



Uponor Ltd.  
2000 Argentia Road  
Plaza 1, Suite 200  
Mississauga, ON L5N 1W1  
888.994.7726  
[www.uponorpro.com](http://www.uponorpro.com)

## Section 22 11 16

### Domestic Water Piping

#### 1.0 General

##### 1.1 SUMMARY

- .1 Section Includes: Cross-Linked Polyethylene (PEX) tubing and fittings for a potable water distribution system.
  - .1 Provide labour, materials, transportation, equipment and services to install a PEX tubing potable water distribution system where indicated on the Contract Drawing and specified herein.
- .2 Related Sections:
  - .1 Examine all other portions of the subcontract documents for work or other terms and conditions related to the work of this section.
  - .2 Provide all work hereunder as required for the support and accommodation of related work.

##### 1.2 REFERENCES

- .1 General: Standards listed by reference, including revisions by issuing authority, form part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title, or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- .2 American Society for Testing and Materials (ASTM):
  - .1 ASTM F876 Standard Specification for Cross-Linked Polyethylene (PEX) Tubing.
  - .2 ASTM F877 Standard Specification for Cross-Linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems.
  - .3 ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-Linked Polyethylene (PEX) Tubing.
- .3 Canadian Standards Association (CSA):
  - .1 CAN/CSA B137.5 Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications.
- .4 National Sanitation Foundation (NSF):

- .1 NSF/ANSI 14 Plastic Piping System Components and Related Materials
- .2 NSF/ANSI 61 Drinking Water System Components – Health Effects.
- .5 Underwriters’ Laboratories of Canada Inc:
  - .1 CAN/ULC-S101 Standard Methods of Fire Endurance Tests of Building Construction and Materials.
  - .2 CAN/ULC-S115 Standard Method of Fire Tests of Firestop Systems.
  - .3 CAN/ULC-S102.2 Standard for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.
- .6 Plastic Pipe Institute (PPI):
  - .1 PPI Technical Report TR-4.
- .7 Uponor, *AQUAPEX Installation Handbook*, current edition.
- .8 Uponor, *Plumbing Design Assistance Manual (PDAM)*, current edition.

### 1.3 SYSTEM DESCRIPTION

- .1 Performance Requirements: Provide PEX tubing potable water distribution system which has been manufactured, fabricated and installed to comply with Federal, Provincial and Municipal plumbing and building codes and to maintain performance criteria stated by manufacturer without defects, damage or failure.

### 1.4 SUBMITTALS

- .1 General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- .2 Product Data: Submit product data for specified products.
  - .1 Submit verification of Standard Grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4. The following 3 Standard Grade ratings are required: 200 degrees F (93 degrees C) at 80 psi (551 kPa); 180 degrees F (82 degrees C) at 100 psi (689 kPa) and 73.4 degrees F (23 degrees C) at 160 psi (1102 kPa).
  - .2 Submit Product Submittal sheets for tubing, manifolds, brackets, pre-sleeved tubing, pre-insulated tubing, supports, tubing/fitting connection system, valves and fittings.
- .3 Regulatory Listings: Submit applicable UL, ULC, Warnock Hersey, Intertek or QAI and CSA or NSF listings as proof of compliance with Federal, Provincial and Municipal plumbing and building codes.
  - .1 Submit listings that indicate that the PEX tubing system has been listed to CAN/ULC-S101 when the PEX tubing is incorporated in and traverses a CAN/ULC-S101 floor/ceiling assembly and wall assembly. The listing must be appropriate to assemblies on site.
  - .2 Submit listings that indicate that the PEX tubing firestop system has been listed to CAN/ULC-S115 where the PEX tubing penetrates a fire separation. The listing must be appropriate to assemblies on site.
  - .3 Submit listings that indicate that the PEX tubing system has been listed to CAN/ULC-S102.2 for maximum 25 flame spread and maximum 50 smoke developed.
  - .4 Submit listings that indicate that the PEX tubing system has been listed to CAN/CSA-B137.5.
- .4 Quality Assurance Submittals: Submit the following:
  - .1 Copy of manufacturer’s letter indicating that the installer has been recognized by the manufacturer as a “Trained Installer” trained in the use of its PEX tubing potable water distribution system.
  - .2 Manufacturer’s Instructions: Manufacturer’s installation instructions.

