



DIRECTIVES: JOB CORPS PROGRAM INSTRUCTION NOTICE NO. 20-15

TO: ALL JOB CORPS REGIONAL STAFF
 ALL USDA FOREST SERVICE CENTER DIRECTORS
 ALL JOB CORPS CENTER DIRECTORS
 ALL JOB CORPS CENTER OPERATORS

FROM: DEBRA A. CARR
 Acting National Director **Debra Carr**
 Office of Job Corps

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Date: 2021.04.09 12:41:50 -04'00'

SUBJECT: Backflow Preventers

1. Purpose. To provide guidance and information to Job Corps Centers on backflow preventers to minimize risk of contamination to center populations from non-potable water sources.
2. Background. In order to understand the importance of protecting the potable water supply, it is necessary to identify potential threats, make a determination of appropriate backflow prevention methods, and have an understanding of how backflow can occur. Backflow depends on atmospheric pressure, water pressures and variations in the water supply at any moment.

The attachment outlines current backflow prevention requirements for potable water supply systems and fire protection systems. All information and figures illustrated in the attachment are extracted from the 2018 International Plumbing Code Commentary.

3. Action. All centers must immediately inspect their water supply systems and/or fire protection systems to determine what type of backflow preventers are installed. Centers must submit a technical support request through the appropriate regional office if they determine that one of the below conditions exists.
 - The water supply systems do not have backflow preventers; or
 - The backflow preventers do not comply with the attachment to this PIN.

Centers must ensure that backflow preventers are maintained, tested and inspected by qualified individuals. All of this must be done consistent with the manufacturer’s instructions and state and/or local jurisdiction requirements.

4. Effective Date. Upon issuance and until superseded.

5. Inquiries. Questions about this Instruction Notice should be addressed to Jose Velazquez, at (202) 693-3099 or velazquez.jose.a@dol.gov.

ATTACHMENT
BACKFLOW PREVENTION GUIDANCE FOR
JOB CORPS CENTERS

This guidance outlines current backflow prevention requirements for potable water supply systems and fire protection systems. All information and figures illustrated below are extracts from the 2018 International Plumbing Code Commentary. The following cases describe the appropriate type of backflow prevention for potable water supply connections and fire protection systems.

Backflow Prevention of Potable Water Supply

Case 1: Connections to boilers - Because boilers are pressurized vessels, the potential for backflow caused by backpressure is high. Backflow can occur when the potable water supply pressure drops below boiler pressure.

- When a boiler system contains only untreated, unconditioned water supplied from a potable source, backflow preventer with an intermediate atmospheric vent is required.
- When chemicals are added to a boiler system, a reduced pressure principle backflow preventer is required.

For Job Corps, lack of a functional backflow preventer on the boiler's connection to the potable water supply is a code-related, life safety deficiency.

Case 2: Connections to cooling towers - Slime, algae, or harmful organisms such as Legionella may grow in the warm, moist and oxygen-rich conditions of a cooling tower. Typically, biocides are added to the cooling water to reduce biological contamination. The potable water supply line may siphon contaminated water from the cooling tower.

One of the most common places for adding make-up water to a cooling tower is into the reservoir (basin). The water level in the basin is normally controlled by a mechanical float ball or an electric water level probe connected to a solenoid valve.

- An air gap, reduced pressure device (RP) or a pressure vacuum breaker (PVB or SVB) can prevent backflow into the make-up water line. If an air gap is used, it must be above the overflow rim of the reservoir by at least twice the diameter of the supply line. If a backflow preventer is installed, the end of the water line may be submerged into the reservoir.
- The air gap, reduced pressure device, or pressure vacuum breaker as protection on a cooling tower must be readily visible and accessible.

For Job Corps, lack of a functional backflow preventer on cooling tower make-up water connection to potable water supply is a code-related, life safety deficiency.

Case 3: Connections to lawn irrigation systems - Irrigation systems are non-potable water systems which may be supplied by a potable water system. The backflow

preventer marks the separation of an irrigation system from the potable water. Irrigation systems can be exposed to contamination as their outlets may be below grade level and irrigation piping is prone to breakage.

- The piping in irrigation systems is not regulated by the code. For this reason, the minimum form of backflow prevention is an atmospheric vacuum breaker.
- Many irrigation systems use zone valve controls that could render an atmospheric vacuum breaker inoperative. Atmospheric vacuum breakers are not permitted for use with zone valve controls.
- Pressure vacuum breaker backflow prevention assemblies are designed to operate under pressure at the device outlet and are permitted for all irrigation systems except those having chemical injection or pumps or air tanks.
- Where fertilizers, herbicides, pesticides or any other chemicals can be introduced into an irrigation system, a reduced pressure principle backflow prevention assembly is required.
- For situations where pumps and auxiliary air tanks are installed to improve pressure, a reduced pressure principle backflow prevention assembly is required.

