**Section 890.1210 Design of a Building Water Distribution System**

a) Design and Installation. The design and installation of the hot and cold water building distribution systems shall provide a volume of water at the required rates and pressures to ensure the safe, efficient and satisfactory operation of fixtures, fittings, appliances and other connected devices during periods of peak use. No distribution pipe or pipes shall be installed or permitted outside of a building or in an exterior wall or attic unless the pipe is protected from freezing.

b) Size of Water Distribution Pipes. The fixture supply for each fixture shall be at least the minimum size provided in Appendix A.Table D. The size of all other water distribution pipes shall be determined by calculating the water supply demand (in water supply fixture units) for that portion of the water distribution system served by the pipe. Using Appendix A.Tables M, N, O, P and Q, the cumulative water supply demand or load shall be calculated for all fixtures, piping, valves and fittings served by the water distribution pipe, and the pipe shall meet the minimum size provided in Appendix A.Table N or O, as applicable. Exception: As an alternative to using Tables M, N, O, P and Q to design and size the piping in the water distribution system, the system may be designed and sized employing current engineering practices, provided that the design/plans are approved in writing by an Illinois licensed professional engineer, an Illinois licensed architect or an individual Certified in Plumbing Design (CPD) by the American Society of Plumbing Engineers and approved in writing by the Department.

c) Minimum Water Pressure. The minimum constant water service pressure on the discharge side of the water meter shall be (at least) 20 psi, and the minimum constant water pressure at each fixture shall be at least 8 psi or the minimum recommended by the fixture manufacturer.

d) Auxiliary Pressure. Supplementary Tank. If the pressure in the system is below the minimum 8 psi at the highest water outlet when the flow in the system is at peak demand, an automatically controlled pressure tank or gravity tank of a capacity to supply sections of the building installation that are too high to be supplied directly from the public water main shall be installed.

e) Low Pressure Cut-Off. When a booster pump, except those used for fire protection, is used on an auxiliary pressure system, a low-pressure cut-off switch shall be installed on the booster pump to prevent the creation of pressures less than 5 psi on the suction side of the pump. A shut-off valve shall be installed on the suction side of the water system and within 5 feet from the pump suction inlet, and a pressure gauge shall be installed between the shut-off valve and pump.

f) Water Hammer. All building water supply systems shall be provided with air chambers or approved mechanical devices or water hammer arrestors to absorb pressure surges. Water pressure absorbers shall be installed at the ends of long pipe runs or near batteries of fixtures.

1) Air Chambers − An air chamber that is installed in a fixture supply shall be at least 12 inches in length and the same diameter as the fixture supply, or an air chamber with an equivalent volume may be used. An air chamber that is installed in a riser shall be at least 24 inches in length and at least the same size as the riser.

2) Mechanical Devices − If a mechanical device or water hammer arrestor is used, the manufacturer's specifications for location and installation shall be followed.

g) Excessive Static Water Pressure

1) If water main pressure exceeds 80 psi, a pressure reducing valve and a strainer with a by-pass relief valve shall be installed in the water service pipe near the entrance to the building to reduce the water pressure to 80 psi or lower, except where the water service pipe supplies water directly to a water pressure booster system, an elevated water tank, or to pumps provided in connection with a hydropneumatic or elevated water supply tank system. Sill cocks and outside hydrants may be left on full water main pressure.

2) When the water pressure exceeds 80 psi at any plumbing fixture, a pressure reducing valve, pressure gauge and a strainer with a by-pass relief valve shall be installed in a water supply pipe serving the fixture to reduce the water pressure at the fixture to 80 psi or lower.

h) Approval of Auxiliary Pressure Systems. Whenever, in any building, structure or premises receiving its potable water supply from the public water system, a pump or any other device for increasing the water pressure is to be installed, installation plans shall be approved by the Department prior to installation in accordance with Section 890.1940.

i) Variable Street Pressures. If the water main has a wide fluctuation in pressure, the water distribution system shall be designed for minimum pressure available at the main.

(Source: Amended at 38 Ill. Reg. 9940, effective April 24, 2014)