

Fort Collins – Loveland Water District

Cross-Connection Control Manual

Revised April 2020

Fort Collins – Loveland Water District

June 16, 2020

Minor revisions, additions, corrections and deletions have been approved and incorporated in the Fort Collins – Loveland Water District Cross Connection Control Manual in accordance with the Rules and Regulations of this District.

Approved By  _____
Mr. Chris Matkins, District Manager

FORT COLLINS – LOVELAND WATER DISTRICT

RESOLUTION NO 2020-06-01

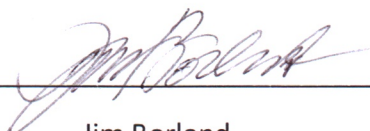
WHEREAS, Regulation 11 of the Colorado Primary Drinking Water Regulations requires the Fort Collins – Loveland Water District to implement a Cross-Connection Control Program:

and

WHEREAS the District, in order to comply with the requirements, set forth above, wishes to adopt the Fort Collins – Loveland Water District Cross-Connection Control Manual.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Directors hereby adopts the attached Fort Collins – Loveland Water District Cross-Connection Control Manual for incorporation with its Rules and Regulations.

ADOPTED this 16th day of June, 2020

CERTIFIED BY:  Chairman
Jim Borland

ATTEST:  Secretary
Chris Matkins

CROSS CONNECTION CONTROL -- WHAT IS IT?

A cross connection is any potential or actual physical connection between potable water and a non-potable fluid. These connections can range in severity from severe hazards (involving sewage or hazardous substances) to aesthetic problems (juice, dirt, etc.).

WHY DO I NEED A CERTIFIED BACKFLOW PREVENTION ASSEMBLY?

Without protective assembly devices, (referred to as backflow prevention assembly devices), the potable water supply can become contaminated by any customer in the system.

Although many people are not aware of it, we see common backflow preventers every day. The average household sink, whether in the bathroom or a kitchen, utilizes an air gap to prevent the potable water supply from becoming contaminated. Other appliances that utilize water (namely, clothes washers) have built-in backflow preventers as well. Some businesses, specifically hospitals and shops that use hazardous chemicals, are isolated from the rest of the system with heavy duty backflow prevention assemblies.

This Cross-Connection Control Program was implemented to ensure compliance with the Colorado Primary Drinking Water Regulations, Regulation 11. These regulations require the Fort Collins – Loveland Water District (FCLWD) to control cross-connections through a collaborative effort, to inventory, monitor and enforce the proper installation and operation of backflow prevention assemblies. This program calls for facility inspections to identify and eliminate cross connections as well as annual testing of backflow prevention assemblies. This manual provides necessary information for the installation and maintenance of commercial and residential backflow prevention assemblies within the FCLWD.

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PART 1 - GENERAL

1.1 DESCRIPTION AND DEFINITIONS

- A. The following words, terms and phrases, when used in these Rules and Regulations, shall have the following meaning ascribed to them:
1. **Approved:** The term “approved” as herein used in reference to a backflow prevention assembly or method shall mean such assembly or method approved by the District as complying with all applicable specifications and requirements of these Rules and Regulations.
 2. **Approved Testing Laboratory:** The Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California (FCCC&HR) and the American Society of Sanitary Engineers (ASSE).
 3. **Approved Water Supply:** Any public potable water supply which has been approved by the Colorado Department of Health and is operating under a valid health permit issued by the Colorado Department of Health.
 4. **ASSE:** American Society of Sanitary Engineers.
 5. **Auxiliary Water Supply:** Any water supply on or available to any premises other than the public potable water supply. These auxiliary water supplies may include, but not be limited to, water from another utility’s potable water system or from any source such as a well, spring, river, pond, lake, reservoir, stream or any other body of water.
 6. **Backflow:** The undesirable reversal of the direction of flow of water or mixtures of water and other liquids, gases, or other substances into a potable water system from any source or sources caused by backpressure and/or back siphonage.
 7. **Backflow Prevention Assembly:** Any assembly or method designed and used to prevent backflow into a potable water system.
 8. **Backpressure:** Any increase in pressure in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above the supply pressure at the point of consideration which would cause, or tend to cause, a reversal of the normal direction of flow.
 9. **Back siphonage:** Any form of backflow due to a reduction in system pressure that causes a negative or sub-atmospheric pressure to exist in the water system.
 10. **Certified Cross-Connection Control Technician (Certified Technician):** A person who must possess a valid certification from the American Society of Sanitary Engineering (ASSE), The American Backflow Prevention Association (ABPA), or the Association of Boards of Certification (ABC). The process for

