.**

Where the portable cleaning equipment connects to the water distribution system, the water supply system shall be protected against backflow in accordance with Section 608.13.1, 608.13.2, 608.13.3, 608.13.5, 608.13.6, or 608.13.8. The type of backflow preventer shall be selected based upon the application in accordance with Table 608.1.

#### **608.16.9 Dental pump equipment.**

Where dental pumping equipment connects to the water distribution system, the water supply system shall be protected against backflow in accordance with [Section 608.13.1](#), [608.13.2](#), [608.13.5](#), [608.13.6](#) or [608.13.8](#).

#### **608.16.10 Coffee machines and noncarbonated beverage dispensers.**

The water supply connection to coffee machines and noncarbonated beverage dispensers shall be protected against backflow by a backflow preventer conforming to ASSE 1022 or by an *air gap*.

#### **608.16.11 Cooling towers.**

The potable water supply to cooling towers shall be protected against backflow by an air gap.

#### **608.16.12 Chemical tanks.**

The potable water supply to chemical tanks shall be protected against backflow by an air gap.

#### **608.16.13 Commercial Dishwashers in commercial establishments.**

The potable water supply to commercial dishwashers in commercial establishments shall be protected against backflow by an air gap, atmospheric vacuum breaker, or pressure vacuum breaker. Vacuum breakers shall meet the requirements of Section 608.15.4.

**608.16.14 Ornamental Fountains.**

The potable water supply to ornamental fountains shall be protected against backflow by an air gap.

**608.16.15 Swimming pools, spas, hot tubs.**

The potable water supply to swimming pools, spas, or hot tubs shall be protected against backflow by an air gap or reduced pressure principal backflow prevention assembly.

**608.16.16 Baptismal fonts.**

The potable water supply to baptismal fonts shall be protected against backflow by an air gap.

**608.16.17 Animal watering troughs.**

The potable water supply to animal watering troughs shall be protected against backflow by an air gap.

**608.16.18 Agricultural chemical mixing tanks.**

The potable water supply to agricultural chemical mixing tanks shall be protected against backflow by an air gap.

**608.16.19 Water hauling trucks.**

The potable water supply to water hauling trucks/tankers shall be protected against backflow by an air gap when filled from above. When allowed to be filled from below, they shall be protected by a reduced pressure principle backflow prevention assembly. When a tanker truck is designated for the hauling of food grade products (and has been cleaned utilizing food grade cleaning procedures) and is allowed to be filled from below, a double check valve assembly shall be acceptable.

**608.16.20 Air conditioning chilled water systems and/or condenser water systems.**

The potable water supply to air conditioning chilled water systems and condenser water systems shall be protected against backflow by a reduced pressure principal backflow prevention assembly.

**608.16.21 Pot-type chemical feeders.**

The potable water supply to pot-type chemical feeders shall be protected against backflow by a reduced pressure principal backflow prevention assembly.

**608.16.22 Food processing steam kettles.**

The potable water supply to food processing steam kettles shall be protected against backflow by a double check valve backflow prevention assembly.

**608.16.23 Individual travel trailer pads.**

The potable water supply to individual travel trailer pads shall be protected against backflow by a double check valve backflow prevention assembly.

**608.16.24 Laboratory and/or medical aspirators.**

The potable water supply to laboratory and/or medical aspirators shall be protected against backflow by an atmospheric or pressure vacuum breaker installed in accordance with Sections 608.3.1 and 608.15.4.

**608.16.25 Laboratory or other sinks with threaded or serrated nozzles.**

The potable water supply to laboratory sinks or other sinks with threaded or serrated nozzles shall be protected against backflow by an atmospheric or pressure vacuum breaker installed in accordance with Sections 608.3.1 and 608.15.4.

**608.16.26 Mortuary/embalming aspirators.**

The potable water supply to mortuary/embalming aspirators shall be protected against backflow by a pressure vacuum breaker installed in the supply line serving the aspirator. The critical level of the vacuum breaker shall be installed a minimum of 12 inches higher than the aspirator. The aspirator shall be installed at least 6 inches above the highest level at which suction may be taken. An air gap shall be provided between the outlet of the discharge pipe and the overflow rim of the receiving fixture.

**608.16.27 Room(s) or other sub-unit(s) of a premise or facility receiving water where access is prohibited.**

When access is prohibited to particular areas, rooms, or other sub-units of a premise or facility which is receiving water, the potable water supply serving those areas shall be protected against backflow by a reduced pressure principal backflow protection assembly.

