Uponor Professional Plumbing Installation Guide
Hot and Cold Potable Water Systems
This installation guide is published for building officials, plumbing professionals and contractors interested in Uponor professional plumbing systems. This manual describes general installation recommendations that use Wirsbo AQUAPEX® tubing or Wirsbo AQUAPEX® plus tubing products. Local code requirements should be followed.

Note: The Uponor plumbing system can include Wirsbo AQUAPEX tubing or Wirsbo AQUAPEX plus tubing. For readability, this document will refer to both Wirsbo AQUAPEX tubing and Wirsbo AQUAPEX plus tubing as Wirsbo AQUAPEX tubing when information applies to both.

Uponor has used reasonable efforts in collecting, preparing and providing quality information and material in this manual. However, system enhancements may result in modification of features or specifications without notice. For the most current technical information, go to the Uponor website at www.uponor-usa.com.

Uponor is not liable for installation practices that deviate from this manual or are not acceptable practices within the mechanical trades. Refer to the Uponor Residential Fire Safety System Installation Guide to install Wirsbo AQUAPEX tubing in Uponor’s fire sprinkler system.

Please direct any questions regarding the suitability of an application or a specific design to your local Uponor representative. For the name of your local representative, please call toll free (800) 321-4739.

Wirsbo AQUAPEX® tubing is a registered trademark of Uponor, Inc. D’MAND® and Structured Plumbing® are federally registered trademarks or trademarks of Advanced Conservation Technology, Inc.
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Section 1
The Uponor Plumbing System

The Uponor plumbing system consists of Wirsbo AQUAPEX® tubing, Uponor fittings, manifolds and additional components.

PEX is an acronym for crosslinked polyethylene. The PE refers to the raw material used to make PEX (polyethylene), and the X refers to crosslinking the polyethylene across its molecular chains. The molecular chains are linked into a three-dimensional network that makes PEX remarkably durable within a wide range of temperatures and pressures.

Uponor manufactures PEX tubing using the Engel method, a hot crosslinking process. The actual crosslinking takes place during the extrusion process when the base polyethylene is above its crystal-melting temperatures. Classified within the industry as PEX-a tubing, Engel-method PEX is superior to other types of PEX, resulting in consistent, uniform and evenly crosslinked PEX — with no weak links within its molecular chains. Wirsbo AQUAPEX also demonstrates a great resistance to chemical-dissolving agents. This unique structure is stable and inert, and is unaffected by chemicals commonly found in plumbing and heating systems.

Wirsbo AQUAPEX tubing has been used in plumbing systems around the world for more than 30 years — longer than any other flexible plumbing system on the market.

Applications
Uses for Wirsbo AQUAPEX tubing include:
• Potable hot and cold water distribution
• Water service
• Hydronic radiant floor, radiant ceiling, baseboard and radiator connections
• Snow and ice melting systems
• Turf conditioning systems
• Fire protection systems
• Permafrost systems
Ratings, Standards, Listings and Codes

Our extensive listings and history of system testing means that Wirsbo AQUAPEX can be installed in many types of residential and commercial structures, including, but not limited to:

- Homes
- Townhomes
- Daycare Centers
- Nursing Homes
- Gymnasiums
- Schools
- Theatres
- Hotels
- Restaurants
- Nursing Homes
- Restaurants
- Hospitals
- Apartments

Ratings

Wirsbo AQUAPEX has Standard Grade Hydrostatic Stress and Pressure Ratings in accordance with all four temperatures and pressures listed in Table 1 of ASTM F876. AQUAPEX tubing is tested in accordance with Plastic Pipe Institute (PPI) TR-3 and listed in PPI TR-4. The Standard Grade hydrostatic ratings are:

- 200°F at 80 psi
- 180°F at 100 psi
- 73.4°F at 160 psi

The Hydrostatic Stress Board of PPI issues these pressure and temperature ratings.

Wirsbo AQUAPEX has an additional rating of 120°F at 130 psi in accordance with UL1821 for ⅛-inch tubing.

Standards

Wirsbo AQUAPEX tubing; ProPEX advanced engineered plastic (EP) fittings; ProPEX and APR brass fittings; and copper and EP manifolds are manufactured to the following standards.

- ASTM F876 “Standard Specification for Crosslinked Polyethylene (PEX) Tubing”
- ASTM F2080 “Standard Specification for Cold-Expansion Fittings with Metal Compression Sleeves for Crosslinked Polyethylene (PEX) Pipe”
Listings

Wirsbo AQUAPEX is listed with the following agencies.

- ANSI/NSF 14 and 61 Certified
- Council of America Building Officials (CABO) One and Two Family Dwelling Code
- Heating Application Baseboard
- ICC ESR-1099
- UPC Listing — Files 3558, 3946, 3960
- U.S. Department of Housing and Urban Development (HUD) Material Release Number 1269
- Crosslinked Polyethylene Sprinkler and Fittings VIXR.EX5219

Codes

Wirsbo AQUAPEX listed to F876 and F877 is approved in the following model codes.