certification must include successful completion of an examination administered by one of the approved organizations.

11. **Check Valve:** A self-closing device that is designed to permit the flow of fluids in only one direction.
12. **Consumer:** The owner or operator of a consumer water system.
13. **Consumer Water System:** Any water system located on any privately or publicly owned premises that is supplied by the public potable water system or by an auxiliary water supply. The water system may be either a potable water system, a nonpotable water system or an industrial piping system.
14. **Contamination:** An impairment of the quality of potable water by sewage, industrial fluids, waste liquids, compounds, or any other materials, solids, gases, or liquids to a degree which creates an actual hazard to the public health through poisoning or the spreading of disease.
15. **Critical Level:** The critical level or “C/L” marking on an approved backflow prevention assembly is the point conforming to approved standards established by the approved testing laboratory which determines the minimum distance above the flood-level rim of the fixture (highest point of usage) or receptacle served at which the assembly may be installed. When a backflow prevention assembly does not bear a critical-level marking, the bottom of any such approved assembly shall constitute the critical-level.
16. **Cross-Connection:** Any unprotected actual or potential physical connection or structural arrangement of piping or fixtures between a consumer’s water system and the public potable water system through which it is possible to introduce into any part of the public potable water system any used water, industrial fluid, gas, liquid, solid or any other substance. Examples of such cross-connections include, without limitation, swing connections; removable sections; four-way valves; removable spools; dummy sections of pipe; swivel or change-over devices; jumper connections; sliding multiport tubes; solid connections; and any other temporary or permanent devices through which or because of which backflow could occur.
17. **Degree of Hazard:** The level of potential risk to the public health and the type of adverse effect that the hazard may have upon the public potable water system.
18. **District:** The Fort Collins – Loveland Water District, employees and representatives.
19. **Flood-Level Rim:** The edge of a receptacle from which liquid overflows.
20. **FCC&HR:** Foundation for Cross-Connection Control and Hydraulic Research.
21. **Health Hazard:** Any condition, device, or practice in a consumer water system and its operation which could create, or in the judgment of the District or the

Colorado Department of Health, may create a danger to the public health and well-being. A health hazard shall, without limitation, be deemed to exist at sewage treatment plants, sewage pumping stations, chemical manufacturing plants, hospitals, medical centers, mortuaries and plating plants.

22. **Multi-Family Residential:** Two dwelling units or more serviced by a single service tap.
23. **Nonpotable Water:** Water that is not safe for human consumption or that has not been approved by the Colorado Department of Health as being safe for human consumption.
24. **Nontestable Assemblies:** Backflow prevention assemblies not approved by the FCCC&HR.
25. **Pollution:** An impairment of the quality of the water to a degree which does not create a hazard to the public health but which does adversely and unreasonably affect the aesthetic quality of the water.
26. **Pollution Hazard:** An actual or potential threat to the physical properties of the public potable water system or to the potability of the water in the public potable water system that would constitute a nuisance be aesthetically objectionable, or cause minor damage to the system or its appurtenances, but which would not be dangerous to the public health.
27. **Potable Water:** Water from any source that has been approved by the Colorado Department of Health as safe for human consumption.
28. **Potable Water System:** Any system used for the transmission, storage and use of potable water. This system includes all pipes, conduits, tanks, receptacles, fixtures, equipment, and all other appurtenances used to transmit, store or use potable water.
29. **Public Potable Water System:** Fort Collins – Loveland Water District, which shall include all sources, facilities, and appurtenances from the source to the point of delivery of potable water to the consumer, such as valves, pumps, conduits, pipes, tanks, receptacles, fixtures, equipment, and all other appurtenances used to produce, convey, treat and store potable water for public consumption or use.
30. **Single-Family Residence:** One dwelling unit served by a single service tap.
31. **System Hazard:** An actual or potential threat of severe damage to the physical properties of the public potable water system or of pollution or contamination which would have a protracted effect on the quality of the potable water in the system.
32. **Used Water:** Any water which has been supplied by the Utility from the public