**608.17 Protection of individual water supplies.**

An individual water supply shall be located and constructed so as to be safeguarded against contamination in accordance with the applicable requirements of LAC 51:XII (Water Supplies) and LAC 56:I (WaterWells).

*[NOTE: DELETED/REMOVED SECTIONS 608.17.1 – 608.18.8]*

**608.18 Containment practices.**

Backflow prevention methods or devices shall be utilized as directed by the water supplier or code official to isolate specific water supply system customers from the water supply system's mains when such action is deemed necessary to protect the water supply system against potential contamination caused by backflow of water from that part of the water system owned and maintained by the customer (for example, the piping downstream of the water meter, if provided). Minimum requirements shall be in accordance with Section 608.18.1 through 608.18.2.

**608.18.1 Containment requirements.**

As a minimum, the following types of backflow prevention assemblies or methods shall be installed and maintained by water supply system customers immediately downstream of the water meter (if provided) or on the water service pipe prior to any branch line or connections serving the listed customer types and categories.

**TABLE 608.18.1 CONTAINMENT PRACTICES**

<b>Air Gap</b>
1. Fire Protection/Sprinkler System utilizing non-potable water as an alternative or primary source of water
<b>Reduced Pressure Principle Backflow Prevention Assembly</b>
1. Hospitals, Out-Patient Surgical Facilities, Renal Dialysis Facilities, Veterinary Clinics
2. Funeral Homes, Mortuaries
3. Car Wash Systems
4. Sewage Facilities
5. Chemical or Petroleum Processing Plants
6. Animal/Poultry Feedlots or Brooding Facilities
7. Meat Processing Plants
8. Metal Plating Plants
9. Food Processing Plants, Beverage Processing Plants
10. Fire Protection/Sprinkler Systems using antifreeze in such system (a detector type assembly is recommended on unmetered fire lines)
11. Irrigation/Lawn Sprinkler Systems with Fertilizer Injection
12. Marinas/Docks
13. Radiator Shops
14. Commercial Pesticide/Herbicide Application
15. Photo/X-ray/Film Processing Laboratories
16. Multiple Commercial Units served by a master meter
17. Any type of occupancy type or any other facility having one or more Single-walled Heat Exchangers which uses any chemical, additive, or corrosion inhibitor, etc., in the heating or cooling medium

18. Any type of occupancy type or any other facility having one or more Double-walled Heat Exchangers which use any chemical, additive, or corrosion inhibitor, etc., in the heating or cooling medium and which does not have a path to atmosphere with a readily visible discharge
19. Premises where access/entry is prohibited
<b>Pressure Vacuum Breaker Assembly/ Spill Resistant Vacuum Breaker Assembly</b>
1. Irrigation/Lawn Sprinkler Systems
<b>Double Check Valve Assembly</b>
1. Fire Protection/Sprinkler Systems (a detector type double check valve assembly is recommended on unmetered fire lines)
2. Two residential dwelling units served by a master meter, unless both units are located on a parcel or contiguous parcels of land having the same ownership and neither unit is used for commercial purposes. As used herein, the term “commercial purposes” means any use other than residential.
3. Three or more residential dwelling units served by a master meter
4. Multistoried Office/Commercial Buildings (over 3 floors)
5. Jails, Prisons, and Other Places of Detention or Incarceration

**608.18.2 Other containment requirements.**

Table 608.18.1 of this code above is not inclusive of all potential contamination sources which may need containment protection. For potential contamination sources not listed in this table, backflow prevention methods or devices shall be utilized in accordance with Table B1 of CAN/CSA B64.10-1994. When a potential contamination source and its associated backflow prevention method or device is not identified in Table 608.18.1 of this code above or Table B1 of CAN/CSA B64.10-1994, backflow prevention methods or devices shall be utilized:

- i. as directed by the building code official; or
- ii. as directed by the water supplier.
- iii. In cases of a discrepancy regarding the particular backflow prevention assembly or method required, the assembly or method providing the higher level of protection shall be required.

# 2012 International Residential Code (amended) Backflow/Cross Connection Control Requirements

**AMENDED SECTION**

**NEW SECTION**

## SECTION P2902 PROTECTION OF POTABLE WATER SUPPLY

### P2902.1 General.

A potable water supply system shall be designed and installed as to prevent contamination from nonpotable liquids, solids or gases being introduced into the potable water supply. Connections shall not be made to a potable water supply in a manner that could contaminate the water supply or provide a cross-connection between the supply and a source of contamination except where approved methods are installed to protect the potable water supply. Cross-connections between an individual water supply and a potable public water supply shall be prohibited.

