

CROSS-CONNECTION CONTROL BACKFLOW PREVENTION

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State and Federal Regulations

- ❖ Colorado Department of Public Health and Environment (CDPHE)
 - ❖ *Regulation 11 and Policy 7*
- ❖ Safe Drinking Water Act (SDWA) Enacted in 1974
- ❖ Clean Water Act (CWA)



Cross-Connection Control Program Goal

The purpose of a cross-connection control program is to reduce the potential contamination of the public water system by identifying actual and potential cross-connections and taking action to protect the system from these hazards.



Elements of a Cross-Connection Control Program

- Authority
 - Backflow Preventers
- Certified Testers and Specialists
- Defensible and Detailed Records
 - Education and Training



Elements of a Cross-Connection Control Program

Authority and Backflow Preventers

- Implement new policies and procedures/update existing policies and procedures
 - Conduct site surveys (Right of Entry)
- Require the installation of an appropriate and approved backflow prevention assembly based on the degree of hazard
- Enforcement through fines/charges and/or disconnection of water service including water used for fire suppression.



Elements of a Cross-Connection Control Program

Certified Testers and Specialists

Once backflow prevention assemblies are properly installed, they must be field-tested annually and properly maintained. Testers are required to go through training every 3 years.

This includes a written test and a practical exam to ensure the tester maintains their proficiency. Specialists must pass a written only certification every three years.

Has the responsibility of requiring site surveys to determine if backflow protection is needed at the location.



Elements of a Cross-Connection Control Program

Defensible and Detailed Records

Another important element of a cross-connection control program is record keeping. Records must be retained for a specific period of time.

The records must be “defensible.” This means the records should be sufficient to show that the administrative authority is meeting all the requirements necessary to carry out their cross-connection control program.

Annual reporting to CDPHE



Elements of a Cross-Connection Control Program

Education and Training

The cross-connection control staff must be educated in the specifics of cross-connection control, including concepts of backflow and how to control a cross connection. Staff must also be trained in backflow testing.

The cross-connection control staff is also responsible for educating and training our water users and backflow testing companies.





Backflow and Cross-Connection Definitions, Protection and Degree of Hazard

- **Backflow** – The phenomenon of “backflow” is the undesirable reversal of flow of water or other substances into the potable water distribution system.

Two causes of Backflow

- **Backpressure** – Pressure in downstream piping that is greater than supply pressure (pumps, elevation of piping, steam pressure, etc)
- **Backsiphonage** – A form of backflow due to a reduction of system pressure, which causes a sub-atmospheric pressure to exist in the water system.



Backflow and Cross-Connection Definitions, Protection and Degree of Hazard

*****Two causes of Backflow*****



Backflow and Cross-Connection Definitions, Protection and Degree of Hazard

- **Cross-Connection** – Any actual or potential connection between a potable water supply and a non-potable substance or source.
 - A **direct cross-connection** is a cross-connection which is subject to both backsiphonage and backpressure. (*Typically, a hard piped connection*)
 - An **indirect cross-connection** is a cross connection which is subject to backsiphonage only. (*Garden hose left in your swimming pool*)



Backflow and Cross-Connection Definitions, Protection and Degree of Hazard

- **Degree of Hazard** – Either a pollutant (non-health hazard) or contaminant (health hazard); derived from the assessment of the materials, which may come in contact with the distribution system through a cross-connection.

Non-health hazard (pollutant)

Low hazard

- **Non-Toxic**
 - Looks bad
 - Taste bad
 - Smell bad
 - Little risk to health

Health hazard (contaminant)

High hazard

- **Toxic**
 - Poses a risk to health
 - Could result in death



Backflow and Cross-Connection Definitions, Protection and Degree of Hazard

- **Backflow Prevention Assembly** – Any effective assembly used to prevent backflow into a potable water system. The type of assembly used shall be based on the existing or potential degree of hazard and backflow condition.
- **Air Gap “Method”** – The physical separation between the potable water supply and the receiving vessel. *“Best form of backflow prevention”*



Means of Preventing Backflow

- **Reduced Pressure Principle Backflow Assembly (RP/RPZ)**
 - Protects against Backpressure and Backsiphonage conditions.
 - *“Best mechanical form of Backflow Prevention”*
 - *It features two independent check valves and a differential pressure relief valve.*
 - *It is designed to protect against a non-health hazard or a health hazard*



Means of Preventing Backflow

- **Double Check Valve Backflow Assembly (DC)**
 - Protects against Backpressure and Backsiphonage conditions.
 - It features two independent check valves.
 - This assembly shall only be used to protect against a non-health hazard.