potable water system and has passed through a water service connection into a consumer water system and is no longer under the control of the Utility.

33. **Vacuum:** Any pressure less than atmospheric pressure.

34. **Water Service Connection:** The terminal end of a service connection to the public potable water system, being the downstream end of the curb-stop or meter pit valve where the Utility loses control over the water at its point of delivery to the consumer water system. "Water service connection" shall also include service connections from a fire hydrant and all other temporary or emergency service connections from the public potable water system.

1.2 QUALITY ASSURANCE

- A. Only those backflow prevention assemblies described in FCCC&HR's most current "List of Approved Backflow Prevention Assemblies" and, in the case of single-family residences, those assemblies bearing the approval of the ASSE, are approved by the District for use as hereinafter set forth in these Rules and Regulations. Only such approved backflow prevention assemblies shall be used, and no substitutions will be allowed.
- B. The entire backflow prevention assembly including the isolation valves furnished as part of the assembly shall meet the design and performance specifications of and be approved by the FCCC&HR.
- C. To be approved, all backflow prevention assemblies, except ASSE approved nontestable residential assemblies, must be readily accessible for in-line maintenance and testing.

1.3 RESPONSIBILITIES

- A. The consumer shall be responsible for preventing pollutants and contaminants from the consumer's water system from entering the public potable water system at the water service connection by installing, operating, having tested and inspected, and by maintaining approved backflow prevention assemblies as required by these Rules and Regulations.

PART 2 - PRODUCTS

2.1 BACKFLOW PREVENTION ASSEMBLIES

- A. **Air-Gap Separation:** A physical separation between the free-flowing discharge end of a public potable water system pipeline and an open or nonpressure receiving vessel. An approved air-gap separation shall be at least double the diameter of the supply pipe measured vertically above the flood-level rim of the vessel, but in no case less than one

inch.

- B. **Reduced Pressure Principle Assembly:** An assembly containing two independently acting, approved check valves together with a hydraulically operating, mechanically independent pressure differential relief valve located between the check valves and at a point below the first check valve. The unit shall include four properly located testcocks and two tightly closing resilient seat isolation valves.
- C. **Pressure Vacuum Breaker:** An assembly containing one or two independently operating, internally loaded check valves and an independently operating loaded air-inlet valve located on the discharge side of the check valves and fitted with two properly located testcocks and two resilient seat isolation valves.
- D. **Nontestable Assemblies:** An ASSE approved dual check assembly.

PART 3 - EXECUTION

3.1 PROTECTION REQUIRED REGARDLESS OF DEGREE OF HAZARD

- A. In the case of a consumer's premises having an auxiliary water supply, the public potable water system shall be protected by an approved air-gap separation or an approved reduced pressure principle assembly installed on each service line to the premises.
- B. In the case of a consumer's premises having internal cross-connections that are not correctable, or there are intricate plumbing arrangements which make it impractical to ascertain whether or not cross-connections exist, the public potable water system shall be protected by an approved air-gap separation or an approved reduced pressure principle assembly installed on each service line to the premises.
- C. In the case of a consumer's premises where entry is restricted or where complete inspections for cross-connections cannot be made with sufficient frequency or on sufficiently short notice to assure that cross-connections do not exist, the public potable water system shall be protected by an approved air-gap separation or an approved reduced pressure principle assembly installed on each service line to the premises.