- International Plumbing Code (IPC)
- Uniform Plumbing Code (UPC)
- National Standard Plumbing Code (NSPC)

Wirsbo AQUAPEX is listed in the following model codes for water service.

- IPC
- UPC
- NSPC

Check with your local Uponor representative for code compliance in your area.
## Tubing Identification

The labeling (print line) on Wirsbo AQUAPEX tubing provides several identifications. For example, ½” Wirsbo AQUAPEX tubing reads as follows:

WIRSBO AQUAPEX® PEX 1006 ½IN SDR9/ B137.5 POTABLE / (ASTM F876/F877/F2023) (ASTM F1960/F2080) /ICC ESR-1099/ ICBO ES ER4407/ HUD MR1269b (WHI-LISTED CAN/US FS25/SD50)/160PSI 73.4°F/100PSI 180°F/80PSI 200°F WIRSBO-PEX-a TUBING UN04950127

### Print Stream on Tubing

<table>
<thead>
<tr>
<th>WIRSBO AQUAPEX®</th>
<th>Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEX 1006</td>
<td>ASTM F2023 testing I/A/W ASTM F876</td>
</tr>
<tr>
<td>½ IN</td>
<td>Tubing Size (example: ½ inch)</td>
</tr>
<tr>
<td>SDR9</td>
<td>Standard Dimensional Ratio of 9</td>
</tr>
<tr>
<td>✚ B137.5 POTABLE</td>
<td>Potable Water Listing by CSA</td>
</tr>
<tr>
<td>✇ 130PSI 120° UL 1821</td>
<td>Rating I/A/W UL 1821 (½”, ¾” &amp; 1” only)</td>
</tr>
<tr>
<td>ULC-ORD C199P</td>
<td>Canadian Rating I/A/W UL 1821 and C199P</td>
</tr>
<tr>
<td>✇ ASTM F876/F877/F2023</td>
<td>Tubing Standards listed by NSF</td>
</tr>
<tr>
<td>✇ ASTM F1960/F2080</td>
<td>Fitting Standards listed by NSF</td>
</tr>
<tr>
<td>✇ IAPMO Reports 3558, 3946, 3960</td>
<td></td>
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<tr>
<td>✇ ICC ESR-1099</td>
<td>ICC Evaluation Services Report 1099</td>
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<tr>
<td>✇ ICBO ES ER4407</td>
<td>ICBO Evaluation Services Report ER4407</td>
</tr>
<tr>
<td>✇ HUD MR1269b</td>
<td>HUD Material Release Report 1269b</td>
</tr>
<tr>
<td>✇ WHI-LISTED CAN/US FS25/SD50</td>
<td>Warnock Hersey listing for 25/50 Plenum Rating</td>
</tr>
<tr>
<td>✇ 160PSI 73.4°F/100PSI 180°F/80PSI 200°F</td>
<td>Hydrostatic Ratings from PPI per ASTM F876</td>
</tr>
<tr>
<td>✇ WIRSBO-PEX-a TUBING</td>
<td>Type of Crosslinking (PEX-a)</td>
</tr>
<tr>
<td>✇ UN04950127</td>
<td>Manufacturing Code to audit material source</td>
</tr>
<tr>
<td>✇ xxxxxxx</td>
<td>Footage marker in increments of three feet</td>
</tr>
</tbody>
</table>

1 For ½-inch tubing only
2 USA, Material Type, Extruder No., Year, Month, Day
3 Footage marking in increments of three
Fire-resistant Construction Standards

National building codes, such as the IBC and UBC, require that products used in construction meet specific standards. Uponor PEX has achieved the following fire-resistant construction ratings when tested in accordance with the applicable standards.

  - UL Design No. L557 rating applies to \( \frac{1}{2} \), \( \frac{3}{4} \), 1", 1\( \frac{1}{4} \), 1\( \frac{1}{2} \), and 2" Wirsbo AQUAPEX tubing, fittings and manifolds installed in one-hour wood frame floor and ceiling assemblies.
  - UL Design No. K913 rating applies to \( \frac{1}{2} \), \( \frac{3}{4} \), 1", 1\( \frac{1}{4} \), 1\( \frac{1}{2} \), and 2" Wirsbo AQUAPEX tubing, fittings and manifolds installed in one- and two-hour concrete floor/ceiling unrestrained (and restrained) assemblies.
  - UL Design No. V444 rating applies to \( \frac{1}{2} \), \( \frac{3}{4} \), 1", 1\( \frac{1}{4} \), 1\( \frac{1}{2} \), and 2" Wirsbo AQUAPEX tubing, fittings and manifolds installed in one-hour steel stud/gypsum wallboard wall assemblies.
  - UL Design No. U372 rating applies to \( \frac{1}{2} \), \( \frac{3}{4} \), 1", 1\( \frac{1}{4} \), 1\( \frac{1}{2} \), and 2" Wirsbo AQUAPEX tubing, fittings and manifolds installed in one-hour wood stud/gypsum.

