CodeNotes™

Backflow Devices and Protection of Water Supply – 2006 and 2009 IPC® and IRC®

Introduction

Protection of the water supply used for drinking, cooking, washing and bathing is one of the most important health and safety protection requirements of the plumbing code. History has many examples of local and widespread occurrences of sickness and disease caused by not safeguarding the water supply. Cross connections are the links through which it is possible for contamination to enter a potable water supply. The contaminant enters the potable water supply when the pressure of the polluted source exceeds the pressure of the potable source. The action may be called "backsiphonage" or "backpressure." The intent of the code is to eliminate cross connections or prevent backflow where cross connections cannot be eliminated.

This CodeNotes™ provides cross-connection scenarios and backflow prevention methods and devices in an organized and user-friendly approach in accordance with the requirements of the 2006 and 2009 *International Plumbing Code*® and *International Residential Code*®. It will cover:

1. Cross connection potential and where backflow protection is required.
2. Backflow prevention devices, methods and installation limitations.
3. Other backflow prevention-related information.

Cross Connection Potential and Where Backflow Protection Is Required

The following are situations where there is potential for backflow to occur:

1. Lawn irrigation systems (backflow of lawn irrigation water into the potable water system through the sprinkler heads and other cracks or leaks in the irrigation pipes); see Figure 1.
2. Sillcocks, hose bibbs, wall hydrants and other openings with a hose connection (backflow of unsanitary water or liquid through the open end of the hose).
3. Toilet tanks (unapproved air gap fitting).
4. Sinks and lavatories (unapproved air gap).
5. Coffee machines (backflow of coffee into water supply).
6. Soft drink dispensing machines (backflow of CO_2 into copper water supply line).

The potable water supply connection to a lawn irrigation system shall be protected from contamination by installing an approved backflow prevention device. Atmospheric-type vacuum breakers (AVB), a pressure-type vacuum breaker (PVB), or a reduced pressure principle backflow preventer (RP) are acceptable devices. (See Table 608.1 of the 2006 and 2009 editions of the IPC or Table P2902.3 of the 2006 and 2009 editions of the IRC, depending on the code that is applicable in your area).

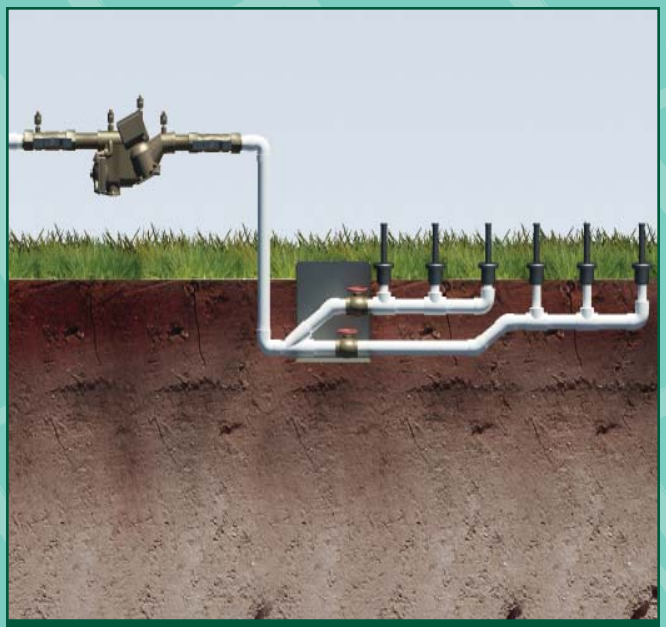

Figure 1 Lawn Irrigation

In all buildings with two or more water distribution systems, one potable and the other nonpotable, each system must be identified either by color marking or metal tags. The color must be consistent throughout the building and the size (see Sections 608.8 of the 2006 and 2009 editions of the IPC and P2901.1 of the 2006 and 2009 editions of the IRC; also see Figure 2).

