

*2.5-2.2.3 Heated Potable Water Distribution Systems

2.5-2.2.3.1 General. Provisions shall be included in the heated potable water distribution system to limit the amount of Legionella bacteria and other opportunistic waterborne pathogens.

2.5-2.2.3.2 Recirculation of hot water. Heated potable water distribution systems serving resident areas shall be under constant recirculation to provide continuous hot water at each hot water outlet or to provide alternative means for maintaining hot water.

APPENDIX

A2.5-2.2.3 Heated potable water distribution systems

- a. Legionella response. There are several ways to treat potable water systems to kill Legionella and other opportunistic waterborne pathogens. Complete removal of these organisms is not feasible, but methods to reduce the amount include hyperchlorination (free chlorine, chlorine dioxide, monochloramine), elevated hot water temperature, ozone injection, silver/copper ions, and ultraviolet light. Each of these options has advantages and disadvantages. While increasing the hot water supply temperature to 140°F (60°C) is typically considered the easiest option, the risk of scalding, especially to youth and the elderly, is significant. See CDC *Guidelines for Environmental Infection Control in Health-Care Facilities* (2003) and ASHRAE Guideline 12: *Minimizing the Risk of Legionellosis Associated with Building Water Systems* for additional information. Another reference is "Legionella Control in Health Care Facilities," available from the American Society of Plumbing Engineers.
- b. Design for efficient heated potable water distribution. Hot water distribution systems should be designed to deliver hot or tempered water in a reasonable time. Low-flow faucets, longer pipe runouts between a recirculated main and the fixture, and larger diameter pipes increase the time it takes to achieve desired temperatures. Given the water conservation benefits of low-flow faucets, designers should consider reducing the length of uncirculated runouts, reducing the pipe size, providing heat tracing for the runout, or using point-of-use water heaters. Following is a guide that may be used in designing a system based on delivery time.
- Design method. Hot and tempered water distribution systems should be designed using either the maximum pipe length or maximum pipe volume limits provided in this appendix section and in appendix table A2.5-a (Maximum Length of Hot Water System Pipe or Tube). For purposes of this discussion, references to pipe should also apply to tubing and the source of hot or tempered water is considered to be a water heater, boiler, circulation loop piping, or electrically heat-traced piping.
 - Maximum allowable pipe length method. The maximum

- (1) Non-recirculated fixture branch piping shall not exceed 25 feet (7.62 meters) in length.
- (2) Alternative means shall be permitted to include the installation of instantaneous systems or another type of water heating system at point of use.

2.5-2.2.3.3 Elimination of dead-end piping

- (1) Installation of dead-end piping (risers with no flow, branches with no fixture) shall not be permitted.
- (2) In renovation projects, dead-end piping shall be removed.
- (3) Installation of empty risers, mains, and branches installed for future use shall be permitted.

allowable pipe length from the source of hot or tempered water to the termination of the fixture supply pipe should be in accordance with the maximum pipe length columns in appendix table A2.5-a. Where the length contains piping of more than one size, the largest pipe size should be used to determine the maximum allowable pipe length in the table.

- Maximum allowable pipe volume method. The maximum volume of hot or tempered water in hot water distribution piping should be calculated in accordance with the guidance in the paragraph on water volume determination below. The maximum volume in piping to public hand-washing sinks, metering or non-metering, should be 2 ounces (0.06 L). For fixtures other than those at public hand-washing sinks, the maximum volume should be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler and 24 ounces (0.7 L) for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe.
 - Water volume determination. The volume should be the sum of the internal volumes of pipe, fittings, valves, meters, and manifolds between the source of the hot water and the termination of the fixture supply pipe. The volume should be determined from the liquid ounces per foot column of appendix table A2.5-a. The volume contained in fixture shutoff valves, flexible water supply connectors to a fixture fitting, or a fixture fitting should not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the volume should include the portion of the fitting on the source pipe that supplies water to the fixture.
 - Maximum flow rate. The maximum flow rate of fixtures should be limited to 0.5 gpm when connected to 1/4-inch piping, 1 gpm when connected to 5/16-inch piping, and 1.5 gpm when connected to 3/8-inch piping.