Means of Preventing Backflow

- **Pressure Vacuum Breaker Backflow Assembly (PVB)**
 - Protects against a backsiphonage condition **only**.
 - It features an independent internally loaded check valve and an independently operating loaded air inlet valve.
 - This assembly is designed to protect against a health hazard and non-health hazard.



Means of Preventing Backflow

- **Spill-Resistant Pressure Vacuum Breaker Assembly (SVB)**
&
- **Atmospheric Vacuum Breaker Assembly (AVB)**
 - Protects against a backsiphonage condition **only**.
 - This assembly is designed to protect against a health hazard and non-health hazard.



Service Protection and Service Connections

Three main types of Service Connections

- **Irrigation** backflow protection is on a lawn irrigation system. It could be tee'd from a domestic service line or on a dedicated irrigation service.
- **Domestic** backflow protection is on the service line before any taps or tees occur.
- **Fire Sprinkler (Fireline)** backflow protection are also located at the water entry. Fireline's are not metered and are typically separate from the domestic service.

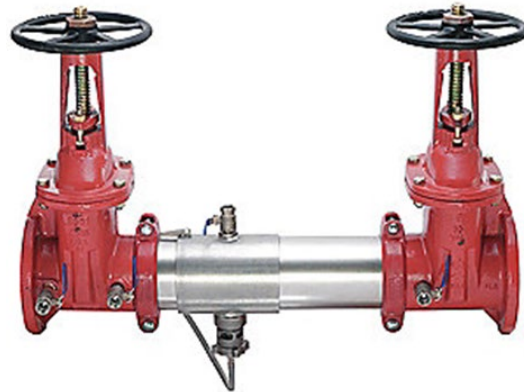


Service Protection and Service Connections

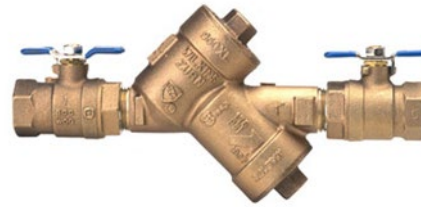
- **Containment** / Service Protection – The appropriate type of backflow protection at the service connection.
- **Isolation** / Internal Protection – The appropriate type of backflow protection within the customers potable water system.



Reduced Pressure Backflow Prevention Assembly (RP, RPZ)



Double Check Valve Backflow Assembly (DC)