  - Certification of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 for \( \frac{3}{8} \) through 2" Wirsbo AQUAPEX tubing.

**Note:** Uponor’s \( \frac{3}{8} \) through 2" Wirsbo AQUAPEX tubing meets the ASTM E84 requirements if covered with \( \frac{1}{2} \)" fiberglass insulation. The tubing runs may be 0" apart for a maximum of three adjacent pipes with an additional 18" spacing to the next pipe runs. There shall be no exposed tubing.

**Note:** The listing to ASTM E84 requires that tubing runs are located at least 18 inches apart for \( \frac{3}{8} \)" through \( \frac{3}{4} \)" tubing without insulation.
Firestop Listings
Numerous firestop manufacturers have tested their products with PEX tubing. These tests establish the installation procedures for installing the firestop around the PEX tubing at the penetration. These test assemblies are divided into sections based on the type of penetration (e.g., wall, floor and ceiling, etc.).

Not all caulks are approved for all penetrations. Ensure the penetration is sealed in accordance with the appropriate test assembly using that manufacturer’s recommended type of firestop material. Larger penetrations may not use a caulk type of firestop, but rather a wrap or collar assembly may be required. Refer to the respective firestop manufacturer for more information pertaining to the appropriate application of their products.
Section 2
Installation Options and Applications

This section outlines the five installation options for Wirsbo AQUAPEX tubing.

1. Structured Plumbing®
   Remote Manifolds with On-demand or Timed Recirculation

   • Manifolds are located near fixture groups.
   • The short drop length (from supply line to fixtures) minimizes the amount of water that needs to be purged for hot water to flow from a fixture.
   • An extension of the hot-water supply line becomes a return line to allow recirculation of hot water.
   • On-demand recirculation provides significant water and energy savings.
   • This method takes advantage of the benefits derived from the flexibility of PEX tubing.
   • This installation method features a significant reduction in the number of individual connections (compared to run-and-branch).
2. Remote Manifolds

**Installation Considerations**

- Branch manifolds are located near fixture groupings.
- This method takes advantage of the flexibility of PEX tubing.
- This installation method features a significant reduction in the number of individual connections (compared to run-and-branch).
3. Home-run (Parallel Piping) Installation

Installation Considerations
- Centralized manifold(s) distribute water to points-of-use.
- Manifolds may be valved or valveless and located near a hot-water source and cold-water incoming supply.
- If valved manifolds are used, water supply to fixtures may be controlled at the manifold (check local codes).
- This installation method features dedicated supply lines from manifold to each individual fixture.
- This method minimizes the number of connection points (fittings) in overall system.
- This method may generally require more tubing (total length) than in other configurations.
- High tubing density at some points requires space planning.
- This method can result in reduced waiting time for hot water at fixtures if dedicated supply lines are shortened. Uponor recommends less than 50 feet.
4. Modified Home-run Installation

**Installation Considerations**

- This method is similar to home run, but uses several flow-through sub-manifolds instead of centralized manifolds.

- Sub-manifolds may be either valved or valveless. Valveless sub-manifolds can be installed behind a wall or in an inaccessible location.

- This method typically uses less tubing (total length) than a home-run system.

- This method features lower tubing density (at some points) than the home-run method.

- This method may provide faster hot-water delivery to individual fixtures compared to some other configurations.
5. Run-and-branch Installation

**Installation Considerations**

- This is the same method as used for configuring rigid plumbing systems (copper or CPVC).
- A directional fitting (e.g., tee or ell) is used each time as necessary to change the direction of a tubing run.
- This method requires more fittings than most other configurations.
- The flexibility of PEX is not used to its best advantage.
- Hot-water delivery may be slow due to the large volume of water in the system.
Applications

Recirculation Systems
Based on our extensive history of use and testing, Uponor provides the following guidelines for using Wirsbo AQUAPEX tubing and corresponding fitting systems in recirculating systems.

1. Uponor highly recommends using the Uponor D’MAND® Hot Water Delivery system for optimized system performance. The D’MAND system delivers hot water only when called for by the end user, providing fast hot water delivery while maximizing water and energy savings. Wirsbo AQUAPEX is ideally suited for systems operating up to 140°F.

2. Wirsbo AQUAPEX may be used in timed recirculation systems operating at temperatures not exceeding 140°F.

3. Wirsbo AQUAPEX may be used in continuous recirculation systems operating at temperatures not exceeding 140°F.

   Note: Uponor does not promote the use of continuous recirculation due to excessive energy waste.

4. The tubing is marked with the following designation as required by the most recent edition of ASTM F876: PEX 1006. The first digit indicates chlorine-resistance testing. 1 = Compliance with ASTM F876 chlorine-resistance testing. 0 = no chlorine resistance or not tested.

5. Do not exceed the published temperature and pressure ratings of the tubing.

6. Using recirculation systems may increase the risk of scalding. Thus, Uponor recommends limiting the delivered water temperature to 120°F in all cases.