### P2902.2 Plumbing fixtures.

The supply lines and fittings for every plumbing fixture shall be installed so as to prevent backflow. Plumbing fixture fittings shall provide backflow protection in accordance with ASME A112.18.1/CSA B125.1.

### P2902.3 Backflow protection.

A means of protection against backflow shall be provided in accordance with [Sections P2902.3.1](#) through [P2902.3.6](#). Backflow prevention applications shall conform to Table P2902.3, except as specifically stated in [Sections P2902.4](#) through [P2902.5.7](#).

**TABLE P2902.3 APPLICATION FOR BACKFLOW PREVENTERS**

DEVICE	DEGREE OF HAZARD <sup>a</sup>	APPLICATION <sup>b</sup>	APPLICABLE STANDARDS
Air gap	High or low hazard	Backsiphonage or backpressure	ASME A112.1.2
Air gap fittings for use with plumbing fixtures, appliances and appurtenances	High or low hazard	Backsiphonage or backpressure	ASME A112.1.3
Antisiphon-type fill valves for gravity water closet flush tanks	High hazard	Backsiphonage only	ASSE 1002, CSA B125.3
Backflow preventer with intermediate atmospheric vents	Low hazard	Backpressure or backsiphonage Sizes 1/4" to 3/4"	ASSE 1012, CSA B64.3
Double check backflow prevention assembly and double check fire protection backflow prevention assembly	Low hazard	Backpressure or backsiphonage Sizes 3/8" to 16"	ASSE 1015, AWWA C510, CSA B64.5, CSA B64.5.1

Double check detector fire protection backflow prevention assemblies	Low hazard	Backpressure or backsiphonage (Fire sprinkler systems) Sizes 2" â€" 16"	ASSE 1048
Dual-check-valve-type backflow preventer	Low hazard	Backpressure or backsiphonage Sizes 1/4" â€" 1"	ASSE 1024, CSA B64.6
Hose-connection backflow preventer	High or low hazard	Low head backpressure, rated working pressure backpressure or backsiphonage Sizes 1/2" â€" 1"	ASSE 1052, CSA B64.2.1.1
Hose-connection vacuum breaker	High or low hazard	Low head backpressure or backsiphonage Sizes 1/2", 3/4", 1"	ASSE 1011, CSA B64.2, CSA B64.2.1
Laboratory faucet backflow preventer	High or low hazard	Low head backpressure and backsiphonage	ASSE 1035, CSA B64.7
Pipe-applied atmospheric-type vacuum breaker	High or low hazard	Backsiphonage only Sizes 1/4" â€" 4"	ASSE 1001, CSA B64.1.1
Pressure vacuum breaker assembly	High or low hazard	Backsiphonage only Sizes 1/2" â€" 2"	ASSE 1020, CSA B64.1.2
Reduced pressure detector fire protection backflow prevention assemblies	High or low hazard	Backsiphonage or backpressure (Fire sprinkler systems)	ASSE 1047
Reduced pressure principle backflow prevention assembly and reduced pressure principle fire protection backflow prevention assembly	High or low hazard	Backpressure or backsiphonage Sizes 3/8" â€" 16"	ASSE 1013, AWWA C511, CSA B64.4, CSA B64.4.1
Spill-resistant pressure vacuum breaker	High or low hazard	Backsiphonage only Sizes 1/4" â€" 2"	ASSE 1056, CSA B64.1.3
Vacuum breaker wall hydrants, frost-resistant, automatic-draining type	High or low hazard	Low head backpressure or backsiphonage Sizes 3/4" â€" 1"	ASSE 1019, CSA B64.2.2

For SI: 1 inch = 25.4 mm.

- a. Low hazard—See Pollution ([Section R202](#)). High hazard—See Contamination ([Section R202](#)).
- b. See Backpressure ([Section R202](#)). See Backpressure, Low Head ([Section R202](#)). See Backsiphonage ([Section R202](#)).

### **P2902.3.1 Air gaps.**

Air gaps shall comply with ASME A112.1.2 and air gap fittings shall comply with ASME A112.1.3. The minimum air gap shall be measured vertically from the lowest end of a water

supply outlet to the flood level rim of the fixture or receptor into which such potable water outlets discharge. The minimum required air gap shall be twice the diameter of the effective opening of the outlet, but in no case less than the values specified in Table P2902.3.1. An air gap is required at the discharge point of a relief valve or piping. Air gap devices shall be incorporated in dishwashing and clothes washing *appliances*.