For Job Corps, lack of a functional backflow preventer on irrigation system connections to the potable water service is a code-related deficiency with no impact on center operations. However, if any chemical is introduced to the lawn irrigation system, the lack of a functional backflow preventer is a code-related life safety deficiency.

Case 4: Chemical dispensers - Chemical dispensers are typically cleaning-related devices that have multiple chambers for holding sanitizing solvents. Often found in janitorial closets, these dispensers are for custodial staff use. These dispensers are stationary self-contained units that are connected directly to the potable water supply to mix chemicals with water to produce a cleaning agent. A connection between the potable water supply and a chemical dispenser is susceptible to backflow. The chemical dispensers may backpressure into the potable water system.

Because of the possibility for contamination, chemical dispensers must be protected using an air gap, a reduced principle backflow preventer, a backflow preventer with intermediate vents, a pressure-type vacuum breaker or an atmospheric-type vacuum breaker. For Job Corps, lack of a functional backflow preventer at the chemical dispensers' connections to the potable water service is a code-related life safety deficiency.

Case 5: Dental Pumping Equipment - Dental equipment that is connected to the potable water supply and operates through the use of a pump may backpressure into the potable water system. Backflow prevention must be prevented by using an air gap, a pressure-type vacuum breaker or an atmospheric-type vacuum breaker. These dental devices include water-flushed cuspidors, water/air syringes, water-powered aspirators/suction systems, water-flushed ultrasonic cleaning apparatus and water-cooled hand pieces. This equipment could introduce pathogens or become reservoirs of waterborne disease because of contact with the microorganisms in a patient's mouth. For Job Corps, lack of a functional backflow preventer on the dental pumping equipment connections to the potable water service is a code-related, life safety deficiency.

Case 6: Humidifiers - A humidifier can contain contaminated water that would be undesirable to have flow into the potable water system. Some humidifiers have internal backflow protection. No further backflow protection is needed.

It is sometimes difficult to determine if internal backflow protection exists. In such cases, humidifiers must have a backflow preventer conforming to ASSE 1012 or by an air gap to protect against backflow. An ASSE 1012 device has an intermediate atmospheric vent where a discharge of water could occur and arrangements for disposing of this vented water are necessary. For Job Corps, lack of a functional backflow preventer on a humidifier's connections to the potable water service is a code-related, life safety deficiency.

Case 7: Coffee machines and noncarbonated drink dispensers - The potable water supply to a coffee machine or a noncarbonated beverage dispenser must have a backflow preventer with an ASSE 1022 device, an ASSE 1024 device, or by an air gap. Each coffee machine and non-carbonated beverage water connection is required to have a backflow preventer. For example, where there are two noncarbonated beverage dispensers at a location served by one potable water supply connection, each dispenser must have its own backflow preventer to prevent a possible cross contamination issue between machines.

For Job Corps, the lack of a functional backflow preventer on the coffee machines and non-carbonated drink dispensers connections to the potable water service is a code-related deficiency with no impact on Center operations.

Case 8: Carbonated (CO₂) beverage dispensers - A backflow preventer with an intermediate atmospheric vent conforming to ASSE 1022 or an air gap must connect the potable water supply to a carbonated beverage dispenser.

A dual check valve alone may not show any visible indication of failure. The backflow preventer for beverage dispensing equipment includes two check valves and an atmospheric vent. A failure of the downstream check valve will cause the vent to discharge, giving a visual indication of the check valve's failure.

Carbon dioxide (CO₂) gas may backflow into copper water supply lines, which causes leaching of copper into the potable water supply. Piping downstream of the backflow preventer with intermediate atmospheric vent must not be copper.

Each carbonated beverage water connection is required to be provided with a backflow preventer; for example, where there are two carbonated beverage dispensers at a location served by one potable water supply connection, each dispenser must be provided with its own backflow preventer to prevent a possible cross contamination issue between machines.

For Job Corps, lack of a functional backflow preventer on carbonated drink dispensers' connections to the potable water service is a code-related deficiency with no impact on Center operations.

Case 9: Hose connections - An atmospheric-type or pressure-type vacuum breaker or a permanently attached hose connection vacuum breaker with the exception of water heater and boiler drain valves and water supply valves intended for connection of clothes washing machines shall be connected to sill cocks, hose bibs, wall hydrants and other openings with a hose connection.