- .3 Installer shall provide in writing to the project owner that the PEX tubing and components furnished under this specification conforms to the material and mechanical requirements specified herein.
- .4 Installer shall provide manufacturer's letter that any firestop coming in contact with the PEX tubing is chemically compatible with the PEX tubing.
- .5 Submit CSA listing that the PEX tubing, PEX rings and PEX fittings from the same manufacturer have been tested together and certified as a system.
- .5 Closeout Submittals: Submit the following:
  - .1 Warranty: Warranty documents specified herein.
  - .2 Manufacturer's Field Reports: Manufacturer's field reports specified herein.
  - .3 Record Documents: Project record documents for installed materials in accordance with Division 1 Closeout Submittals (Project Record Documents) Section.

## 1.5 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Installer Qualifications: Installer shall be experienced in performing work of this section and has specialized in installation of work similar to that required for this project.
  - .2 Installer Qualifications: Installer shall be recognized by the tubing/fitting manufacturer as a "Trained Installer".
  - .3 Installation Qualifications: Installation must be by skilled tradesmen holding a trade qualification license or apprentices under the supervision of a licensed tradesman.
- .2 Regulatory Requirements: PEX tubing and components shall be installed in full compliance with all Federal, Provincial and Municipal codes, standards and requirements. In particular:
  - .1 CAN/ULC S102.2:
    - .1 As outlined in CAN/ULC S102 Appendix Section A1.23, Plastic Fittings and Valves, fittings shall be tested and listed by being mounted to plastic pipe in a method that is representative of field installation.
    - .2 ½" PEX tubing, fittings and PEX ring with no restriction on tubing spacing shall be listed to a Maximum 25 flame spread / 50 smoke developed.
    - .3 ¾ " to 1" PEX tubing, fittings and PEX ring with 18" tube spacing restriction shall be listed to a Maximum 25 flame spread / 50 smoke developed.
    - .4 Up to 2 " PEX tubing, fittings and PEX ring shall be listed to a Maximum 25 flame spread / 50 smoke developed when covered with rated Armaflex insulation.
    - .5 Up to 3" PEX tubing and fittings and PEX ring shall be listed to a Maximum 25 flame spread / 50 smoke developed when covered with rated fiberglass insulation.
  - .2 CAN/ULC S115:
    - .1 PEX tubing penetrating a fire separation shall be sealed per CAN/ULC-S115.
  - .3 CAN/ULC S101:

- .1 PEX tubing contained within a fire separation shall be listed per CAN/ULC-S101.
- .2 Ice maker & laundry boxes when contained within a fire separation shall be listed as part of the assembly to CAN/ULC S101.
- .3 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings) Section.

## **1.6 DELIVERY, STORAGE AND HANDLING**

- .1 General: Comply with Division 1 Product Requirements Sections.
- .2 Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- .3 Delivery: Deliver materials to job site in manufacturer's original, unopened, undamaged containers with identification labels intact.
- .4 Storage and Protection: Store materials protected from exposure to harmful weather and job site conditions.
  - .1 Store PEX tubing in original packaging or under cover to avoid dirt or foreign material from being introduced into the tubing.
  - .2 Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, installer is responsible for providing UV protection to portions of tubing exposed to direct sunlight.

## **1.7 WARRANTY**

- .1 Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- .2 PEX Manufacturer's Warranty: Warranty must meet the following conditions:
  - .1 PEX tubing and fittings shall carry a twenty-five (25) year non-prorated warranty against failure due to defect in material or workmanship and;
  - .2 All tubing manufacturer's valves and stops shall carry a one (1) year non-prorated warranty against failure due to defect in material or workmanship and;
  - .3 The assembly of manufacturer's tubing and fittings shall carry a twenty-five (25) year non-prorated warranty on maintaining a leak-proof seal and;
  - .4 Warranty shall provide for repair or replacement of any tube, fittings or connection, which are proven to be defective and pay for consequential damages and;
  - .5 Warranty shall be transferable to subsequent owners and;
  - .6 Effective Warranty: Current manufacturer's warranty at time of installation and;
  - .7 Warranty Period: Warranty shall commence on Date of Substantial Completion.