Uponor Residential Fire Safety Systems
The Uponor Residential Fire Safety System was developed by Uponor as a residential fire protection system that is installed in combination with the cold side of the domestic potable water system. Only licensed contractors trained by Uponor can install this system. Contact your local Uponor representative for more information concerning training and project support for the Uponor Residential Fire Safety System.
**Combined Potable Water and Hydronic Heating Systems**

Wirsbo AQUAPEX is used in combined potable water and hydronic heating systems only where allowed by code. Depending on the heating control strategy employed, these systems typically do not exceed 140°F. Should the system water temperature exceed 140°F, the installing contractor is responsible for providing anti-scald devices to protect the inhabitants. In addition, the installer must ensure, and is responsible for, providing weekly off-season (summer) circulation through the heating portion of the system to prevent water stagnation.

Refer to your local plumbing and heating code official as to whether these combined systems are allowed in your area. If allowed within your area, ensure a proper heat loss and design is completed that considers the loss of heat energy between the two systems and the resulting impact on either system’s performance.

**Hydronic Heating Systems**

Wirsbo AQUAPEX can be used in closed-loop hydronic heating systems operating at sustained temperatures up to 180°F, provided any issues concerning oxygen diffusion are properly addressed. Corrodible or ferrous components may not be used in a system designed with Wirsbo AQUAPEX unless these components are isolated from the tubing.

Please see the Uponor Complete Design Assistance Manual (CDAM) for information about using Wirsbo AQUAPEX in hydronic radiant heating systems. Refer to the Uponor Snow and Ice Melting Design Manual for information about using Wirsbo AQUAPEX for snow-melting applications.
Section 3
Working with Wirsbo AQUAPEX Tubing

Storing and Handling PEX

Caution:
- Do not store PEX tubing outdoors.
- Keep PEX tubing in the original packaging until time of installation.
- Ensure that exposure to sunlight during installation does not exceed the maximum recommended UV exposure time of 30 days.

Uncoiling PEX
We recommend the Uponor Select Uncoiler (E6062000), Uponor Compact Select Uncoiler (E6063000) or Uponor Tube Uncoiler (E6061000) to facilitate convenient uncoiling of PEX tubing. If one is not available, construct a suitable uncoiler.

Bending PEX
The minimum bend radius of Wirsbo AQUAPEX tubing is six times the outside diameter.

Bend supports are available for \( \frac{3}{8} \), \( \frac{1}{2} \), \( \frac{3}{4} \), and 1” Wirsbo AQUAPEX tubing to facilitate 90-degree rigid bends.

Reforming Kinked Tubing
If the tubing is kinked and hinders flow, repairs can be made easily.

1. Make sure the system is not pressurized.
2. Straighten the kinked portion of the tubing.
3. Heat the kinked area to approximately 265°F with an electric heat gun (approximately 450 watts of power). Apply the heat evenly until the tubing returns to its original size and shape. Do not use an open flame.
4. Let the repaired Wirsbo AQUAPEX tubing cool undisturbed to room temperature. When the tubing returns to its opaque appearance, the repair is complete.

Caution: Do not allow the temperature of the tubing surface to exceed 338°F. Do not apply direct flame to Wirsbo AQUAPEX tubing.
Wirsbo AQUAPEX tubing repaired according to these recommendations will return to its original shape and strength. If Wirsbo AQUAPEX tubing is sliced, punctured or otherwise damaged beyond the capacity of the crosslinked memory, it is necessary to install a coupling. Crosslinked polyethylene cannot be welded or repaired with adhesives.

**Note:** You may temporarily affix adhesive tape to PEX tubing or EP fittings during installation. However, to protect the integrity of the system, the tape should not be permanent. Remove the tape and residual adhesive after completing the installation.

**Thawing Frozen Tubing**

Wirsbo AQUAPEX tubing has the ability to withstand extreme freeze-thaw cycles better than other tubing or pipe. The crosslinked structure of the tubing allows it to expand and absorb much of the expansion energy from the freezing process. No tubing product is freeze-proof, but Wirsbo AQUAPEX tubing is extremely resistant to freeze damage.

If freezing occurs, the contractor should advise the end user to correct the lack of insulation or heat to eliminate the problem from reoccurring.

Should the PEX tubing experience an ice blockage, use the following methods to thaw the tubing.

1. Pour hot water over the affected area of the tubing.
2. Wrap hot towels around the affected area of the tubing.
3. Place a small portable heating device in the area to heat the space and thaw the ice blockage from the tubing.
4. Slowly heat the affected area of the tubing with a heat gun. Rub your hand over the area while heating the tubing to ensure the tubing does not get too hot.
5. Use a commercial system that pumps hot water to the ice blockage and returns the cooled water to be reheated.
Handling Guidelines for PEX Tubing
Although not comprehensive, the following highlights the most common guidelines to use when handling Uponor PEX tubing:

• Install Uponor systems according to the manufacturer’s installation instructions. Failure to follow the instructions and installation guidelines can result in the failure of Uponor systems.

• Do not use Uponor PEX where temperatures and pressures exceed ratings.