For Job Corps, lack of a functional backflow preventer on the hose connections to the potable water service should be considered as a code-related deficiency with no impact on Center operations.

Backflow Prevention Assemblies Required for Fire Protection Systems

An automatic fire sprinkler system that is connected to a building's potable water supply system must have a backflow preventer.

Wet Systems

A "wet" fire sprinkler system may contain stagnant water. To what degree of hazard the stagnant water creates a possible health issue for users of potable water is an ongoing debate; this is part of the reason the code provides backflow preventer options that offer protection against different degrees of hazard (i.e., low hazard versus high hazard).

Dry Systems

In a "dry" fire protection system, there is no stagnant water and the system stays dry until activation of the system during a fire incident. The only risk hazard associated with the cross contamination of the potable water is when a fire apparatus/pumper truck connects to the system via the fire department connections (FDC). With a higher pressure than the City/domestic water system; this condition may result in back flowing of the pumper truck water into the potable water system.

The following seven cases illustrate how to determine which type of a backflow preventer must be installed assuming the automatic fire sprinkler system has fire department connections:

- **Case 1:** The suction piping system for pumping from a secondary source of potable water has underground piping that is in close proximity to a sanitary sewer, septic tank, seepage pit, privy, cesspool or a piping system carrying high-hazard materials. Table 608.18.1 and Section 603.2 of International Plumbing Code can be used to establish acceptable vertical and horizontal separations from sources of contamination.
 - Where the underground piping is within any of the required separation distances, a reduced pressure principle fire protection backflow prevention assembly is required at the connection of the sprinkler system to the potable water supply.
- **Case 2:** Water entering through the fire department connection to the sprinkler system cannot be guaranteed to be potable. Tanks of fire trucks often contain corrosion inhibitors, antifreeze, extinguishing agents or other chemicals. Pumper trucks sometimes draw from lakes, ponds, rivers, reservoirs, non-potable water wells, mill water systems or other industrial water sources (AWWA Manual 14 indicates 1,700 feet as the maximum distance for an auxiliary water source to be considered a potential water supply for pumper trucks).

- Where any of these conditions are anticipated, a reduced pressure principle fire protection backflow prevention assembly is required at the connection of the sprinkler system to the potable water supply.
- **Case 3:** The sprinkler system is directly connected to a non-potable secondary water supply such as a pond or a reservoir.
 - A reduced pressure principle fire protection backflow prevention assembly is required at the connection of the sprinkler system to the potable water supply.
- **Case 4:** The sprinkler system contains chemical additives, antifreeze or liquid foam fire-extinguishing concentrates.
 - A reduced pressure principle fire protection backflow prevention assembly is required at the connection of the sprinkler system to the potable water supply.
- **Case 5:** A wet sprinkler system where none of the conditions in Case 1 or 2 exist.
 - A double check valve assembly could be considered for the backflow preventer. The local code official may disallow this assembly based on the degree of hazard that the stagnant water in the sprinkler system presents to the potable water system.
- **Case 6:** A dry, preaction or deluge sprinkler system of any type of pipe material, where none of the conditions of Case 1 or 2 exist.
 - No backflow preventer is required at the connection of the sprinkler system to the potable water supply.
- **Case 7:** The sprinkler system is a multipurpose-type system where all the piping in the system is suitable for use in water distribution systems.
 - A backflow preventer is not required at the take-off points in the water distribution system for the sprinkler piping.

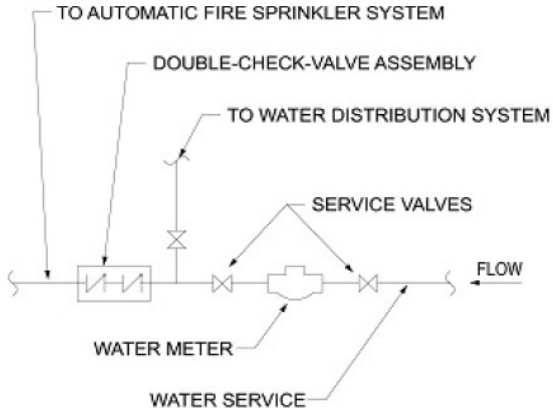
For Job Corps, lack of a functional backflow preventer on automatic “wet” fire sprinkler systems is a life safety code related deficiency.

For Job Corps, lack of a functional backflow preventer on automatic “dry” fire sprinkler systems with Fire Department Connection should be considered as a code related deficiency due to lower hazard associated with cross-contamination.