**TABLE P2902.3.1 MINIMUM AIR GAPS**

FIXTURE	MINIMUM AIR GAP	
	Away from a wall <sup>a</sup> (inches)	Close to a wall (inches)
Effective openings greater than 1 inch	Two times the diameter of the effective opening	Three times the diameter of the effective opening
Lavatories and other fixtures with effective opening not greater than 1/2 inch in diameter	1	1.5
Over-rim bath fillers and other fixtures with effective openings not greater than 1 inch in diameter	2	3
Sink, laundry trays, gooseneck back faucets and other fixtures with effective openings not greater than 3/4 inch in diameter	1.5	2.5

For SI: 1 inch = 25.4 mm.

a. Applicable where walls or obstructions are spaced from the nearest inside edge of the spout opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the diameter of the effective opening for two intersecting walls.

**P2902.3.2 Atmospheric-type vacuum breakers.**

Pipe-applied atmospheric-type vacuum breakers shall conform to ASSE 1001 or CSA B64.1.1. Pipe-applied atmospheric type vacuum breakers shall be installed not less than 6 inches (152 mm) above all downstream piping and not less than 6 inches (152 mm) above the flood-level rim of the fixture receptor or device served. Hose-connection vacuum breakers shall conform to ASSE 1011, ASSE 1019, ASSE 1035, ASSE 1052, CSA B64.2, CSA B64.2.1, CSA B64.2.1.1, CSA B64.2.2 or CSA B64.7. These devices shall operate under normal atmospheric pressure when the critical level is installed at the required height. Atmospheric vacuum breakers including, but not limited to, hose bibb vacuum breakers shall not be subjected to continuous water pressure and shutoff or control valves shall not be installed downstream of these devices.

**P2902.3.3 Backflow preventer with intermediate atmospheric vent.**

Backflow preventers with intermediate atmospheric vents shall conform to ASSE 1012 or CAN/CSA B64.3. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

**P2902.3.4 Pressure vacuum breaker assemblies.**

Pressure vacuum breaker assemblies shall conform to ASSE 1020 or CSA B64.1.2. Spill-resistant vacuum breaker assemblies shall comply with ASSE 1056. These assemblies shall be installed

not less than 12 inches (305 mm) above all downstream piping and not less than 12 inches (305 mm) above the flood-level rim of the fixture receptor or device served. Pressure vacuum breaker assemblies shall not be installed in locations where spillage could cause damage to the structure.

**P2902.3.5 Reduced pressure principle backflow prevention assemblies.**

Reduced pressure principle backflow prevention assemblies and reduced pressure principle fire protection backflow prevention assemblies shall conform to ASSE 1013, AWWA C511, CSA B64.4 or CSA B64.4.1. Reduced pressure detector fire protection backflow prevention assemblies shall conform to ASSE 1047. These devices shall be permitted to be installed where subject to continuous pressure conditions. The relief opening shall discharge by air gap and shall be prevented from being submerged.

**P2902.3.6 Double check-valve assemblies.**

Double check-valve assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double-detector check-valve assemblies shall conform to ASSE 1048. These devices shall be capable of operating under continuous pressure conditions.

**P2902.4 Protection of potable water outlets.**

Potable water openings and outlets shall be protected by an air gap, reduced pressure principle backflow preventer with atmospheric vent, atmospheric-type vacuum breaker, pressure-type vacuum breaker or hose connection backflow preventer.

**P2902.4.1 Fill valves.**

Flush tanks shall be equipped with an antisiphon fill valve conforming to ASSE 1002 or CSA B125.3. The fill valve backflow preventer shall be located not less than 1 inch (25 mm) above the full opening of the overflow pipe.

**P2902.4.2 Deck-mounted and integral vacuum breakers.**

*Approved* deck-mounted or equipment-mounted vacuum breakers and faucets with integral atmospheric vacuum breakers or spill-resistant vacuum breaker assemblies shall be installed in accordance with the manufacturer's instructions and the requirements for labeling. The critical level of the breakers and assemblies shall be located at not less than 1 inch (25 mm) above the *flood level rim*.