• Do not use or store Uponor PEX where it will be exposed to direct sunlight for more than 30 days.

• Do not weld, glue or use adhesives or adhesive tape with Uponor PEX.\(^1\)

• Do not apply open flame to Uponor PEX.

• Do not install Uponor PEX within 6 inches of any gas appliance vents, with the exception of double-wall B-vents, which have a minimum clearance of 1 inch.

• Do not install Uponor PEX within 12 inches of any recessed light fixtures, unless the PEX line is protected with suitable insulation.

• Do not solder within 18 inches of any Uponor PEX tubing in the same water line. Make all sweat connections prior to making the fitting connection.

• Do not use Uponor PEX to convey natural gas.

• Do not install Uponor PEX between the tub/shower valve and tub spout.

• Do not use Uponor PEX for an electrical ground.

• Do not spray on or allow organic chemicals, pesticides, strong acids or strong bases to come into contact with Uponor PEX.

• Do not use petroleum or solvent-based paints on Uponor PEX.

• Use only approved and appropriate firestop materials with Uponor PEX.

• Do not allow rodents, insects or other pests to come into contact with Uponor PEX tubing.

• Do not subject Uponor PEX to impact.

• During remodeling or ceiling repair, implement appropriate precautions to protect the tubing from damage.

• Uponor PEX and fittings are intended for use in systems outlined on page 1.

\(^1\) You may temporarily affix adhesive tape to PEX tubing during installation. However, to protect the integrity of the system, the tape should not be permanent. Remove the tape and residual adhesive after completing the installation.
Uponor ProPEX® fittings, manufactured to ASTM F1960, are designed for use with Wirsbo AQUAPEX ASTM F876 and F877 tubing. Make connections by sliding a ProPEX Ring over the PEX tubing and expanding them simultaneously. The expanded tubing and ProPEX Ring then slide over the fitting. The connection is made as the PEX tubing shrinks over the fitting because of the unique shape memory of Wirsbo AQUAPEX.

Uponor offers ProPEX fittings made from EP or brass. Both are NSF-61 certified.

Making ProPEX Connections
Make strong, reliable connections using one of Uponor’s expander tools (battery, air or hand). The steps are virtually the same for all three tools — with a slight variation in step 3.

1. Square-cut the PEX tubing perpendicular to the length of the tubing. Remove all excess material or burrs that might affect the fitting connection.

2. Slide the ProPEX Ring over the end of the tubing. Extend the end of the ring over the end of the tubing no more than \( \frac{1}{16} \) inch (1mm).

3. When using the ProPEX Hand Expander Tool, brace the free handle of the tool against your hip, or place one hand on each handle. Fully separate the handles and slide the expander head into the tubing until it stops. Full expansions are necessary to make a proper connection. Bring the handles together to expand. Separate the handles, remove the head from the tubing and rotate it one-eighth turn. Slide the tool head into the tubing in the newly rotated position and expand again.
4. When using the ProPEX Air or Battery Expander tools, slide the expander head into the tubing until it stops. Full expansions are necessary to make a proper connection. Press the trigger to expand.

5. Release the trigger, remove the head from the tubing and rotate it ⅛ turn after each expansion. Slide the tool head into the tubing in the newly rotated position and expand again.

**Important:**
Rotate the tool one-eighth turn in either direction after each expansion to provide smooth and even expansion of the tubing. If the head is not repositioned after each expansion, the segments on the tool head may cause deep grooves in the tubing. These grooves can result in potential leak paths.

**Note:** It is not necessary to rotate the tool in only one direction. Alternating the turning direction will ease expansion in confined spaces. The photos above show enlarged views inside expanded tubing.

6. Repeat the expansion process until the tubing and ring are snug against the shoulder on the expander head. See **Table 4-1** for the recommended number of expansions for each tubing size.
Section 4 – ProPEX Fitting System

7. Immediately remove the ProPEX expander tool. As you slide the tubing over the fitting, you should feel some resistance. If the tubing reaches the shoulder of the fitting without any resistance, the tubing may be over-expanded and may require additional time to fully shrink over the fitting. The tubing and ProPEX Ring should seat against the shoulder of the fitting for a proper connection.

Important Tips for a Proper ProPEX Connection

• If the fitting does not slide into the tubing all the way to the stop, immediately remove it from the tubing and expand the tubing one final time.

**Note:** To avoid over-expanding the tubing, do not hold the tubing in the expanded position.

• The number of expansions in Table 4-1 is the recommended number of expansions. Experience, technique and weather conditions influence the actual number of expansions. Fewer expansions may be necessary under certain conditions. The correct number of expansions is the amount necessary for the tubing and the shoulder of the fitting to fit snugly together.

• Good connections result when the ProPEX Ring rests snugly against the stop of the ProPEX fitting shoulder. If there is more than $\frac{1}{16}$ inch between the ring and the shoulder of the fitting, square-cut the tubing 2 inches away from the fitting, and make another connection using a new ProPEX Ring.