3.2 TYPE OF PROTECTION REQUIRED FOR SPECIFIC FACILITIES

Table 1:

Type of Application	Domestic Device	Fire Line Device
S.F.R. - No Fire Line	Dual Check	XXXXXXXXXX
S.F.R. - Integrated Fire Line	Dual Check	XXXXXXXXXX
S.F.R. - Independent Fire Line	Reduced Pressure	Reduced Pressure
S.F.R. - Pump & Storage Tank Fire System	Air Gap or Reduced Pressure	XXXXXXXXXX
M.F.R. (2-Units or More) - No Fire Line	Dual Check	XXXXXXXXXX
M.F.R. (2-Units or More) - Integrated Fire Line	Dual Check	XXXXXXXXXX
M.F.R. (2-Units or More) - Independent Fire Line	Reduced Pressure	Reduced Pressure
Independent or High Hazard Irrigation	Reduced Pressure	XXXXXXXXXX
Non-Residential	Reduced Pressure	Reduced Pressure
Raw Water Sources	Reduced Pressure	Reduced Pressure

Abbreviation Key:

S.F.R. - Single Family Residential

M.F.R. - Multi-Family Residential

- A. **Booster Pumps:** When it becomes necessary due to low pressure or special operating conditions to install a booster pump on the water service line to any consumer's premises, such service line shall be protected by the installation of an approved air-gap separation or an approved reduced pressure principle assembly, between the water meter and the pump.
- B. **Fire Systems:** For fire protection a reduced pressure principle assembly is required within 300 feet of the District's water main or as required by the District.
- C. **Single Family Residential:** In the event that a high hazard, uncontrolled cross connection is discovered, a reduced pressure principle assembly will be required to be installed by the property owner.
- D. **Irrigation and Lawn Sprinkling Systems:**
 - 1. Irrigation and lawn sprinkling systems that permit the mixing, pumping, dissolution, injection, or siphoning of any foreign substance into the water, or any such system which incorporates the use of any booster pump(s), or which is subject to backpressure, shall be separated from the public potable water system

by an approved air-gap separation or an approved reduced pressure principle assembly, the assemblies are to be located as close downstream of the meter as required by the District.

2. In irrigation and lawn sprinkling systems that do not incorporate the use of an injection system or booster pump(s), a pressure vacuum breaker assembly may be used. Irrigation and lawn sprinkling systems having quick-coupling valves or other similar type heads that will permit pressure to be retained in the system shall have a pressure vacuum breaker assembly installed on the system. Irrigation and lawn sprinkling systems using the subsurface drip method shall also have a pressure vacuum breaker assembly installed on the system.
 3. In any irrigation or lawn sprinkling system where the terrain makes the installation height of a pressure vacuum breaker assembly impractical, the public potable water system shall be protected by an approved reduced pressure principle assembly. A reduced pressure principle assembly may also be installed to serve multiple irrigation circuits in lieu of pressure vacuum breakers.
- E. **Multiple Service Lines:** All premises being served with two or more water service lines shall have installed on each such service line that backflow prevention assembly which is required for the service line having the highest degree of hazard. By way of example, if any one of the multiple service lines has as its degree of hazard the classification of “health hazard,” but the other service lines are classified only as a “pollution hazard,” the backflow prevention assemblies required by these Rules and Regulations to be installed for a “health hazard” shall be installed on all the service lines.
- F. **Multi-Storied Buildings:** All multi-storied buildings greater than 40 feet in height shall have an approved reduced pressure principle assembly installed at a point on the water service line to the facility that is approved by the District. Where possible, the assembly shall be located within the building.
- G. **Pump and Storage Tanks:** All premises using a pump and storage tank system shall have an approved air gap or a reduced pressure principle assembly located directly downstream of the main shut-off valve where the service enters the facility.
- H. **Solar-Heating Systems:** In any facility or premises where a liquid-based solar-heating system is installed, whether utilized for space or water heating, backflow protection of the public potable water system and exchange of heat shall be accomplished by way of an approved vented double-walled heat exchanger. An exception to this requirement may be granted by the District for a single-walled heat exchanger if the exchanger is used in conjunction with an expansion tank and an approved reduced pressure principle assembly.
1. In the case of premises where a single fluid solar domestic hot water preheat system, which utilizes drain-down design for freeze protection, is being used, properly trapped and vented receptor with a visible air-gap separation of at least three times the diameter of said drain line with a fixed minimum air-gap separation of 1 inch above the flood level rim of the receptor.
 2. In the case of premises where a solar-heating system utilizes an approved fan coil unit to exchange heat from the hot air to preheat water for domestic uses,