**P2902.4.3 Hose connection.**

Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection shall be protected against backflow by an atmospheric-type or pressure-type vacuum breaker installed in accordance with Section 608.15.4, or by a permanently attached hose connection vacuum breaker in which the highest point of usage is less than 10 feet above the hose connection vacuum breaker. Hose bib vacuum breakers shall not be subjected to continuous water pressure.

**Exceptions:**

1. This section shall not apply to water heater and boiler drain valves that are provided with hose connection threads and that are intended only for tank or vessel draining.
2. This section shall not apply to water supply valves intended for connection of clothes washing machines where backflow prevention is otherwise provided or is integral with the machine.

**P2902.5 Protection of potable water connections.**

Connections to the potable water shall conform to [Sections P2902.5.1](#) through [P2902.5.5](#).

**P2902.5.1 Connections to boilers.**

The potable supply to the boiler shall be equipped with a backflow preventer with an intermediate atmospheric vent complying with ASSE 1012 or CSA B64.3. Where conditioning chemicals are introduced into the system, the potable water connection shall be protected by an air gap or a reduced pressure principle backflow preventer complying with ASSE 1013, CSA B64.4 or AWWA C511.

**P2902.5.2 Heat exchangers.**

Heat exchangers using an essentially toxic transfer fluid shall be separated from the potable water by double-wall construction. An air gap open to the atmosphere shall be provided between the two walls. Heat exchangers utilizing an essentially nontoxic transfer fluid shall be permitted to be of single-wall construction.

**P2902.5.3 Lawn irrigation systems.**

The potable water supply to lawn irrigation systems shall be protected against backflow by an atmospheric vacuum breaker, a pressure vacuum breaker assembly or a reduced pressure principle backflow prevention assembly. Shutoff or control valves shall not be installed downstream from an atmospheric vacuum breaker. When an irrigation/lawn sprinkler system is provided with separate zones, the potable water supply shall be protected by a pressure vacuum breaker or reduced pressure principle backflow prevention assembly. Atmospheric vacuum breakers shall be installed at least 6 inches (152 mm) above the highest point of usage (i.e., 6 inches (152 mm) above all downstream piping or highest sprinkler head). Pressure type vacuum breakers shall be installed at least 12 inches (305 mm) above the highest point of usage (i.e., 12 inches (305 mm) above all downstream piping and the highest sprinkler head). Where chemicals are introduced into the system, the potable water supply shall be protected against backflow by a reduced pressure principle backflow prevention assembly.

**P2902.5.4 Connections to automatic fire sprinkler systems.**

The potable water supply to automatic fire sprinkler shall be protected against backflow by a double check backflow prevention assembly, a double check fire protection backflow prevention assembly, a reduced pressure principle backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly.

**Exception:** Where systems are installed as a portion of the water distribution system in accordance with the requirements of this code and are not provided with a fire department connection, backflow protection for the water supply system shall not be required.

**P2902.5.4.1 Additives or nonpotable source.**

Where systems contain chemical additives or antifreeze, or where systems are connected to a nonpotable secondary water supply, the potable water supply shall be protected against backflow by a reduced pressure principle backflow prevention assembly or a reduced pressure principle fire protection backflow prevention assembly. Where chemical additives or antifreeze is added to only a portion of an automatic fire sprinkler or standpipe system, the reduced pressure principle fire protection backflow preventer shall be permitted to be located so as to isolate that portion of the system.

**P2902.5.5 Solar systems.**

The potable water supply to a solar system shall be equipped with a backflow preventer with intermediate atmospheric vent complying with ASSE 1012 or a reduced pressure principle backflow preventer complying with ASSE 1013. Where chemicals are used, the potable water supply shall be protected by a reduced pressure principle backflow preventer.

**Exception:** Where all solar system piping is a part of the potable water distribution system, in accordance with the requirements of the *International Plumbing Code*, and all components of the piping system are listed for potable water use, cross-connection protection measures shall not be required.

**P2902.5.6 Connections to swimming pools.**

The potable water supply to swimming pools shall be protected against backflow by an air gap or reduced pressure principle backflow prevention assembly.

**P2902.5.7 Connections to animal watering troughs, ornamental fountains, or other similar equipment.**

The potable water supply to animal watering troughs, ornamental fountains, or other similar fixtures shall be protected against backflow by an air gap.