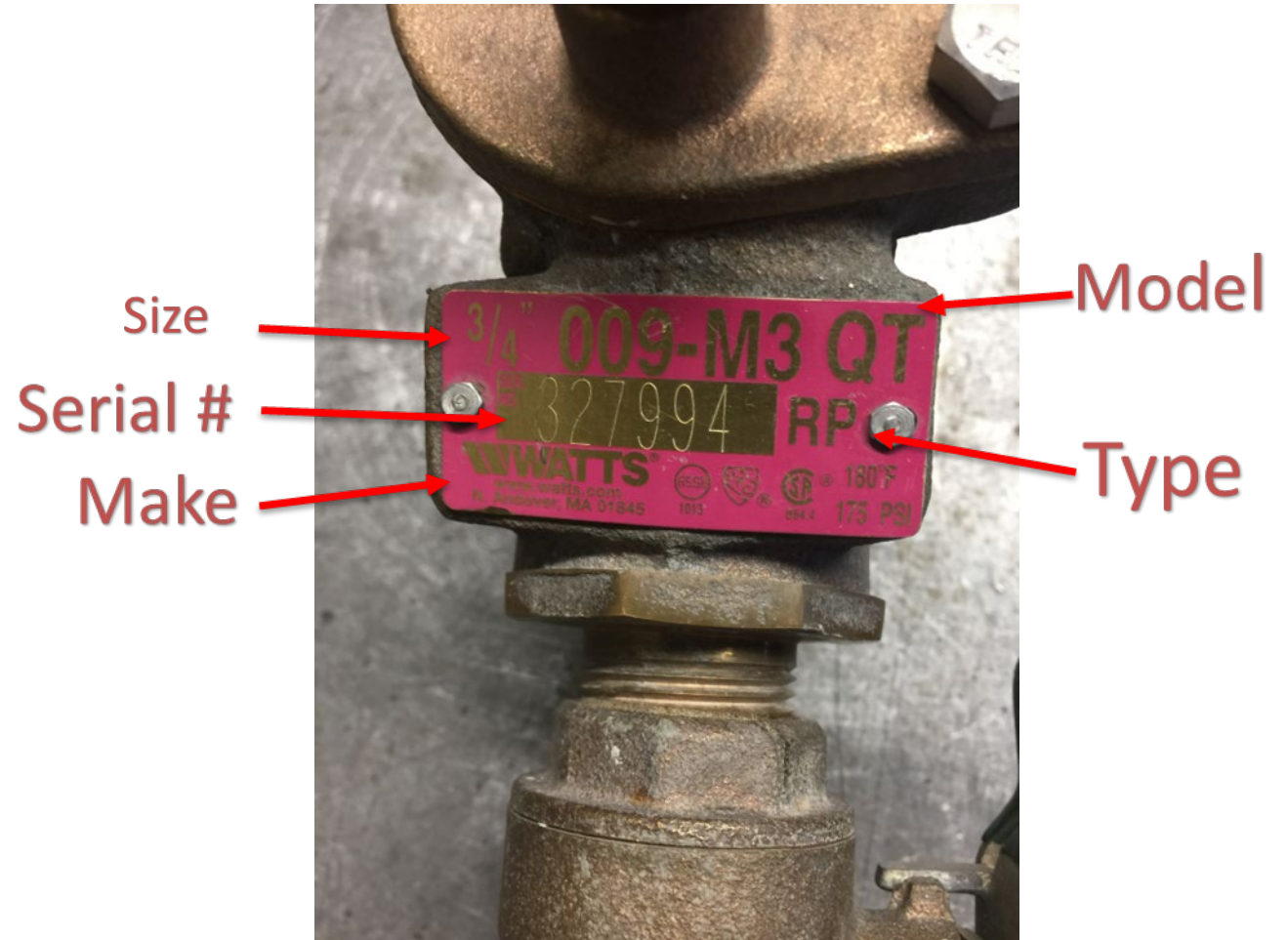
Pressure Vacuum Breaker Backflow Assembly (PVB)



Backflow Assembly Information

Most information about the backflow assembly can be found on an information plate. Generally located on the top or side of the backflow assembly.

Sometimes they might not have a plate, but information will be stamped/etched on the side of the assembly itself.



Backflow Assembly Information



Installations Can Vary!



Installations Can Vary!



Installations Can Vary!