## **2.0 Products**

### **2.1 PEX POTABLE WATER DISTRIBUTION SYSTEM**

- .1 All PEX tubing, fittings and fitting assembly shall be by one manufacturer.

- .2 All PEX tubing, PEX rings and PEX fittings from the same manufacturer have been tested together and certified as a system
- .3 Manufacturer: Uponor Ltd.
- .4 Proprietary System: Uponor AQUAPEX Professional Plumbing System.

## 2.2 PRODUCT SUBSTITUTIONS

- .1 Substitutions: No substitutions permitted.

## 2.3 MATERIALS

- .1 Tube Materials: Tube shall be cross-linked polyethylene (PEX) manufactured by PEX-a or peroxide method.
  - .1 Tubing Type: Uponor AQUAPEX tubing.
  - .2 PEX tubing shall be ASTM F876 tested and approved for excessive temperature and pressure for 725 hours at 210 degrees F (99 degrees C) @ 150 psi (1035 kPa).
  - .3 PEX tubing shall be manufactured in accordance with ASTM F876, ASTM F877 and CAN/CSA-B137.5. The tube shall be listed to ASTM by an independent third party agency.
  - .4 PEX tubing shall be listed to both NSF/ANSI 14 and 61.
  - .5 PEX tubing shall have Standard Grade hydrostatic design and pressure ratings of 200 F (82 degrees C) at 80 psi (551 kPa), 180 degrees F (82 degrees C) at 100 psi (689 kPa), and 73.4 degrees F (23 degrees C) at 160 psi (1102 kPa). Temperature and pressure ratings shall be issued by the Plastic Pipe Institute (PPI), a division of the Society of the Plastic Industry (SPI).
  - .6 Minimum bend radius for cold bending of the PEX tubing shall not be less than six (6) times the outside diameter. Bends with a radius less than stated shall require the use of a bend support as supplied by tube manufacturer.
  - .7 PEX tube dimensions shall be:
    - .1 ½" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .2 ¾" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .3 1" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .4 1 ¼" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .5 1 ½" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .6 2" nominal inside diameter in accordance with ASTM F876 and ASTM F877 and/or,
    - .7 3" nominal inside diameter in accordance with ASTM F876 and ASTM F877 as indicated on contract drawings.
- .2 Pre-Sleeved Tubing: All PEX tubing that is incased in concrete shall be pre-sleeved in corrugated polyethylene tubing. **[Specifier may choose to remove this clause if local codes allow]**
  - .1 Pre-sleeved tubing shall be supplied by the PEX tubing manufacturer.
- .3 Pre-Insulated Tubing: All ½" to 1" PEX tubing that is required to be insulated shall be pre-insulated with ½" PEX-foam insulation. This insulation requirement does not apply to tubing that is required to be insulated to the requirements of ASHRAE 90.1.

- .1 Pre-insulated tubing shall be supplied by the PEX tubing manufacturer.
- .4 Manifold Materials: Manifolds shall be manufactured of Engineered Polymers (EP). Manifold connections shall be made to the requirements of ASTM F1960.
  - .1 Manifolds shall be supplied by the PEX tubing manufacturer.
  - .2 PEX-a cold expansion type manifolds shall be an assembly consisting of insert and PEX-a cold expansion ring.
  - .3 Manifold Type: Uponor Engineered Polymer (EP) manifold.
- .5 Multi-Port Tee Materials: Multi-Port Tee's shall be manufactured of Engineered Polymers (EP). Multi-Port Tee connections shall be made to the requirements of ASTM F1960.
  - .1 Multi-Port Tee's shall be supplied by the PEX tubing manufacturer.
  - .2 PEX-a cold expansion type manifolds shall be an assembly consisting of insert and PEX-a cold expansion ring.
  - .3 Multi-Port Tee Type: Uponor Engineered Polymer (EP) Multi-Port Tee.
- .6 Fitting Materials: Fittings shall be manufactured of Engineered Polymer (EP). Lead free brass materials are allowed only for transition fittings. Fitting connections shall be made to the requirements of ASTM F1960.
  - .1 Fittings shall be supplied by the PEX tubing manufacturer.
  - .2 PEX-a cold expansion type fittings shall be an assembly consisting of insert and PEX-a cold expansion ring.
  - .3 Polymer Fitting Type: Uponor Engineered Polymer (EP) fittings.
  - .4 Brass Fitting Type: Uponor lead free brass fittings.
- .7 Insulation Materials: [Specify insulation materials for tubing above 1" and all tubing sizes when in installed in a building required to meet ASHRAE 90.1 standards]