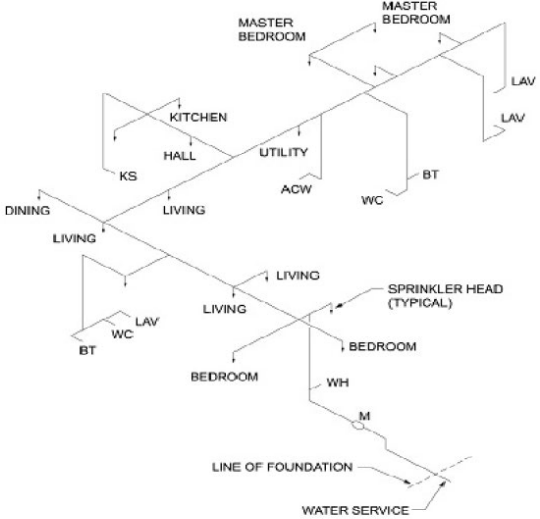
OVERALL RECOMMENDATIONS

- All backflow prevention assemblies, whether installed by the Water Work Authorities or the Center, shall be assemblies of a model and size approved by the Public Water Work Authority in the jurisdiction they are located.
- Final approval of any assembly proposed for installation shall include a certificate of approval issued by an approved testing laboratory certifying full compliance with AWWA standards and Foundation for Cross-Contamination Control and Hydraulic Research (FCCCHR) specifications.
- Installation of all backflow and cross-connection prevention devices shall be in accordance with the jurisdiction’s standard details.

- Qualified individuals must maintain, test, and inspect backflow preventers in accordance with manufacturer instructions and state/local jurisdiction requirement.
 - A qualified and licensed vendor must test backflow preventer devices on sprinkler systems annually at the designed flow rate of the fire protection system (forward flow test).
 - Maintenance personnel shall inspect reduced-pressure assemblies and reduced-pressure detector assemblies weekly to ensure that the differential-sensing valve relief port is not continuously discharging.
 - After any testing or repair, the system shall be tested to ensure all isolation valves are in the normal open position and properly locked or electrically supervised.
 - Backflow prevention assemblies shall be inspected internally every 5 years to verify that all components operate correctly, move freely, and are in good condition.
 - A qualified individual shall conduct maintenance of all backflow prevention assemblies following the manufacturer’s instructions in accordance with the procedure and policies of the authority having jurisdiction.



COMMON FIRE SPRINKLER AND DOMESTIC WATER SUPPLY



COMBINATION WATER DISTRIBUTION/AUTOMATIC SPRINKLER SYSTEM

Definitions and Abbreviation

Air Gap (Water Distribution System) - The unobstructed vertical distance through the 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.

ASSE – American Society of Sanitary Engineers

AWWA - American Water Works Association

Backflow - Pressure created by any means in the water distribution system, which by being in excess of the pressure in the water supply mains causes a potential backflow condition.

Backsiphonage - The backflow of water caused by system pressure falling below atmospheric pressure. Atmosphere supplies the force that reverses flow. Any gauge reading of pressure below atmospheric pressure will be negative.

Backpressure - Pressure created in a non-potable system in excess of the water supply mains, causing backflow. Backpressure can be created by mechanical means, such as a pump; by static head pressure, including an elevated tank; or by thermal expansion from a heat source, such as a water heater.

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

Contamination (High Hazard) - 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.

Double check Backflow Prevention Assembly - A backflow prevention device designed to protect water supplies from contamination. It is different from the two-way check valves (sometimes erroneously referred to as double check valves) used in air brake systems on heavy trucks which select from the highest pressure source. Double check backflow prevention assemblies shall conform to ASSE 1015, CSA B64.5, CSA B64.5.1 or AWWA C510. Double check detector fire protection backflow prevention assemblies shall conform to ASSE 1048. These assemblies shall be capable of operating under continuous pressure conditions.

FCCCHR - Foundation for Cross-Contamination Control and Hydraulic Research

FDC- Fire Department Connection

Pollution - An impairment of the quality of the potable water to a degree that does not create a hazard to public health but that does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use.

Pollution (Low Hazard) - An impairment of the quality of the potable water to a degree that does not create a hazard to the public health but that does adversely and unreasonably affect the aesthetic qualities of such portable water for domestic use.

Reduced Pressure Principle Backflow Prevention Assembly - A backflow prevention device consisting of two independently acting check valves, internally force-loaded to a normally closed position and separated by an intermediate chamber (or zone) in which there is an automatic relief means of venting to the atmosphere, internally loaded to a normally open position between two tightly closing shutoff valves and with a means for testing for tightness of the checks and opening of the relief means. 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.