Domestic Examples



AURORA
WATER

Fireline Examples



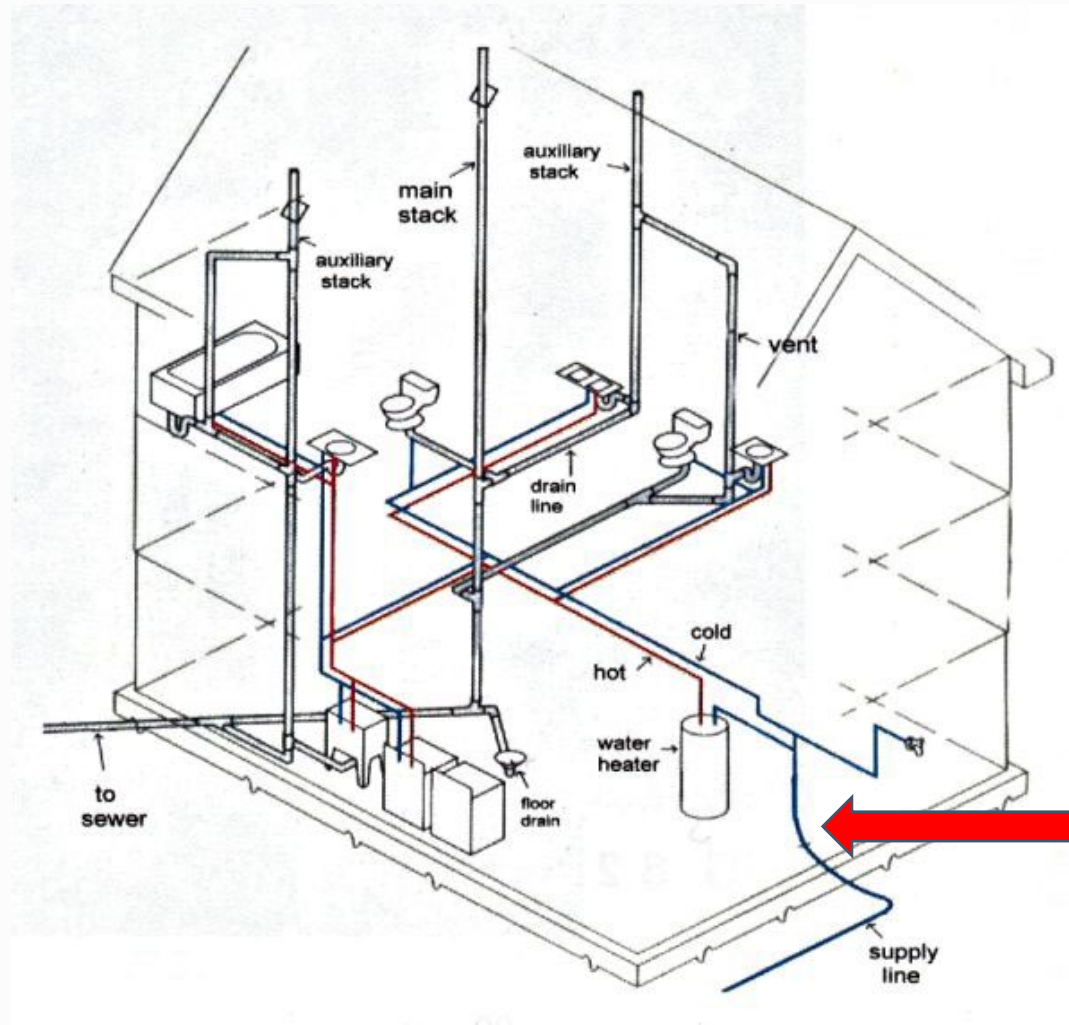
Fireline Examples



Irrigation Examples



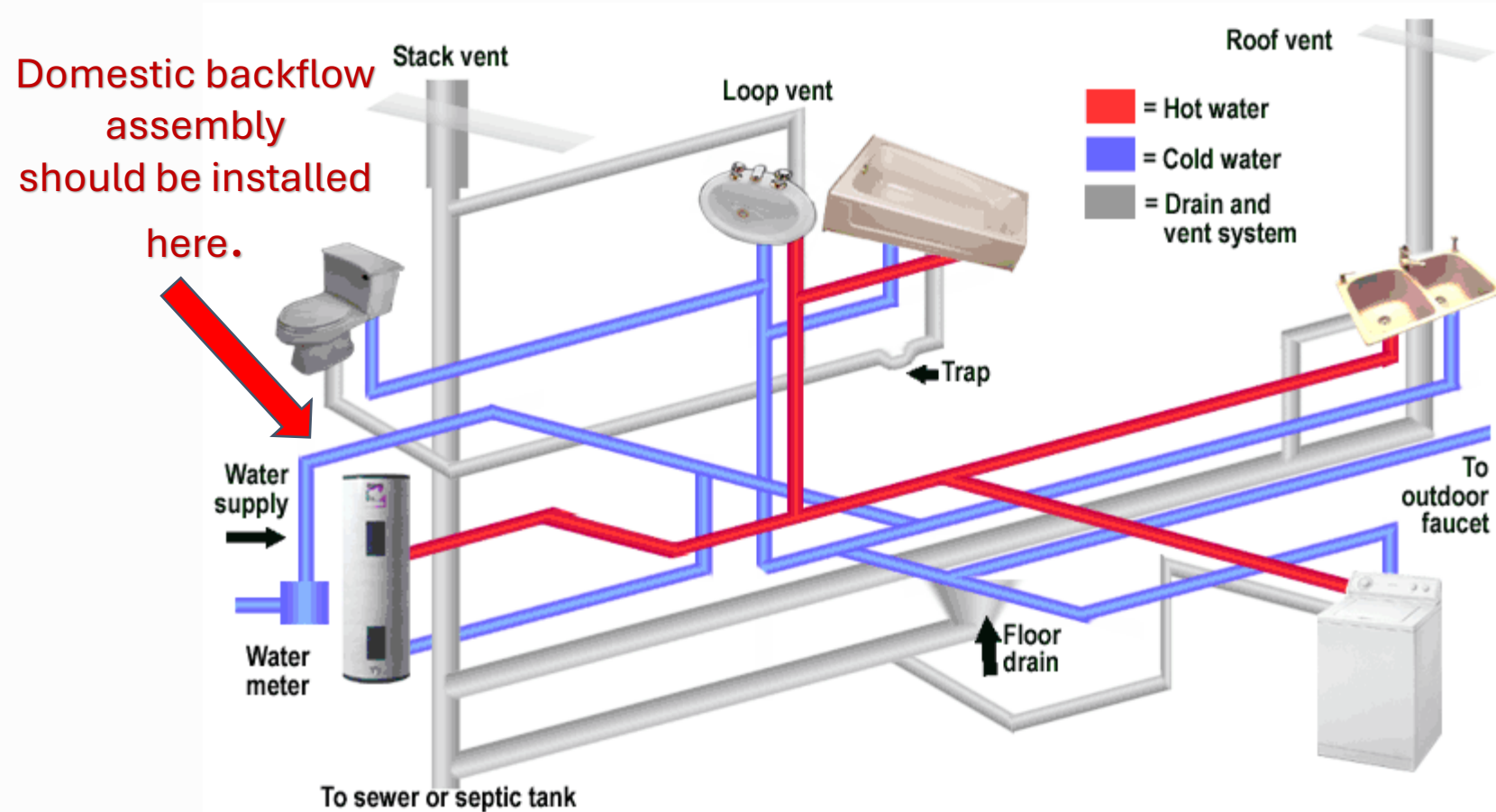
DOMESTIC EXAMPLES