## 2.4 ACCESSORIES

- .1 Outlet Boxes: Ice Maker and Washing Machine Outlet Boxes shall be supplied by the PEX tubing manufacturer.
- .2 Fixture Shut-Off Valves: Fixture Shut-Off valves shall be supplied by the PEX tubing manufacturer.
- .3 Tubing Wall Penetration Brackets: Brackets designed for tubing wall membrane penetrations shall be supplied by PEX tubing manufacturer.
  - .1 Bracket Type: Uponor ProPEX Out-of-the-Wall System.
- .4 Horizontal Pipe Support Channels: All horizontal pipe supports for PEX sizes 1" and greater shall be galvanized steel channels and self-gripping and be supplied by the PEX tubing manufacturer.
  - .1 Pipe Support Type: Uponor PEX-a Pipe Support.
- .5 Riser Clamps: All PEX riser clamps shall be epoxy coated.

## 2.5 RELATED MATERIALS

- .1 Related Materials: Refer to other sections listed in Related Sections paragraph herein for related materials.

## 3.0 Execution

### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: Comply with manufacturer's product data, including product technical bulletins, installation instructions and product carton instructions for installation.

**3.2 EXAMINATION**

- .1 Site Verification of Conditions: Verify conditions which have been previously installed under other sections, are acceptable for PEX tubing system installation in accordance with manufacturer's instructions.

**3.3 INSTALLATION**

- .1 PEX Potable Water Distribution System:
  - .1 Install PEX tubing in accordance with tubing manufacturer's recommendations, installation manuals and technical bulletins and as indicated on Contract Drawings.
  - .2 PEX tubing shall not be exposed to direct sunlight for more than 30 days.
  - .3 Insulation must cover the PEX tubing when exposed to a direct UV light source such as fluorescent light bulbs or any UV generating device.
  - .4 Ensure that no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the tube manufacturer.
  - .5 PEX tubing passing through structural concrete slabs shall be pre-sleeved with corrugated polyethylene as supplied by the manufacturer.
  - .6 PEX tubing passing through metal studs shall be use grommets or sleeves at the penetration.
  - .7 Protect PEX tubing with sleeves where abrasion may occur.
  - .8 Use strike protectors where PEX tubing has the potential for being struck with a screw or nail.
  - .9 Manufacturer's bend supports shall be used where bends are less than 6 times outside pipe diameter.
  - .10 All horizontal runs of 1" and greater PEX tubing runs shall be supported by PEX-a galvanized support channels.
  - .11 All fitting connections to the PEX tubing shall made to the requirements of ASTM F1960.
  - .12 Multi-Port Tee's shall be used in-suite wherever possible instead of straight or reducing tee's to minimize pressure drops in the plumbing distribution system.
  - .13 A mid-story support shall be installed in all PEX risers.
  - .14 An epoxy coated riser clamp shall be installed on top of every floor and against every second ceiling for all PEX risers.
  - .15 Manufacturer's wall penetration brackets shall be used at all wall membrane penetrations.
  - .16 **[Specify insulation installation requirements]**
  - .17 Pressurize PEX potable water distribution system with air or potable water in accordance with applicable codes or, in the absence of applicable codes, to a pressure of 25-psi (173 kPa) above normal working pressure of the system provided that the pressure and temperature rating on the tubing us not exceeded.
  - .18 Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Water shall not be used to pressurize the system if ambient air temperature has the possibility of dropping below 32 degrees F (0 degrees C).
- .2 Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

**3.4 FIELD QUALITY REQUIREMENTS**

- .1 Site Tests (Installation and Post-Installation Testing): [Specify applicable test requirements to be performed during and after product installation].
- .2 Manufacturer's Field Services: Provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
  - .1 Site Visits: [Specify number and duration of periodic site visits].

**3.5 CLEANING**

- .1 Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

**3.6 PROTECTION**

- .1 Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION