

8.0 GENERAL

A. All potable water distribution systems shall be designed, constructed, and maintained so as to prevent leakage of water due to defective materials, improper jointing, corrosion, settling, impacts, freezing, or other causes. Valves and blow-offs shall be provided so that necessary repairs can be made with a minimum interruption of service.

8.1 MATERIALS

8.1.1 Standards and materials selection

A.1. Any solder or flux which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free (i.e., shall not contain more than 0.2 percent lead). Any pipe, pipe fitting, plumbing fitting, fixture, and any other appurtenance which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free (i.e., shall not contain more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, fixtures, and any other appurtenances).

2. Exception. The lead free requirement of Paragraph A.1 above shall not apply to:

- a. leaded joints necessary for the repair of existing cast iron pipes;
- b. pipes, pipe fittings, plumbing fittings, fixtures and any other appurtenances, including backflow preventers, that are used exclusively for nonpotable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption; or,
- c. toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, fire hydrants, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

B.1. Water Piping Quality. All potable water pipes, pipe related products and materials that join or seal pipes and pipe related products shall be evaluated and listed as conforming with a national consensus product (or material) standard, ASTM, AWWA, ANSI/NSF Standard 61, and NSF/ANSI 372. Any solder or flux which is used in the installation or repair of any public water system or any plumbing in a residential or nonresidential facility providing water for human consumption shall be lead free.

2. Exception. The lead free requirement of Paragraph B.1 above shall not apply to:

- a. leaded joints necessary for the repair of existing cast iron pipes;
- b. pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers, that are used exclusively for nonpotable services such as manufacturing, industrial

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processing, irrigation, outdoor watering, or any other uses where the water is not anticipated to be used for human consumption; or,

c. toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, fire hydrants, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

8.1.2 Permeation by organic compounds

Where distribution systems are installed in areas contaminated by organic compounds detected at levels that are known to pose a health risk.

a. pipe and joint materials which do not allow permeation of the organic compounds shall be used.

b. non-permeable materials shall be used for all portions of the system including, pipe, joint materials, hydrant leads, and service connections.

8.1.3 Used materials

Water mains which have been used previously for conveying potable water may be reused provided they meet the above standards and have been restored practically to their original condition.

8.1.4 Joints

Manufacturer approved transition joints shall be used between dissimilar piping materials.

8.2 SYSTEM DESIGN

8.2.1 Pressure

The system shall be designed to maintain a minimum pressure of 20 psi (140 kPa) at ground level at all points in the distribution system under all conditions of flow.

8.2.2 Diameter

The minimum size of water main which provides for fire protection and serving fire hydrants shall be six-inch diameter. Larger size mains will be required if necessary to allow the withdrawal of the required fire flow while maintaining the minimum residual pressure specified in Section 8.2.1.

The minimum size of water main in the distribution system where fire protection is not to be provided shall be a minimum of three (3) inch diameter. Any departure from

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minimum requirements shall be justified by hydraulic analysis and future water use, and can be considered only in special circumstances.

8.2.4 Dead ends

Dead end mains shall be equipped with a means to provide adequate flushing. No flushing device shall be directly connected to any sewer.

8.3 VALVES

Valve spacing shall not exceed one mile except for transmission mains 24" or larger. Valve spacing shall not exceed five miles for transmission mains 24" or larger.

8.4 HYDRANTS

8.4.3 Hydrant leads

The hydrant lead shall be at least as large as the hydrant. For new construction and hydrant replacement, auxiliary valves shall be installed on all hydrant leads.

8.4.4 Hydrant drainage

- a. Where hydrant drains are not plugged, a gravel pocket or dry well shall be provided unless the natural soils will provide adequate drainage.
- b. Hydrant drains shall not be connected to sanitary sewers or located within 406 feet of sanitary sewers, storm sewers, or storm drains.
- c. Hydrant drains, where allowed, must be above the seasonal groundwater table.

8.5 AIR RELIEF VALVES

8.5.1 Air relief valves

At high points in water mains where air can significantly accumulate provisions shall be made to remove the air by means of air relief valves.

8.5.2 Air relief valve piping

- a. If used, the open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward-facing elbow.
- b. Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer.

8.7 INSTALLATION OF WATER MAINS

8.7.1 Standards

Specifications for installation of water mains shall incorporate the provisions of the AWWA standards and/or manufacturer's recommended installation procedures including bedding, cover and blocking requirements.

8.7.6 Pressure and leakage testing

Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate AWWA Standards.