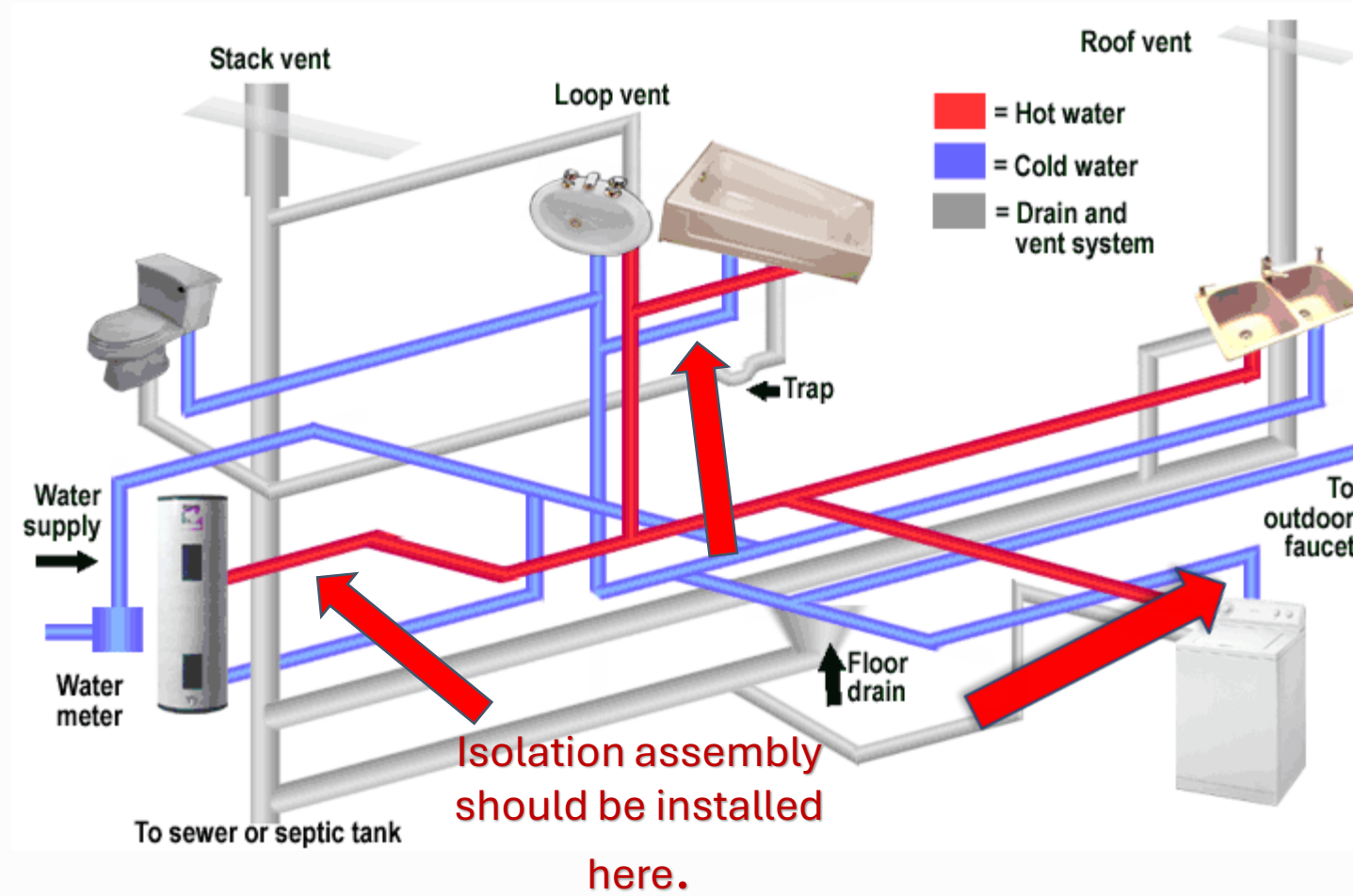
Domestic backflow
assembly
should be installed
here.



DOMESTIC EXAMPLES



ISOLATION EXAMPLES



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Backflow Prevention Assembly Testing

Backflows should be tested annually. The state of Colorado allows the following two certifications.

ABPA

American Backflow Prevention Association.