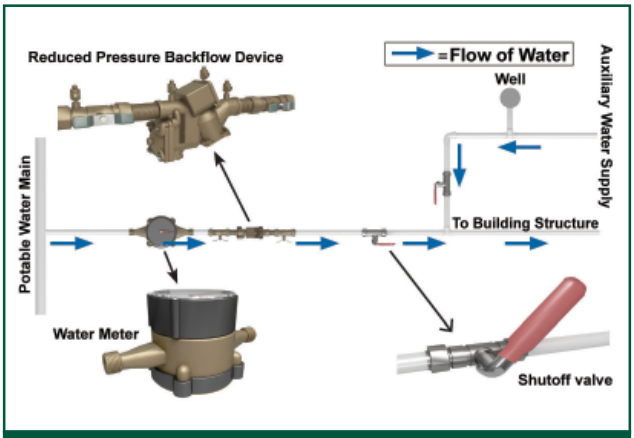

Figure 2 Cross Connections

Backflow Prevention Devices, Methods and Installation Limitations

1. **Reduced Pressure Principle Devices**
   - Provide protection against low- or high-hazard contamination.
   - Provide protection against backsiphonage and backpressure backflow.
   - The device can be used where it is under continuous pressure from the water supply.
   - The relief vent opening must discharge through an air gap.
   - The device must be accessible for testing and maintenance.
   - The device cannot be installed below grade where it may be subject to submersion.
   - Provisions must be made at or near the location of the installation to prevent drainage from the relief vent opening causing damage to the structure when the device is installed in a building or structure.

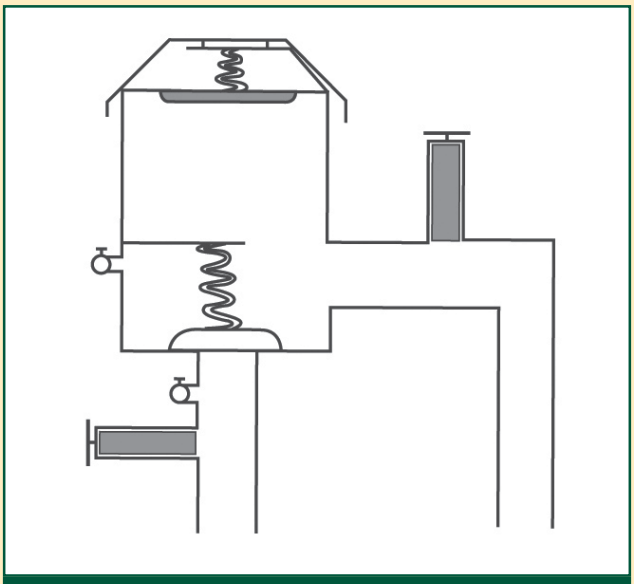

Figure 3 Pressure Vacuum Breaker

2. **Pressure-Type Vacuum Breakers** (see Figure 3 above).
   - Provide protection against low- or high-hazard contamination.
   - Provide protection against backsiphonage only.
   - Can be used where it is under continuous pressure from the water supply (valving permitted downstream).
   - This device has a critical level of installation of 6 inches (152 mm) above the flood level rim in the 2006 IPC and IRC.
   - The device must be accessible for inspection and maintenance.
   - Provisions must be made at or near the location of the installation to prevent drainage from the relief vent opening causing damage to the structure when the device is installed in a building or structure.