<table>
<thead>
<tr>
<th>Tubing Size</th>
<th>Ring Marking</th>
<th>Head Marking</th>
<th>Number of Expansions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{5}{8}''$</td>
<td>$\frac{5}{8}''$</td>
<td>$\frac{5}{8}''$</td>
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Table 4-1
Making 3/8" ProPEX Connections

The 3/8" ProPEX Ring is smaller and thicker than the ProPEX Rings used for other tubing sizes. The 3/8" ProPEX Ring must be expanded once on each side to properly fit over the tubing. Expansion of the ProPEX Ring is only necessary for 3/8" Wirsbo AQUAPEX tubing.

1. Square-cut the 3/8" Wirsbo AQUAPEX tubing perpendicular to the length of the tubing.

2. Expand each side of the 3/8" ProPEX Ring with the ProPEX Expander Tool once.

3. Slide the expanded 3/8" ProPEX Ring over the end of the tubing. Extend the end of the ring over the end of the tubing no more than 1/16 inch (1mm).

Once the 3/8" ProPEX Ring is properly expanded and on the tubing, refer to steps 3 through 5 on pages 19 and 20 for further instruction.

Important Tips for a Proper 3/8" ProPEX Connection

- When the temperature is above 40°F, ProPEX connections to 3/8" Wirsbo AQUAPEX tubing require four to five expansions. When the temperature is below 40°F, only four expansions are necessary.

- The thicker ProPEX Ring used for 3/8" ProPEX connections shrinks over the fitting faster than other size rings.

Disconnecting a ProPEX Brass Fitting

ProPEX Brass Fittings are manufactured connections and can be concealed in walls, ceilings and floors.

However, when necessary, ProPEX Brass Fittings can be disconnected (APR and EP fittings cannot be reclaimed or reused). To disconnect a ProPEX Brass Fitting:

1. Make sure the system is not pressurized.

2. Use a heat gun to heat one side of the ProPEX Ring. When the ring is clear, use a utility knife to carefully cut through the ring. Take care to cut only the ring and not the tubing. This will protect the fitting from being gouged by the knife. Remove the ProPEX Ring from the tubing with pliers or another tool to avoid touching the hot ring.

   **Note:** Do not gouge the fitting when cutting the ProPEX Ring. Nicks and gouges in the fitting may result in leaks. If nicked, discard the fitting.

3. Remove the ProPEX Ring and apply heat directly around the fitting and tubing connection. Gently work the tubing back and forth while pulling slightly away from the fitting until the tubing separates from the fitting.
4. After removing the tubing from the fitting, square-cut the tubing 2 inches (minimum) from the end of the tubing.

5. Use a new ProPEX Ring and follow the steps to make a new ProPEX connection (see page 19). Allow the fitting to cool before attempting to make another connection.

Troubleshooting ProPEX Connections
Trouble-free ProPEX installations begin with a ProPEX Expander Tool that is maintained in proper working condition. If the tool or segment fingers are damaged, it is very difficult to make a proper connection. The following troubleshooting suggestions are designed to assist with problems in the field.

For Fittings That will not Seal:
- Make sure the expander head is securely screwed onto the tool (hand-tightened).
- Make sure the segment fingers are not bent. If the head does not completely close when the battery tool’s drive unit is fully retracted or the handles of the manual tool are open, replace the head.
- Examine the tool for excess grease on the segment fingers. Remove excess grease prior to making ProPEX connections.
- Examine the fitting for any damage. Nicks and gouges on the fitting will cause the fitting to leak.
- Make sure the internal driver cone is not damaged or bent.
- Make sure the last expansion is not held in the expanded position before the fitting is inserted. The longer the tubing and ProPEX Ring are held in the expanded position, the greater the chance for a leak.
- Be sure to rotate the tool one-eighth turn after each expansion.

If Expansion is Difficult:
- Make sure the internal cone is properly greased.

If the Expansion Head Slips out of the Tubing When Making Expansions:
- Ensure the tubing and ProPEX Ring are dry.
- Make sure that grease is not getting into the tubing.
- Examine the segment fingers to make sure that none are bent.
If the ProPEX Ring Slides Down the Tubing During Expansion:

- Ensure your hands are clean while handling the tubing. Any sweat or oils on your hands can act as a lubricant. Due to the smoothness of PEX, any form of lubricant can cause the ProPEX Ring to slide across the tubing during expansion.

- If you anticipate the ring may possibly slide down, position the ProPEX Ring slightly farther over the end of the tubing and make the first couple of expansions slowly. Once the ring and the tubing begin to expand together, you can continue with the normal number and type of expansions.

- Place your thumb against the ProPEX Ring to help support it and feel for any movement. If caught early, slide the ring up the tubing and expand as described in the previous bullet point.

If More Than the Recommended Number of Expansions are Needed to Make a Connection:

- Make sure that the head is hand-tightened to the expander tool.

- Examine the segment fingers to make sure that none are bent.

- Be sure to completely cycle the tool on each expansion, (e.g., close the manual tool handle or release the battery expander tool trigger).