ASSE

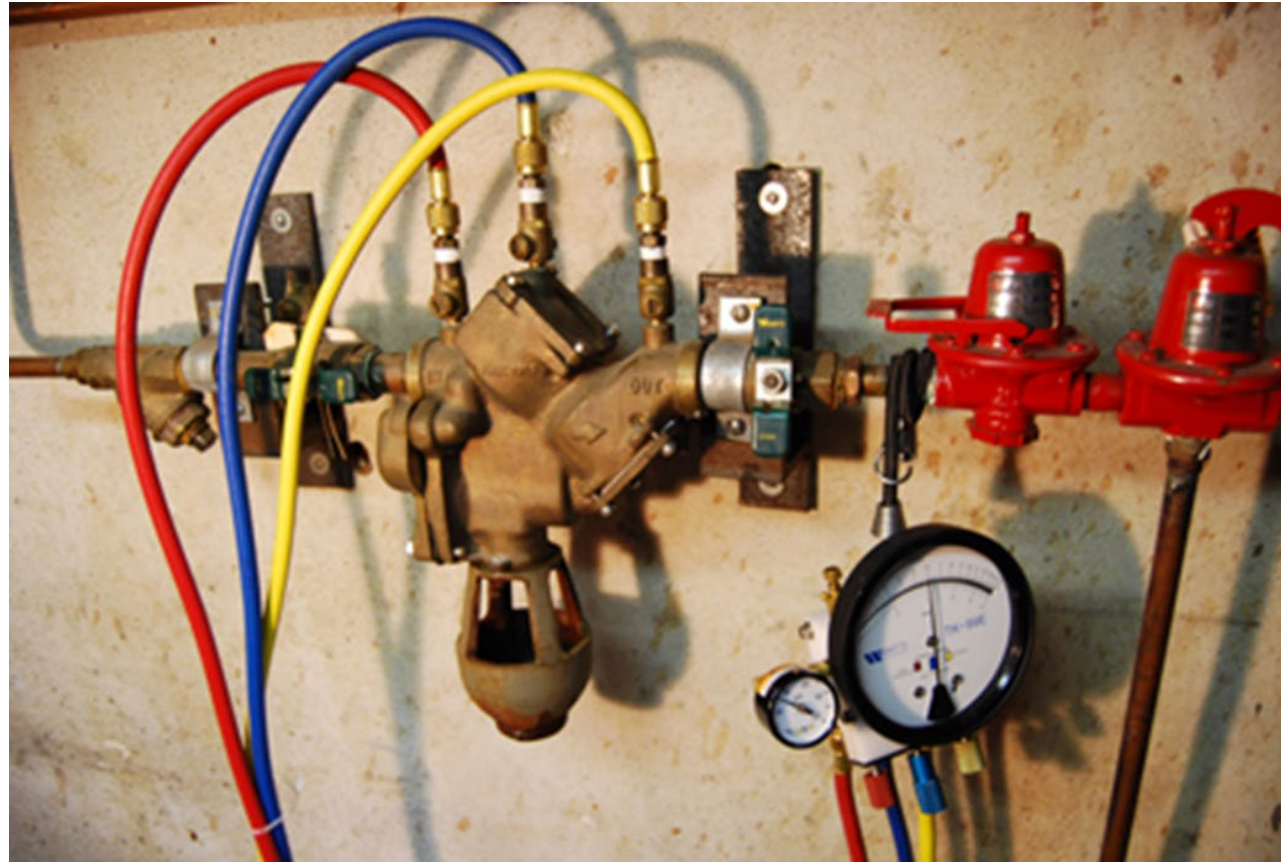
American Society of Sanitary Engineers.



