the National Electrical Code, NFPA No. 70–2005.

[40 FR 58752, Dec. 18, 1975, as amended at 42 FR 961, Jan. 4, 1977. Redesignated at 44 FR 20679, Apr. 6, 1979, as amended at 52 FR 4586, Feb. 12, 1987; 58 FR 55014, Oct. 25, 1993; 70 FR 72049, Nov. 30, 2005; 71 FR 19639, Apr. 17, 2006; 78 FR 73985, Dec. 9, 2013; 79 FR 31863, June 3, 2014]

§ 3280.608 Hangers and supports.

(a) *Strains and stresses.* Piping in a plumbing system shall be installed without undue strains and stresses, and provision shall be made for expansion, contraction, and structural settlement.

(b) *Piping supports.* Piping must be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents. Unless otherwise stated in the standards incorporated by reference for specific materials at § 3280.604(a), or unless specified by the pipe manufacturer, horizontal plastic drainage piping must be supported at intervals not to exceed 4 feet and horizontal plastic water piping must be supported at intervals not to exceed 3 feet. Vertical drainage and water piping must be supported at each story height.

(c) *Hangers and anchors.* (1) Hangers and anchors shall be of sufficient strength to support their proportional share of the pipe alignments and prevent rattling.

(2) Piping shall be securely attached to the structure by hangers, clamps, or brackets which provide protection against motion, vibration, road shock, or torque in the chassis.

(3) Hangers and straps supporting plastic pipe shall not compress, distort, cut or abrade the piping and shall allow free movement of the pipe.

[40 FR 58752, Dec. 18, 1975, as amended at 86 FR 2521, Jan. 12, 2021]

§ 3280.609 Water distribution systems.

(a) *Water supply*—(1) *Supply piping.* Piping systems shall be sized to provide an adequate quantity of water to each plumbing fixture at a flow rate sufficient to keep the fixture in a clean and sanitary condition without any danger of backflow or siphonage. (See table in § 3280.609(f)(1)). The manufacturer shall include in his written installation instructions that the manufactured home has been designed for an inlet water pressure of 80 psi, and a statement that when the manufactured home is to be installed in areas where the water pressure exceeds 80 psi, a pressure reducing valve should be installed.

(2) *Hot water supply.* Each manufactured home equipped with a kitchen sink, and bathtub and/or shower shall be provided with a hot water supply system including a listed water heater.

(b) *Water outlets and supply connections*—(1) *Water connection.* Each manufactured home with a water distribution system shall be equipped with a ¾ inch threaded inlet connection. This connection shall be tagged or marked ''Fresh Water Connection'' (or marked ''Fresh Water Fill''). A matching cap or plug shall be provided to seal the water inlet when it is not in use, and shall be permanently attached to the manufactured home or water supply piping. When a master cold water shutoff full flow valve is not installed on the main feeder line in an accessible location, the manufacturer's installation instructions shall indicate that such a valve is to be installed in the water supply line adjacent to the home. When a manufactured home includes expandable rooms or is composed of two or more units, fittings or connectors designed for such purpose shall be provided to connect any water piping. When not connected, the water piping shall be protected by means of matching threaded caps or plugs.

(2) *Prohibited connections.* (i) The installation of potable water supply piping or fixture or appliance connections shall be made in a manner to preclude the possibility of backflow.

(ii) No part of the water system shall be connected to any drainage or vent piping.

(3) *Rim outlets.* The outlets of faucets, spouts, and similar devices shall be spaced at least 1 inch above the flood level of the fixture.

(4) *Appliance connections.* Water supplies connected to clothes washing or dishwashing machines shall be protected by an approved or listed fixed air gap provided within the appliance by the manufacturer.

(5) *Flushometer valves or manually operated flush valves.* An approved or listed vacuum breaker shall be installed and maintained in the water supply line on the discharge side of a water closet flushometer valve or manually operated flush valve. Vacuum breakers shall have a minimum clearance of 6 inches above the flood level of the fixture to the critical level mark unless otherwise permitted in their approval.

(6) *Flush tanks.* Water closet flush tanks shall be equipped with an approved or listed anti-siphon ball cock which shall be installed and maintained with its outlet or critical level mark not less than 1 inch above the full opening of the overflow pipe.

(7) *Hose bibbs.* When provided, all exterior hose bibbs and laundry sink hose connections must be protected by a listed nonremovable backflow prevention device. This requirement is not applicable to hose connections provided for automatic washing machines with built-in backflow prevention or water heater drain valves.

(8) *Flushometer tanks.* Flushometer tanks must be equipped with an approved air gap or vacuum breaker assembly that is located above the flood-level rim above the fixture.

(c) *Water heater safety devices*—(1) *Relief valves.* (i) All water heaters shall be installed with approved and listed fully automatic valve or valves designed to provide temperature and pressure relief.

(ii) Any temperature relief valve or combined pressure and temperature relief valve installed for this purpose shall have the temperature sensing element immersed in the hottest water within the upper 6 inches of the tank. It shall be set to start relieving at a pressure of 150 psi or the rated working pressure of the tank whichever is lower and at or below a water temperature of 210 °F.