Cold-weather Expansions

- Temperatures affect the time required for the tubing and ring to shrink onto the fitting. The colder the temperature, the slower the contraction time.

- Warming ProPEX fittings and ProPEX Rings reduces contraction time. Put fittings and rings in your pockets prior to installation to keep them warm.

- Make ProPEX connections at temperatures above 5°F (-15°C).

- Fewer expansions are necessary in temperatures below 40°F.

Proper Expander Tool and Head Maintenance

The ProPEX expander tools are sturdy, but must be handled with care to prevent possible damage to the cone and the expander heads.

- Remove and clean the segment fingers as needed.

- Remove the segments from the attachment ring by pushing the segment finger down toward the opening in the ring. Once the first segment is removed, the rest follow easily.
• Place the segments on a flat surface with the ridges facing up. The fingers should lay flat without any curve in the middle. If the segments are bent, replace the head immediately.

• To reassemble, replace the segment fingers one at a time to the attachment ring by sliding the grooved portion of the segment fingers over the spring in the attachment ring. The narrow end of the segment fingers point away from the solid side of the attachment ring. Hold these segment fingers in place with your thumb as the remaining segment fingers are inserted.

• Once the expander head is cleaned and reassembled, use a lint-free cloth to apply a light coat of lubricant to the cone prior to making any ProPEX connections.

• Apply the lubricant daily if used regularly.

• Keep all other parts of the tool free from lubricant.

• The Hand Expander Tool handles will open and close smoothly if the tool is properly lubricated.

• Failure to properly lubricate the tool may result in improper connections.

  Caution: Excessive lubrication may result in improper connections. Only use a small amount of lubrication to keep the tool working properly.

• Once a month, soak the heads in degreasing agent to remove any grease from between the segments. Clean the cone using a clean, dry cloth.

• Store the tool and expander heads in the case. Store the tool with an expansion head in place to protect the cone.

• Store the tool in a dry location to prevent rust.

Tool Depot
Uponor offers the Tool Depot as a convenient way to repair or replace tools quickly and easily. For more information, contact Uponor Technical Services toll free at (800) 321-4739, or go to www.uponor-usa.com and click on Online Services. For access to the Tool Depot, please use tool for your username, and depot for the password. First-time users must complete a registration form. Contractors with existing accounts do not need to re-register.
Handling Guidelines for EP Fittings

Although not comprehensive, the following highlights the most common guidelines to use when handling EP fittings:

- Do not solder within 18 inches of any EP fittings in the same water line. Sweat connections must be made prior to making the ProPEX connection.
- Do not subject EP fittings to impact.
- Do not use adhesives or adhesive tape with EP fittings.
- Do not expose EP fittings to open flame.
- Do not allow solder, flux, pipe dope, solvents or urethane foams to come in contact with EP fittings as immediate damage may result.
- Never pull or drag tubing by the installed EP fittings.
- Do not expose EP fittings to excessive bending loads (greater than 100 lbs.).
- Do not use EP fittings where temperatures and pressures exceed ratings.
- Do not spray on or allow organic chemicals, strong acids or strong bases to come into contact with EP fittings.
- Do not use petroleum or solvent-based paints on EP fittings.
- Do not allow rodents, insects or other pests to come into contact with EP fittings.

1 You may temporarily affix adhesive tape to EP fittings during installation. However, to protect the integrity of the system, the tape should not be permanent. Remove the tape and residual adhesive after completing the installation.
Section 5

APR Fitting System

The Uponor APR fitting system complements our ProPEX fitting technology, and is designed to provide an optional method for connecting Wirsbo AQUAPEX.

APR fittings use an expander tool to expand the tubing enough to insert a brass fitting, and a ratchet tool to slide a brass sleeve over the tubing and the fitting.

Note: The APR tools and expander heads are not interchangeable with the ProPEX tools and expander heads.

Making APR Connections

Follow the steps below to make a proper APR connection.

1. Prepare the APR Blunt Expander Tool. Before placing the expander head on the tool, ensure the APR Blunt Expander Tool cone is clean. Apply a very thin film of graphite grease on the cone, if needed. Hold the tool by its swing handle and thread the expander head onto the tool.

2. Select and prepare the proper APR Ratchet Tool, red (1⁄2- and 3⁄4-inch) or black (all sizes). To change jaws on the APR Ratchet Tool, open the handles slightly to relieve pressure against the jaws. Push the retaining pin back and pull the head of the pin away from the tool.

3. Pull the jaw from the tool. Repeat the procedure for the other jaw. To install a new jaw set, reverse the removal sequence. Each jaw set is labeled with the respective PEX tubing size.
4. Install the jaws so they form a V shape.

5. Push the release pin down on the handle to reset the tool handles for storage. The reset pin should face down when stored in the case.

6. Cut the PEX tubing. Make a clean perpendicular cut on the tubing using only an appropriate PEX tubing cutter. Do not use knives, hacksaws or other means of cutting the tubing. Ensure the cut end of the tubing is free of burrs or jagged ends.