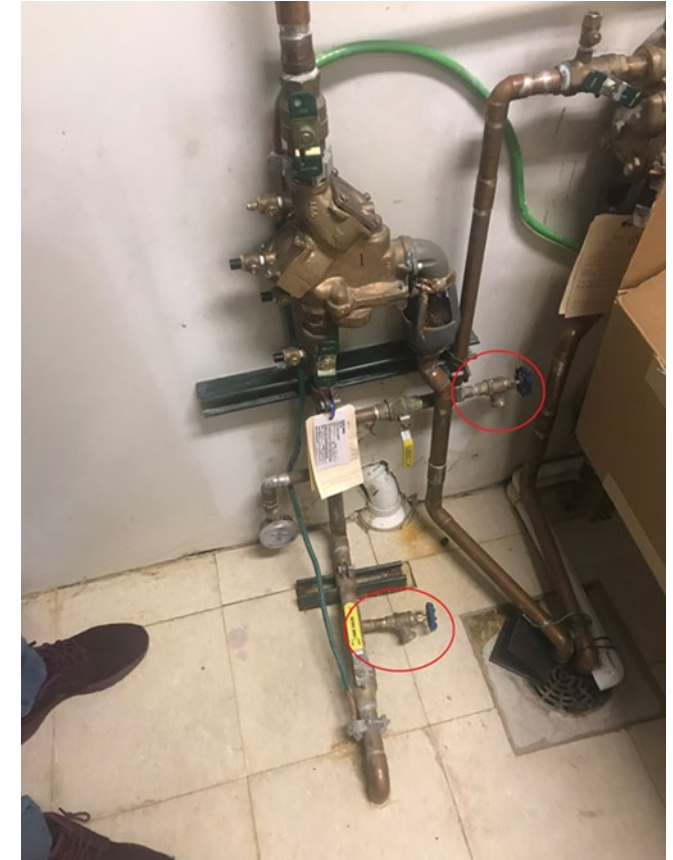
Backflow Prevention Assembly Testing



Backflow Prevention Assembly Testing



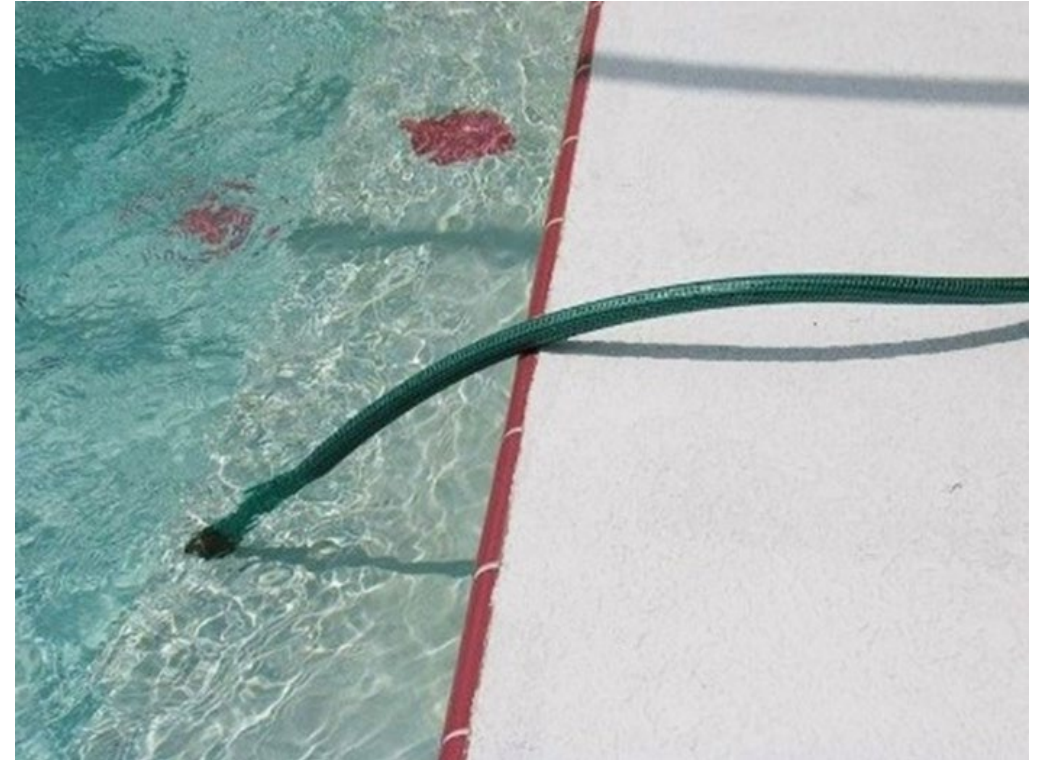
Cross-Connection Problems / Examples



Cross-Connection Problems / Examples



Cross-Connection Problems / Examples



Cross-Connection Problems / Examples



QUESTIONS ?

Q. What is the best method of Backflow Protection?

A. Air Gap

Q. Name 2 types of Backflow Prevention Assemblies?

A. Reduced pressure zone (RP/RPZ), double check (DC), pressure vacuum breaker (PVB).

Q. What is one condition that contributes to backflow?

A. Backpressure or Back siphonage

Q. Which backflow prevention assembly is needed for the highest degree of hazard?

A. Reduced pressure zone (RP/RPZ).



Fun Facts

Aurora Water currently tracks approximately 12,500 backflow prevention assemblies across Aurora.

5,500 – Domestic / 2,750 – Fire / 4,250 – Irrigation



THANK YOU!

Aurora Water Cross Connection Control

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