### **P2902.6 Location of backflow preventers.**

Access shall be provided to backflow preventers as specified by the manufacturer's installation instructions for the required testing, maintenance and repair. A minimum of 1-foot of clearance shall be provided between the lowest portion of the assembly and grade or platform. Elevated installations exceeding 5-feet above grade(g) shall be provided with a suitably located permanent platform capable of supporting the installer, tester, or repairer. Reduced pressure zone (RPZ) type backflow preventers, and other types of backflow preventers with atmospheric ports and/or test cocks (e.g., atmospheric type vacuum breakers, double check valve assemblies, pressure type vacuum breaker assemblies, etc.), shall not be installed below grade (in vaults or pits) where the potential for a relief valve, an atmospheric port, or a test cock being submerged exists.

#### **P2902.6.1 Outdoor enclosures for backflow prevention devices.**

Outdoor enclosures for backflow prevention devices shall comply with ASSE 1060.

#### **P2902.6.2 Protection of backflow preventers.**

Backflow preventers subjected to freezing temperatures shall be protected by heat, insulation or both; or as otherwise recommended by the manufacturer.

#### **P2902.6.3 Relief port piping.**

The termination of the piping from the relief port or air gap fitting of the backflow preventer shall discharge to an *approved* indirect waste receptor or to the outdoors where it will not cause damage or create a nuisance.

### **P2902.8 Inspection and testing of backflow prevention assemblies, barometric loops and air gaps.**

Inspection and testing shall comply with Sections P2902.8.1 through P2902.8.3.

#### **P2902.8.1 Inspections**

Annual inspections shall be made of all backflow prevention assemblies and air gaps to determine whether they are operable, properly installed and maintained, and meet testing/code requirements. Inspections of backflow prevention devices including air gaps used to protect high degree of hazard cross connections shall be documented in writing and the report provided to the owner of the backflow prevention device.

#### **P2902.8.2 Testing**

Reduced pressure principle, double check, pressure vacuum breaker, reduced pressure detector fire protection, double check detector fire protection, and spill-resistant vacuum breaker backflow preventer assemblies shall be tested at the time of installation, immediately after repairs or relocation and at least annually. The testing procedure shall be performed in accordance with one of the following standards: ASSE 5013, ASSE 5015, ASSE 5020, ASSE 5047, ASSE 5048, ASSE 5052, ASSE 5056, CSA B64.10.1, USC's FCCC & HR's "Manual of Cross-Connection Control", or UFL's TREEO's "Backflow Prevention Theory and Practice". Any backflow preventer which is found to be defective shall be repaired.

#### **P2902.8.3 Owner Responsibilities**

The owner of the backflow prevention assemblies shall comply with the following.

- (a). It shall be the duty of the owner of the backflow prevention assembly to see that these tests are made in a timely manner in accord with the frequency of field testing specified in P2902.8.2 of this code.
- (b). The owner shall notify the building official, and/or water supplier (for those devices associated with containment) in advance when the tests are to be undertaken so that the building official and/or water supplier may witness the tests if so desired.

(c). Upon completion, the owner shall provide records of such tests, repairs, overhauls, or replacements to the building official or water supplier (for those devices associated with containment). In addition, all records shall be kept by the owner of the backflow prevention device or method for at least 5 years and, upon specific request, shall be made available to the building official or water supplier.

(d). All tests, repairs, overhauls or replacements shall be at the expense of the owner of the backflow preventer.

#### **P2903.4 Thermal expansion control.**

A means for controlling increased pressure caused by thermal expansion shall be installed where required in accordance with [Sections P2903.4.1](#) and [P2903.4.2](#).

##### **P2903.4.1 Pressure-reducing valve.**

For water service system sizes up to and including 2 inches (51 mm), a device for controlling pressure shall be installed where, because of thermal expansion, the pressure on the downstream side of a pressure-reducing valve exceeds the pressure-reducing valve setting.

##### **P2903.4.2 Backflow prevention device or check valve.**

Where a backflow prevention device, check valve or other device is installed on a water supply system utilizing storage water heating equipment, a device for controlling pressure shall be installed at an accessible location between the checking device and the water heating equipment to limit thermal expansion of the water being heated to not more than 80 psi (552 kPa) static pressure at any fixture on the system. A potable water expansion tank or auxiliary relief valve set at 80 psi (552 kPa) shall be acceptable. The auxiliary relief valve shall be in addition to the water heater safety relief valve. This thermal expansion control device shall be designed and trimmed for repeated operation. The valve shall be a minimum 1/2-inch pipe size, shall be adjustable and calibrated, and shall include a tag describing its function.