no backflow prevention assembly will be required; however, if the fan coil unit utilizes drain-down freeze protection, said drain from the exchange coil shall conform to the same requirements of the aforementioned single fluid drain-down solar-heating systems.

- I. **Use of Fire Hydrants:** No person shall connect to and/or transfer water from any fire hydrant to or into any container, tank, vessel, pipe, conduit, pond, lake, reservoir, stream or other body of water by use of a hose, tube, conduit, pipe or other means, unless the receiving unit is separated from the hydrant by an approved air-gap separation or an approved reduced pressure principle assembly.

3.3 INSTALLATION

A. GENERAL REQUIREMENTS

1. Backflow prevention assemblies shall only be installed in conformance with these Rules and Regulations as herein provided and in conformance with the drawings attached hereto or in such other manner as approved by the District.
2. The provisions for these Rules and Regulations shall apply to all existing consumer water systems as well as to all consumer water systems coming into existence after the adoption of these Rules and Regulations, except for consumer water systems legally in existence at the time of the adoption of these Rules and Regulations that are not in strict compliance with these Rules and Regulations shall be permitted to be used by consumers only if, in the opinion of the District, such consumer water systems do not constitute a health hazard, a pollution hazard or a system hazard to the public potable water system.
3. All backflow prevention assemblies shall be installed in an accessible location and with adequate clearances in accordance with accepted design standards to facilitate maintenance, testing and repair. All reduced pressure principle assemblies installed in a confined area should maintain minimum clearances as follows:
 - a) Minimum 12 inches and maximum 36 inches above a permanent finish floor or final grade.
 - b) Minimum 12 inches from the adjacent or back wall.
 - c) Minimum 24 inches from the opposing or facing wall.
 - d) Minimum 24 inches above the assembly.
 - e) Adequate clearance shall be provided at each end for operation of valves and/or repair of the assembly.

4. All backflow prevention assemblies shall be installed in a horizontal position unless written approval has been obtained from the District for installation in a vertical orientation.
5. In no case is it permissible to have connections or tees installed on the water service line between the meter and the backflow prevention assembly
6. All systems protected with a backflow prevention assembly shall meet all requirements for pressure relief valves set forth in the most recent edition of the International Plumbing Code.
7. Isolation valves furnished as part of the backflow prevention assembly shall not be used as the inlet or outlet valve of the meter. Testcocks shall not be used as supply connections.
8. Approved backflow prevention assemblies shall be installed without any bypass, unless the bypass line is also protected by an approved backflow prevention assembly providing an equivalent degree of protection.
9. Backflow prevention assemblies shall not be located in any enclosure or hooded area containing corrosive, toxic or poisonous fumes.
10. Stop and waste valves are not allowed upstream of backflow prevention assemblies.
11. All facilities are required to install the minimum type of backflow protection assembly listed in Table 1, Section 3.2 under, but not limited to, the following conditions:
 - a. Remodel or addition.
 - b. Degree of hazard changes.
 - c. Unable to access for inspection.
 - d. There is no current backflow protection.
 - e. A backflow prevention device that is replaced.
 - f. The current backflow prevention device does not meet the District's requirements.

B. SPECIFIC REQUIREMENTS

1. An approved air-gap separation shall be installed downstream of the water service connection and in such a manner so that no hose, piping arrangement or other fixture may be attached to defeat the air-gap separation.

