PLUMBING & CROSS-CONNECTION CONTROL

MODULE 2

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IV. Evaluating Cross-Connections:
High & Low Hazard, Continuous & Noncontinuous Pressure

V. Physical Backflow Prevention Methods: Air Gap & Barometric Loop

IV. EVALUATING CROSS-CONNECTIONS

There are several different types of assemblies (units that can be tested after installation) and devices (can not be tested after installation) available for controlling cross-connections and preventing backflow. The type of assembly or device needed depends upon the type of cross-connection, the intended purpose of the plumbing configuration, and what could backflow into the water supply under various scenarios.

EVALUATING EXISTING OR POTENTIAL CROSS-CONNECTIONS:

1. Evaluate the plumbing supply, equipment attached to it, and any waste lines attached or near by. Think about WHAT COULD GO WRONG with this design and WHAT CAN BE DONE TO MAKE IT SAFER.

2. Determine the DEGREE OF HAZARD INVOLVED, either a HIGH or LOW hazard will exist with a cross-connection. The degree of hazard depends on whether the nonpotable source is deleterious or not.

   HIGH HAZARD situations exist when there is an actual or potential connection for any toxic or infectious substance (also referred to as a CONTAMINANT), to be introduced into the water supply, and may create a danger to the health and well-being of anyone using the water. Examples of contaminants are pesticides, chemicals, and infectious microorganisms.

   LOW HAZARD situations exist when there is an actual or potential connection for a nontoxic substance (also referred to as a POLLUTANT) to be introduced to the water supply and create a nuisance, or be aesthetically objectionable to the water user. Examples of pollutants are turbidity, beverages, and food coloring.

3. Evaluate the use of the backflow prevention device relative to the TIME that supply pressure is present on both the “up stream” and “down stream” side of the device.

   CONTINUOUS PRESSURE conditions exist when the water pressure remains on both sides of the device for more than 12 hours. Continuous water pressure can exist under DYNAMIC conditions (the water is “on” and flowing in the intended direction through the device) or STATIC conditions (the water is “on” but a shut off device down stream in the “off” or closed position results in no flow through the device).

   NON-CONTINUOUS PRESSURE conditions exist when the device is only subject to intermittent water pressure on both sides of the device that does not exceed 12 hours.

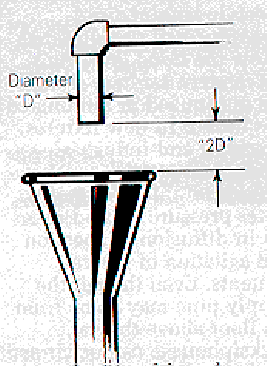
   Note: Continuous and non-continuous pressure conditions are important factors in determining the installation and use of backflow prevention devices.

V. PHYSICAL BACKFLOW PREVENTION METHODS

AIR GAP or PHYSICAL AIR GAP (an "air break" is in reference to waste lines only)

An air gap is the **MOST DESIRABLE METHOD OF BACKFLOW PREVENTION**. It is simple, economical, non-mechanical (no moving parts), fail safe, and can be used for potential back- siphonage or backpressure situations. An air gap is an unobstructed, vertical air space that separates a potable system from a nonpotable system. This air gap is necessary to prevent any contaminant or pollutant from being siphoned or pushed back into the potable water supply. Although this is an extremely effective backflow preventer, the interruption in the piping creates a subsequent pressure drop on the "down stream" portion. Consequently, most air gaps are used at the end of the supply line or faucet such as at a sink, vat or storage tank.

FIGURE 12
Air Gap



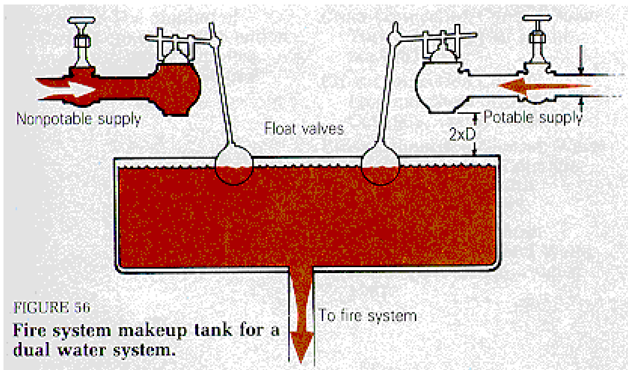


FIGURE 56
Fire system makeup tank for a dual water system.