8.7.7 Disinfection

New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651 (Disinfecting Water Mains).

Water from new water mains shall not be furnished for consumer's use until tests performed by a laboratory certified by the state health officer have shown the new water mains to be free from contamination by coliform bacteria (following EPA approved procedures prescribed in Standard Methods for the Examination of Water and Wastewater, Nineteenth Edition).

After cutting into or repairing existing mains, the water shall be tested by a laboratory certified by the state health officer for coliform bacteria (following EPA approved procedures prescribed in Standard Methods for the Examination of Water and Wastewater, Nineteenth Edition) to determine the effectiveness of the disinfection procedure. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If E. coli/fecal coliform positive samples are recorded then the state health officer shall be notified. If total coliform positive samples are recorded, then corrective action must be taken, and daily sampling shall continue until two consecutive negative samples are recorded.

Samples shall not be collected from the new facilities until such new facilities have been disinfected as prescribed above, and the chlorinated water thoroughly flushed from the system until the chlorine measurements are no higher than that generally prevailing in the distribution system.

8.8.2 Parallel installation

a. Water mains shall be laid at least 6 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subsoil treatment system. The distance shall be measured edge to edge.

b. In cases where it is not practical to maintain a 6 foot separation, the state health officer may allow deviation on a case-by-case basis, if supported by data from the design engineer.

8.8.3 Crossings

- a. Water mains crossing sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer with preference to the water main located above the sewer.
- b. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

8.8.4 Exception

When it is impossible to obtain the minimum specified separation distances, the state health officer must specifically approve any variance from the requirements of Sections 8.8.2 and 8.8.3. Where sewers are being installed and Section 8.8.2 and 8.8.3 cannot be met, the following methods of installation may be used:

- a. Such deviation may allow installation of the water main closer to a sewer, provided that the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer at such an elevation that the bottom of the water main is at least 18 inches above the top of the gravity sewer.
- b. the sewer materials shall be water works grade 150 psi (1.0 Mpa) pressure rated pipe meeting AWWA standards or pipe approved by the state health officer and shall be pressure tested to ensure water tightness.

8.8.5 Force mains

There shall be at least a 6 foot horizontal separation **edge to edge** between water mains and sanitary sewer force mains. There shall be an 18 inch vertical separation at crossings as required in Section 8.8.3.

8.8.6 Sewer manholes

No water pipe shall pass through or come in contact with any part of a sanitary sewer manhole. Water main shall be located at least 6 feet from sanitary sewer manholes.

8.9.1 Above-grade piping

Above-grade piping shall be adequately supported and anchored, protected from vandalism, damage and freezing **including, but not limited to, velocity, heat trace and insulation,** and accessible for repair or replacement.

8.9.2 Underwater crossings

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A minimum cover of five feet shall be provided over the pipe unless otherwise approved by the reviewing authority. When crossing water courses which are greater than 15 feet in width **at measured low flow**, the following shall be provided:

- a. the pipe shall be of special construction, having flexible, restrained or welded watertight joints;
- b. valves shall be provided at both ends of water crossings **within one half mile for less than 24 inch mains or within 2.5 miles for 24 inch or larger mains** so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding **under normal conditions**. **All other mains, services, taps, hydrants, or other devices located inside of the limits of these isolation valves shall also have easily accessible isolation valve.; and**
- c. permanent taps or other provisions to allow **use** of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source. **It is permissible to have combination taps for both an air relief valve and a pressure tap provide the assemble meets the above criteria and the air relief valve can be isolated during the testing of the crossing.**

8.10 INTERCONNECTIONS

8.10.3 Interconnections

The approval of the state health officer shall be obtained for interconnections between potable water supplies.

8.11 WATER SERVICES AND PLUMBING

8.11.1 Plumbing

Water services and plumbing shall conform to the applicable local and/or state plumbing codes.

8.11.2 Booster pumps

Where permitted by the water supplier, pumps that are used to draw water from a water supply distribution system or are placed in a system to increase the line pressure, **shall not reduce the pressure at the customer connection below 20 psi**. Provision must be made to maintain the pressure **at the customer connection to not less than 20 psi (pounds per square inch) gauge**.