- a) Approved air-gap separations must have a properly sized and located drain to adequately drain the maximum discharge from the public potable water system service line.
- b) Approved air-gap separations that are protecting the public potable water system shall be considered a backflow prevention assembly and shall be subject to the same testing and inspection required by these Rules and Regulations for all other backflow prevention assemblies.

2. An approved reduced pressure principle assembly shall not be installed in any below-grade pit, vault, or crawl spaces.

- a) Basement installations, although a form of pit, are allowed providing the following conditions are met:
 - i. A drain large enough to allow the maximum flow of water the assembly is capable of discharging under twice the normal static water pressure, AND
 - ii. Installation of a high-water alarm system. Electrical systems and/or components shall not be installed in the same general area.
- b) Shall be installed in such a manner that the relief valve opening shall never have a water level under the assembly come within a vertical distance of 12 inches of the relief valve discharge port. The relief valve discharge port shall be down.
- c) The relief valve discharge port on a reduced pressure principle assembly shall not be connected to any sump or sanitary sewer.
- d) Only factory supplied funnels shall be used to remove the periodic discharge from the assembly and the piping system must have an approved airgap at the termination of the run.

3. An approved pressure vacuum breaker shall be installed as follows:

- a) It shall be installed with the critical level (C/L) of the assembly a minimum of 12 inches above the highest point of downstream usage.
- b) It shall be installed in an upright position and in locations where the assembly may be subjected to continuous pressure but in no event shall the assembly be subjected to backpressure or become submerged.

3.4 MAINTENANCE

- A. Backflow prevention assemblies shall be tested, repaired or replaced by the consumer at the consumer's expense whenever the assemblies are found to be defective.
- B. Any existing backflow prevention assembly installed on a consumer's premises that is not approved by an approved testing laboratory shall be replaced within a period of 10 days with an approved backflow prevention assembly as required by these Rules and Regulations.
- C. Only those replacement and/or repair parts produced or specifically recommended by the manufacturer of the backflow prevention assembly shall be used in the repair of the assembly. Any other repair parts utilized shall be considered a modification of the factory design, and the assembly shall be considered unapproved.

3.5 TESTING, INSPECTION AND ACCEPTANCE

- A. Except as provided in paragraph B. below, it shall be the duty of the consumer at any premises where backflow prevention assemblies are required by these Rules and Regulations to be installed, to have such assemblies tested and inspected annually or as deemed by the Fort Collins – Loveland Water District, by a Certified Cross Connection Control Technician (CCCCT) to assure the assembly is functioning properly. Non-testable assemblies that are approved under these Rules and Regulations are exempt from this testing and inspection requirement.
 - 1. Backflow prevention assemblies shall not be considered as accepted under these Rules and Regulations until a certified inspection and test is made on the installed assembly and the assembly has passed such inspection and testing.
 - 2. The inspections and tests shall be at the expense of the consumer and shall be performed by a Certified Cross Connection Control Technician (CCCCT).
- B. Certified tests and inspections of backflow prevention assemblies shall occur at least annually. In those instances where the hazard is deemed to be great enough, the District may require that certified inspections and operational tests be performed at more frequent intervals.
- C. Records of all tests, inspections, repairs and overhauls of backflow prevention assemblies shall be kept by the consumer and by the Certified Cross Connection Control Technician (CCCCT) for a period of three years after such tests, inspections, repairs and overhauls. The Certified Cross Connection Control Technician (CCCCT) shall file with the District a copy of the records of all such tests, inspections, repairs, and overhauls, within 10 days of completing such tests, inspections, repairs and overhauls. In addition, the consumer shall provide the District with copies of such records if requested by the District.
- D. All testing gauges used by Certified Cross Connection Control Technician (CCCCT) shall be checked for accuracy at least yearly, and proof of compliance shall be

submitted to the District upon request.

4.1 FAILURE TO COMPLY

- A. If any consumer of the District fails to comply with any provision of these Cross-Connection Control Rules and Regulations, the District may discontinue water service to the consumer until the consumer is in compliance with these Rules and Regulations.