(iii) Relief valves must be provided with full-sized drains, with cross sectional areas equivalent to that of the relief valve outlet. The outlet of a pressure relief valve, temperature relief valve, or combination thereof, must not be directly connected to the drainage system. The discharge from the relief valve must be piped full size separately to the exterior of the manufactured home, not underneath the home, or to an indirect waste receptor located inside the manufactured home. Exterior relief drains shall be directed down and shall terminate between 6″ and 24″ above finished grade. Drain lines must be of a material listed for hot water distribution and must drain fully by gravity, must not be trapped, and must not have their outlets threaded, and the end of the drain must be visible for inspection.

(iv) Relief valve piping designed to be located underneath the manufactured home is not required to be installed at the factory provided the manufacturer designs the system for site assembly and also provides all materials and components including piping, fittings, cement, supports, and instructions for proper site installation.

(d) *Materials*—(1) *Piping material.* Water pipe shall be of standard weight brass, galvanized wrought iron, galvanized steel, Type K, L or M copper tubing, approved or listed plastic or other approved or listed material.

(i) *Plastic piping.* All plastic water piping and fittings in manufactured homes must be listed for use with hot water.

(ii) [Reserved]

(2) *Fittings.* Appropriate fittings shall be used for all changes in size and where pipes are joined. The material and design of fittings shall conform to the type of piping used. Special consideration shall be given to prevent corrosion when dissimilar metals are joined.

(i) Fittings for screw piping shall be standard weight galvanized iron for galvanized iron and steel pipe, and of brass for brass piping. They shall be installed where required for change in direction, reduction of size, or where pipes are joined together.

(ii) Fittings for copper tubing shall be cast brass or drawn copper (sweat-soldered) or shall be approved or listed fittings for the purpose intended.

(3) *Prohibited material.* Used piping materials shall not be permitted. Those pipe dopes, solder, fluxes, oils, solvents, chemicals, or other substances that are toxic, corrosive, or otherwise detrimental to the water system shall not be used. In addition, for those manufactured homes to be connected to a public water system, all water piping shall

be lead-free (as defined in section 109(c)(2) of the Safe Drinking Water Act Amendments of 1986) with solders and flux containing not more than 0.2 percent lead and pipes and pipe fittings containing not more than 8.0 percent lead.

(e) *Installation of piping*—(1) *Minimum requirement.* All piping equipment, appurtenances, and devices shall be installed in workmanlike manner and shall conform with the provisions and intent of this standard.

(2) *Screw pipe.* Iron pipe-size brass or galvanized iron or steel pipe fittings shall be joined with approved or listed standard pipe threads fully engaged in the fittings. Pipe ends shall be reamed to the full bore of the pipe. Pipe-joint compound shall be insoluble in water, shall be nontoxic and shall be applied to male threads only.

(3) *Solder fittings.* Joints in copper water tubes shall be made by the appropriate use of approved cast brass or wrought copper fittings, properly soldered together. The surface to be soldered shall be thoroughly cleaned bright mechanically. The joints shall be properly fluxed and made with a solder that contains no more than 0.2 percent lead.

(4) *Flared fittings.* A flaring tool shall be used to shape the ends of flared tubing to match the flare of fittings.

(5) *Plastic pipe and fittings.* Plastic pipe and fittings shall be joined by installation methods recommended by the manufacturer or in accordance with provisions of a listed standard.

(f) *Size of water supply piping*—(1) *Minimum size.* The size of water supply piping and branch lines shall not be less than sizes shown in the following table:

MINIMUM SIZE TUBING AND PIPE FOR WATER DISTRIBUTION SYSTEMS

Number of fixtures	Tubing (nominal)		Pipe iron pipe size (inches)
	Diameter (inches)	Outer diameter (inches)	
1	*¼	⅜	½
2	⅜	½	½
3	½	⅝	½
4	½	⅝	½
5 or more	¾	⅞	¾

*6 ft maximum length.

Exceptions to table: ⅜ inch nominal diameter or ½ inch OD minimum size for clothes washing or dishwashing machines, unless larger size is recommended by the fixture manufacturer. ½ inch nominal diameter or ⅝ inch OD minimum size for flushometer or metering type valves unless otherwise specified in their listing. No galvanized screw piping shall be less than ½ inch iron pipe size.

(2) *Sizing procedure.* Both hot and cold water piping systems shall be computed by the following method:

(i) *Size of branch.* Start at the most remote outlet on any branch of the hot or cold water piping and progressively count towards the water service connection, computing the total number of fixtures supplied along each section of piping. Where branches are joined together, the number of fixtures on each branch shall be totalled so that no fixture is counted twice. Following down the left-hand column of the preceding table a corresponding number of fixtures will be found. The required pipe or tubing size is indicated in the other columns on the same line.

(ii) A water heater, food waste disposal unit, evaporative cooler or ice maker shall not be counted as a water-using fixture when computing pipe sizes.

(g) *Line valves.* Valves, when installed in the water supply distribution system (except those immediately controlling one fixture supply) and when fully opened, shall have a cross-sectional area of the smallest orifice or opening, through which the water flows, at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

[40 FR 58752, Dec. 18, 1975. Redesignated at 44 FR 20679, Apr. 6, 1979, as amended at 52 FR 4586, Feb. 12, 1987; 53 FR 23611, June 23, 1988; 58 FR 55014, Oct. 25, 1993; 78 FR 73986, Dec. 9, 2013; 86 FR 2521, Jan. 12, 2021]

§ 3280.610 Drainage systems.

(a) *General.* (1) Each fixture directly connected to the drainage system shall be installed with a water seal trap (§ 3280.606(a)).

(2) The drainage system shall be designed to provide an adequate circulation of air in all piping with no danger of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.