8.13 WATER LOADING STATIONS

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Water loading stations present special problems since the fill line may be used for filling both potable water vessels and other tanks or contaminated vessels. To prevent contamination of both the public supply and potable water vessels being filled, the following principles shall be met in the design of water loading stations:

- a. there shall be no backflow to the public water supply,
- b. the piping arrangement shall prevent contaminant being transferred from a hauling vessel to others subsequently using the station,
- c. Potable water loading stations where portable hoses are used for filling water containers shall be provided with a metal disk at the nozzle to prevent contact of nozzle with ground or floors. When not in use, the portable hoses shall be protected from dirt and contamination by storage in a tightly enclosed cabinet or storage container and shall have a cap to cover the nozzle to maintain their potable water quality. Hoses shall be disinfected prior to use.

Acceptable Water Loading Station See Section 8.13

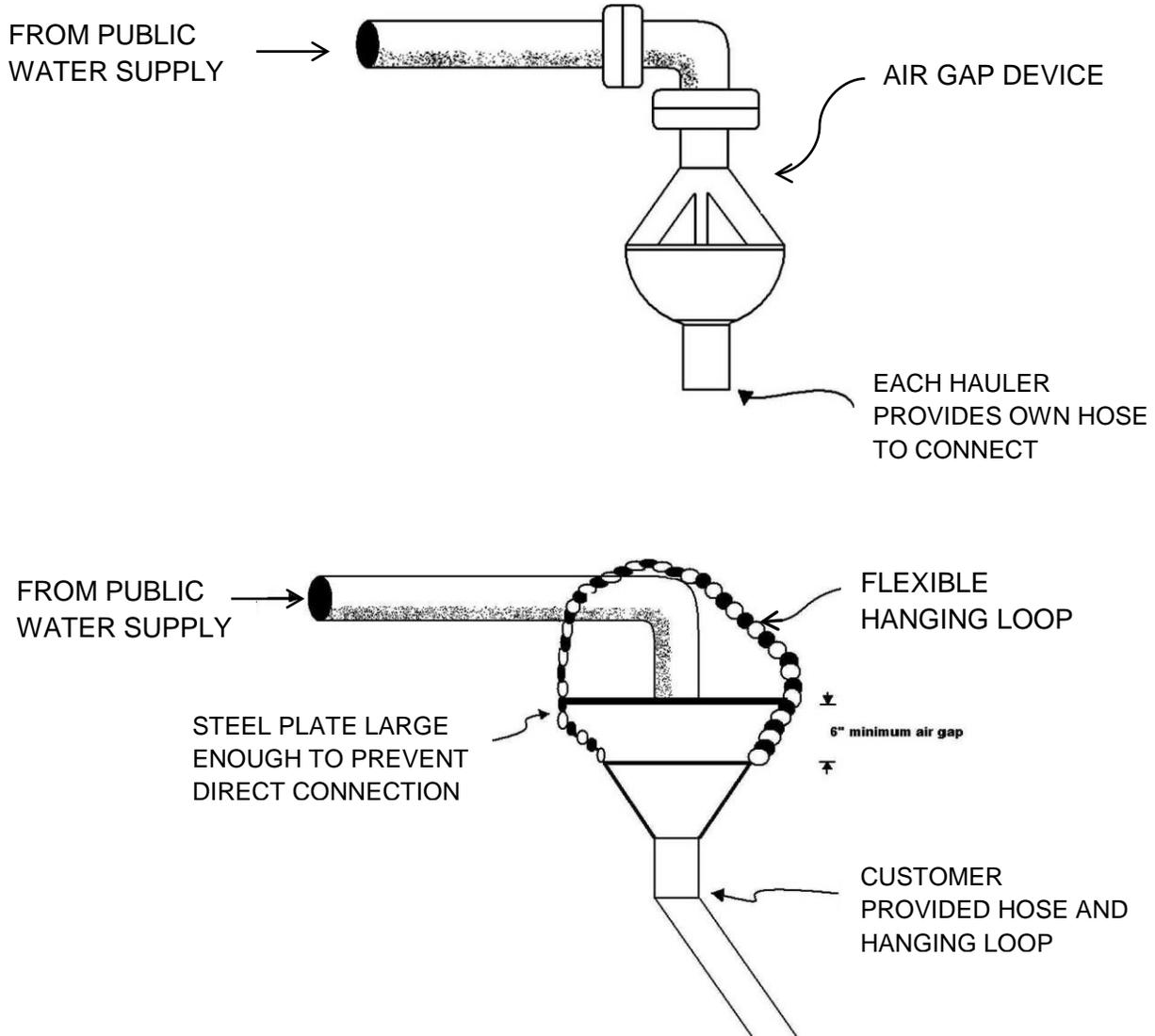


FIGURE 1 - SUGGESTED FILLING DEVICE FOR WATER LOADING STATIONS