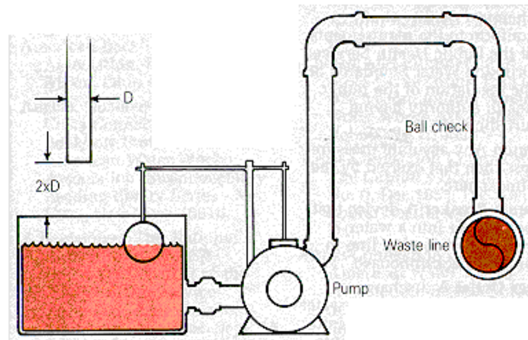


FIGURE 54
Airgap to sewer subject to backpressure - force main.

AIR GAP INSTALLATION & USE:

1. The air gap must be the greater of the two - **A MINIMUM OF ONE INCH OR TWICE THE INSIDE DIAMETER OF THE SUPPLY PIPE.** This distance is measured from the supply pipe to the flood level rim (the point of over flow) of the receptacle or fixture.

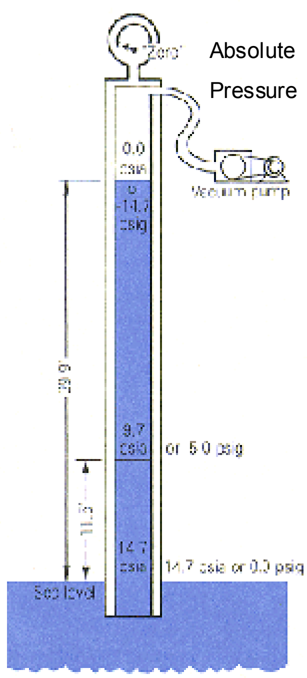
2. Air gaps require inspection for any compromised "2xD or 1 inch" requirements and any splashing problems, but no testing is necessary.

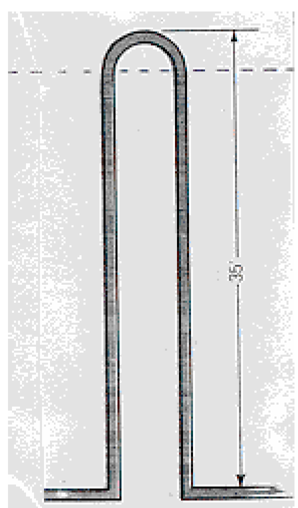
3. An air gap can be installed in a continuous piping system to protect the source from any potential contaminant on the down stream side of the system. Providing an air gap within the supply system (versus at the end of the supply line) would require a reservoir and possibly a booster pump. An open reservoir can subject the water to air borne pollutants and the loss of free chlorine in a treated supply. If a reservoir is utilized, then there needs to be a means to periodically drain and clean the tank.

BAROMETRIC LOOP

The barometric loop is an extension of the supply line that can be construed as a giant upside down "U". This configuration is designed based on the fluid dynamics of water and is utilized to protect all down stream inlets against "back-siphonage" **only**. An absolute vacuum on a pipe can only "pull" the water up 33.9 feet; to go any higher, a pump would be necessary to push the water up the column. The barometric loop must be at least 35 feet tall and the base must be at a higher elevation than any of the inlets or fixtures that are on the down stream side of the loop. The size of the 35 foot high loop limits its practicality for application (processing plant) for protecting against negative pressure.

Figure 4.
Effect of evacuating air from a column.





Barometric Loop

Usage Point

Supply

Flow

BAROMETRIC INSTALLATION & USE:
1.The loop must be at least 35 feet upright and all plumping inlets or fixtures must be no higher than the loop's base.

Approved for **CONTINUOUS PRESSURE & NO POTENTIAL BACKPRESSURE.**