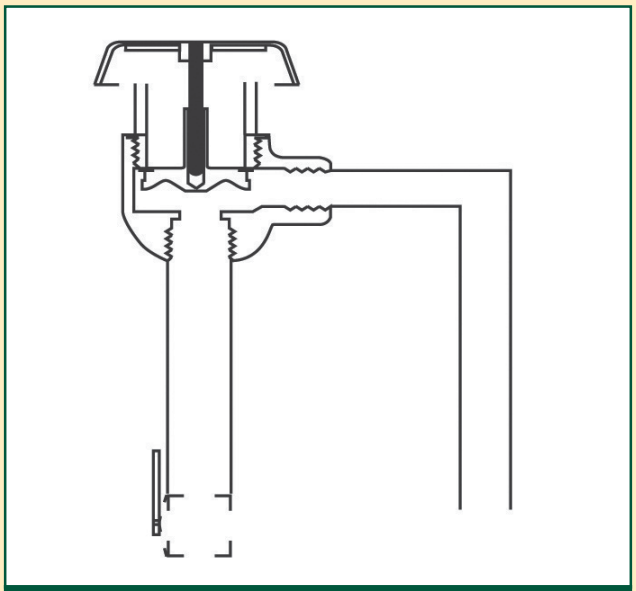

Figure 4 Atmospheric Vacuum Breaker

3. **Atmospheric-Type Vacuum Breakers** (see Figure 4 above).
   - Provide protection against low- or high-hazard contamination.
   - Provide protection against backsiphonage only.
   - The device cannot be installed where it is under continuous pressure from the water supply (12-hour or less intervals).
   - The device must be accessible for inspection and maintenance.

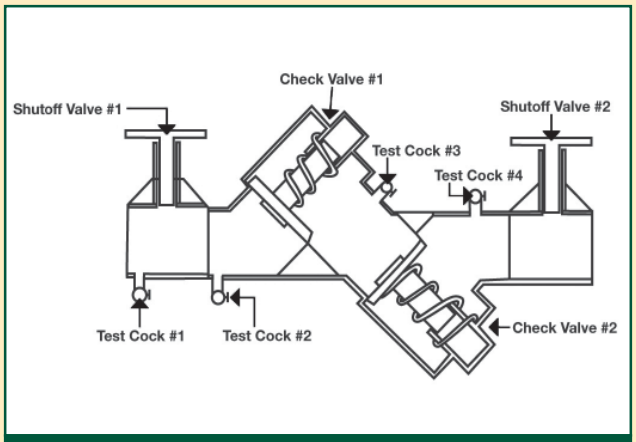

Figure 5 Double Check Valve

4. **Double Check-Valve Assemblies** (see Figure 5 above).
   - These devices are designed for low-hazard applications subject to backpressure and backsiphonage.
   - The device must be accessible for inspection and maintenance.
   - These devices must not be confused with dual check-valve devices or two single check valves placed in series.
   - Double-detector check-valve assemblies are always permitted as an option where double check-valve assemblies are required because they offer identical protection.

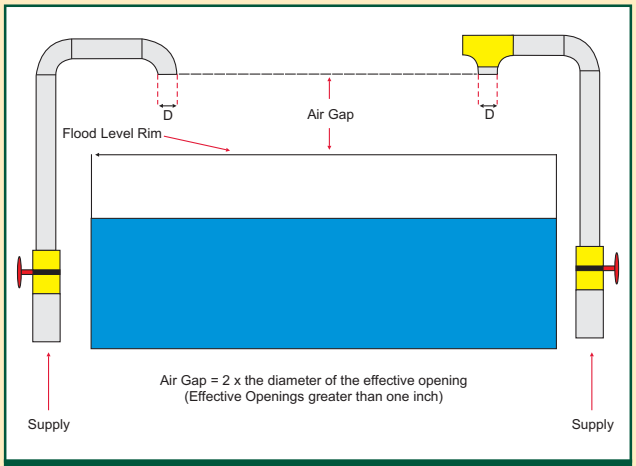

Figure 6 Air Gap Piping System

5. **Air Gap** (see Figure 6 above).
   - The most effective and dependable means of preventing backflow and should be used where feasible.
   - The minimum required air gap shall be measured 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 Table 608.15.1 of the IPC or P2902.3.1 of the IRC.
   - The distance between the outlet and a wall or similar obstruction (see Table 608.5.1 of the IPC or P2902.3.1 of the IRC).
   - Access shall be provided to backflow preventers as specified by the installation instructions of the approved manufacturer (see Sections 608.14 of the IPC and P2902.6 of the IRC).
   - Water pumps, filters, softeners, tanks and all other devices that handle or treat potable water shall be protected against contamination (see Section 608.12).
   - Proper identification of potable and nonpotable water systems (see Section 608.8).

Other Backflow Prevention—Related Information

For water closet backflow assembly, see Figure 7.

All hose bibs, wall hydrants, sill cocks and other openings with a hose threaded connection shall be protected by an atmospheric-type vacuum breaker, pressure-type vacuum breaker, or permanently attached hose connection vacuum breaker (see Section 608.15.4.2 of the IPC or P2902.4.3 of the IRC; also see Figures 8, 9 and 10).

