

**Installation Standard
For
PE-RT HOT AND COLD WATER
DISTRIBUTION SYSTEMS**

IS XX-2010

1.0 SCOPE

1.1 This Standard shall govern the installation of tubing in potable hot and cold water distribution systems within and under buildings and shall apply only to Polyethylene of Raised Temperature (PE-RT) tubing meeting the requirements of ASTM F 2769 and fittings meeting the requirements of ASTM F 2159, F 2735, F2769, F2098, or F 1807. Installation, materials, and inspection should comply with the current edition of the Uniform Plumbing Code (UPC) published by the International Association of Plumbing and Mechanical Officials (IAPMO), and shall also comply with this standard and manufacturer's installation recommendations.

NOTE: *The following sections of the Uniform Plumbing Code shall apply to composite PE-RT water distribution systems.*

- 310.0** Workmanship
- 313.0** Protection of Piping, Materials, and Structures
- 316.1** Types of Joints
- 316.2.3** Connections Plastic Pipe to Other Materials

Chapter 6 Water Supply and Distribution

Chapter 2* DEFINITIONS

ASTM	American Society for Testing and Materials
IAPMO	International Association of Plumbing and Mechanical Officials
PE-RT	Polyethylene of Raised Temperature
UPC	Uniform Plumbing Code as published by IAPMO

2.0 PRODUCT REQUIREMENTS

2.1 Materials and Fittings

2.1.1 Materials. Materials shall comply with the following requirements:

Materials	ASTM Standard
Polyethylene of Raised Temperature (PE-RT)	F 2769
Insert Fittings for PE-RT	F 2159, F 2735, F1807, F 2769, F 2098

2.1.2 Tubing. PE-RT tubing shall comply with ASTM F 2769

2.1.3 Fittings. Fittings shall be metal or plastic insert type and shall comply with ASTM F 2159, F2735, F2769, F 2098 or F 1807. Fittings are limited to the following types:

- (a) Insert fittings or compression type fittings,

- (b) Special listed fittings of other types.
 - Connections to galvanized pipe or fittings shall be specifically designed for that purpose.

PE-RT	160 psi at 73°F (1103 kPa at 23°C)	100 psi at 180°F (690 kPa at 82°C)
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NOTE 1: *Manufacturers of fittings shall recommend assembly procedures.*

2.2 Markings

2.2.1 Tubing. Tubing shall be legibly marked at intervals of not more than 5 ft. (1.5m) with at least the following:

- (a) Manufacturer's name or trademark;
- (b) ASTM F 2769
- (c) Nominal tubing size;
- (d) Material type – PE-RT;
- (e) Pressure ratings for water and the temperature for which the temperature rating is valid;
- (f) Mark of an acceptable certification agency;
- (g) Manufacturer's date and material code;
- (h) Standard dimension ratio, SDR 9;
- (i) Standard designation(s) of the fitting system(s) for which the tubing is recommended for use by the tubing manufacturer. [UPC 301.1.2]

The elevated temperature and pressure ratings for PE-RT in accordance with ASTM F 2769 are

2.2.2 Fittings. Fittings shall be marked with at least the following:

- (a) Manufacturer's name or trademark or other acceptable Markings; and
- (b) The mark of an acceptable certification agency.
- (c) If size permits, ASTM F 2769, F 2159, F 2735, F 1807 or F 2098 whichever is applicable. [UPC 301.1.2]

2.2.3 Position of Markings. When practical, markings shall be visible for inspection. Markings shall be visible prior to installation.

2.3 Protection of Tubing

2.3.1 Abrasion. Tubing passing through metallic studs, joists, or hollow masonry walls shall be protected from abrasion or sharp edges by elastomeric or plastic sleeves, grommets, conical shaped punch holes or other approved means.

2.3.2 Puncture. Steel plate protection, minimum 18 gauge, shall be installed when the tubing is within 1" (25 mm) of the nailing surface. [UPC 313.9]

2.4 Exposed Tubing

2.4.1 General – Where exposed tubing may be subjected to mechanical damage it must be protected.

2.4.2 Freezing. In areas where the system must be drained to protect

the system from freezing, horizontal lines shall be graded to drain.

2.4.3 Storage. Tubing shall be stored in a way to protect the system from mechanical damage (slitting, puncturing, etc.). Tubing should be stored undercover to keep it clean and avoid long term exposure to sunlight. Tubing may be stored in coils of number size and length recommended by the manufacturer. Consult tubing manufacturer for recommended limits for outside storage.

2.5 Thermal Expansion

2.5.1 General. The linear expansion rate for PE-RT is approximately 1.1 in. (28 mm) per 100 ft. (30 mm) of tube per 10°F (5.6°C) change in temperature. When installing long runs of tubing, allow 1/8 to 3/16 in. (10 to 14 mm) of run to accommodate thermal expansion. Tubing should not be anchored rigidly to support but allowed freedom of movement to expand and contract.

2.5.2 Clearance. Bored holes and sleeves shall provide adequate clearance between the piping and structure to allow for free longitudinal movement.

2.6 Hangers and Supports

2.6.1 Vertical Tubing. Vertical tubing shall be supported at every floor. Tubing shall have a mid-story guide.

2.6.2 Horizontal Tubing. The maximum recommended spacing between horizontal supports is 32 in. (800 mm) for all sizes.

2.6.3 Hangers and Anchors. Tubing shall not be anchored rigidly to a support; but shall be secured with smooth plastic strap hangers, which

permit ease of movement during expansion/contraction cycles. Do not use hangers or straps with sharp or abrasive edges. Do not use hangers that pinch the tubing. [UPC 314.0]

2.7 Inspection and Testing

A. Inspection. All tubing shall be properly seated on to the fitting per the manufacturer instructions. For crimp fittings, each crimped joint shall be checked. Buckled, gouged or obviously damaged pipe shall not be used. Consult manufacturer recommendations for repair procedures.

B. Testing. Upon completion of a section or of the entire hot and cold water supply system it shall be tested and proved tight under a water pressure or air test not less than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source. The system shall withstand the test without leaking for a period of not less than fifteen (15) minutes.

2.8 Joints and Connections

2.8.1 Procedure. Tubing should be cut with a tube cutter designed specifically for tubing. Tubing shall be cut square, i.e. perpendicular to the length. No other cutting methods shall be used and care must be taken to remove any excess material, flashing, or burrs.

2.8.2 Tools. Fitting manufacturer's recommended tool shall be used with the insert fitting systems. For specific procedures, follow the manufacturer's recommendations.

2.8.3 Transition Joints

2.8.3.1 Fittings. Transitions for tubing to metal piping or valves shall be made only with transition fittings intended for that purpose.

2.8.4 Joints. Joints shall not be allowed in tubing installed in or under a concrete slab resting on grade unless for repair within a building structure. All repair joints must be properly protected with a heat shrink sleeve. All slab penetrations shall be sleeved.

2.9 Pressure Relief Valves

2.9.1 PE-RT Tubing. PE-RT tubing used for temperature and/or pressure relief valve drain lines shall be graded to the outlet end and shall be supported at a maximum of 32 in. (800 mm) interval horizontally. Vertical tubing shall be supported at every floor. Vertical tubing shall have a mid-story guide.

2.10 Installation

2.10.1 Bends. Tubing shall be bent at room temperature hand to a minimum radius of 6 times the outside diameter. Outside diameter is equal to nominal diameter plus 1/8 in. (3 mm). Nominal precaution is taken to avoid buckling or flattening. Fix the tubing by supports on both sides of the bend at installation.

2.10.2 Damage. Kinked, buckled, gouged, or other obvious damaged pipe shall not be used.

2.10.3 Finish Nipples. Finish nipples shall be connected to drop ear fittings to prevent rotation. Finish nipples shall not be PEX.

2.10.4 Hose Bibs. The piping directly connected to any hose bib shall be so anchored that the load on the hose bib will not strain the composite piping.

2.10.5 Heated Joints. An open flame shall not be applied to PE-RT tubing when brazing, soldering or welding joints.

2.10.6 Working Pressure and Temperature. Long term working pressures for the PE-RT shall not exceed a maximum of 100 psi (690 kPa) and the long term working temperature shall not exceed 180°F (82°C).

2.10.7 Exposure to Sunlight. Only UV stabilized composite piping can be subjected to direct sunlight after installation and can be installed on the surface of the building. Composite pipe contains an ultraviolet (UV) inhibitor to withstand limited exposure to UV light. Manufacturer recommends placing the unused portion of a coil back in the product's box rather than storing in the sunlight while not in use.

2.10.8 Water Heater Connections.

Components may not be suitable for use with the instantaneous type (coil or immersion) water heater. Components are suitable for use with storage type water heaters with connections made in an approved manner.

2.10.9 Water Hammer Arrestors. A composite hot water system will withstand repeated pressure surges, well in excess of its rated pressure. The Uniform Plumbing Code requires a means of attenuating water hammer. Consequently water hammer arrestors shall be required when solenoid valves or other quick closing devices are used in the system. In designing for such situations, it is advisable to consult the pipe or fittings manufacturer for recommended surge pressure limits. Water hammer and surge pressure

calculations are reviewed in Chapter 7, AWWA Manual M-11. [UPC 609.10]

2.11 Sizing

2.11.1 Method – Tubing shall be sized in accordance with UPC Section 610.0. Maximum velocities through PE-RT copper alloy fittings shall be limited to eight (8) feet per second (fps) (2.4 mps) in cold water and five (5) feet per second (fps) (1.52 mps) in hot water. [UPC 610.0]