Note: The exceptions are water heater drain valves and hose bibs for washing machines.

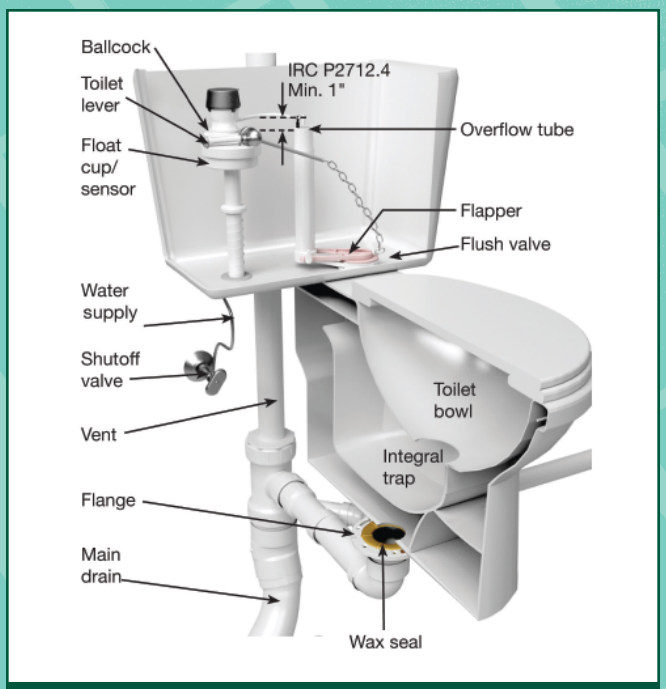

Figure 7 Water Closet

Figure 8 Hose Bibb

Figure 9 Sill Cock

Figure 10 Vacuum Breaker

Significant Changes to the 2009 IPC® & IRC®

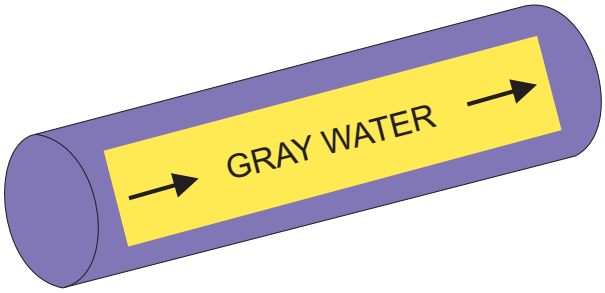

Figure 11 Gray Water Distribution System

Sections 608.8.2 of the 2009 IPC and 2902.1 of the 2009 IRC have been modified to require that the color purple be used to identify reclaimed, rain, and gray water distribution systems. (see Figure 11).

Sections 608.7 of the 2009 IPC and P2903.9.5 of the 2009 IRC allow installation of freezeproof yard hydrants that drain the riser into the ground if the potable water supply to such hydrants is protected upstream of the hydrants in accordance with Sections 608 of the 2009 IPC and P2902 of the 2009 IRC. The hydrants are to be permanently identified as nonpotable outlets by approved signage that reads as follows: "Nonpotable. Not Safe For Drinking." (see Figure 12).

Figure 12 Approved Hydrant Signage

POTABLE WATER. Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming to the bacteriological and chemical quality requirements of the Public Health Service Drinking Water Standards or the regulations of the public health authority having jurisdiction.

CONTAMINATION. An impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

Credits
Figures 1, 2, 3, 4, 5, 7, 8, 9, and 10 courtesy of DeWalt Plumbing Code Reference, copyright © 2008 Cengage Delmar Publications.

To order *DeWalt Plumbing Code Reference,* the *2006 International Plumbing Code,* the *2006 IPC Code and Commentary* or other plumbing code support publications, contact the International Code Council.

Website: http://www.iccsafe.org/store

Telephone: 1-800-786-4452 (Product Orders)

ISBN 978-1-58001-923-1
9 781580 019231
Item No. 4530S1

ICC INTERNATIONAL CODE COUNCIL®

American Backflow Prevention Association

AMERICAN BACKFLOW PREVENTION ASSOCIATION
tel: 979.846.7606
www.abpa.org