7. Install the appropriate size brass sleeve onto the tubing. Ensure the flush end of the sleeve with the fitting marking (e.g., size, designation, etc.) is placed onto the tubing first. The 30-degree beveled end of the sleeve must face the cut end of the tubing. Slide the sleeve far enough down the tubing so it does not interfere with the expansion.

8. Expand the tubing twice. Ensure the proper expander head is installed on the tool prior to expanding. Hold the APR Blunt Expander Tool by its swing handle and insert the nose of the expander head into the PEX tubing until the tubing is against the shoulder of the expander head.
9. While keeping slight pressure against the tubing and tool, bring the handles together for the first expansion. Next, fully open the handle and rotate either the tool or the tubing one-eighth turn and complete the second and final expansion.

**Note:** Do not use the ProPEX Expander Tool for APR fittings.

10. Quickly remove the APR Blunt Expander Tool and insert the appropriate fitting into the tubing. Slide the brass sleeve toward the fitting.

**Note:** The tubing should stop before the first barb located next to the fitting shoulder, but not past it.

11. Align the PEX tubing, brass sleeve and APR fitting onto the APR Ratchet Tool. Once in place, ratchet the tool to slide the brass sleeve over the tubing and fitting. Stop ratcheting the tool once the brass sleeve is snug against the shoulder of the fitting.

12. Visually inspect the fitting. Remove the APR Ratchet Tool from the fitting assembly and ensure the fitting is secure and complete. The maximum gap between the brass sleeve and the shoulder of the fitting should not exceed \( \frac{1}{32} \) inch.

**Note:** You cannot reuse or reclaim an APR fitting.

13. Close the fitting. The minimum distance between two fittings in line is 6 inches from the shoulder of one fitting to the shoulder of the other fitting. This distance will ensure room for making the second fitting without damaging the tools or experiencing difficulty with the brass sleeve.
**Section 6**

**Water Service Phase**

**Handling and Repairs**
Although Wirsbo AQUAPEX tubing is highly resistant to kinking and abrasion, it is important to take care while handling and installing the tubing to prevent damage and possible failure. If damage occurs during installation, the area should be cut out and repaired before backfilling.

To reform kinked tubing see **Section 3**. If damaged beyond the tubing’s thermal memory capacity, use a ProPEX Repair Coupling. Do not reuse or reclaim APR or EP fittings.

**Trench Bottom Preparation**
To achieve a satisfactory installation, it is essential that the supporting soil provides a stable and continuous support for the tubing.

**Good Soil Conditions** — If the trench is cut smoothly, install the tubing directly on the prepared bottom. The bottom must be flat with no hollows, lumps or rocks.

**Poor Soil Conditions** — In rocky, clay, muddy or other poor soil conditions, it may be necessary to prepare the trench bottom using granular material of such size and grading to provide a stable base. See your local code for additional requirements.
Installation
Install Wirsbo AQUAPEX tubing underground in a manner that ensures external loads will not subsequently cause a decrease in the vertical dimension of the cross section of the tubing that exceeds 5% of the outside diameter. Install Wirsbo AQUAPEX tubing in a snaking pattern with sufficient slack in the line to provide an allowance for contraction of the line due to temperature change prior to backfilling. The linear expansion rate for Wirsbo AQUAPEX tubing is approximately 1.1 inch per 10°F temperature change for every 100 feet of tubing.

Note: Do not use blocking to support the tubing or change the tubing grade. Do not install potable water service tubing in, under or above cesspools, septic tanks, septic tank drainage fields or pits.

Joining Methods and Fittings
Use ProPEX, APR or approved compression fittings to connect tubing to itself or to the corporation and curb stops. Check with Uponor or the fitting manufacturer for application suitability and proper usage instructions.

For applications requiring direct burial, Uponor offers DZR brass ProPEX or APR fittings for Uponor large-dimension Wirsbo AQUAPEX tubing. DZR brass is a low-lead material that is resistant to aggressive soil and water and meets the requirements of NSF 61.

Note: Water service fittings designed for SDR-9 tubing, such as Mueller 110 and Philmac #2 (¾-inch) and #3 (1-inch) fittings, are approved for Wirsbo AQUAPEX tubing in cold-water service applications. Other fittings designed for SDR-9 tubing may also be used. A polyethylene stiffener is required for use with these fittings. Please contact the fitting manufacturer for temperature and pressure ratings.
**Tubing Embedment**

Proper soil selection, placement and compaction are essential in the area around the tubing. Backfill the tubing with sand or gravel of ¾-inch maximum particle size.

Compact the initial backfill around the tubing to provide adequate tubing support and prevent settlement. It is particularly important to adequately compact the soil around the tap connection. It is recommended to pressurize the tubing prior to backfilling to reveal any damage. In heavy vehicular traffic areas, compact backfill to 90% of maximum soil density.

Do not use highly plastic clays, silts, organic materials or sharp or large rocks as backfill in the immediate vicinity of the tubing. Compact the backfill from the subgrade to a level per local code that will cover the tubing 4 to 6 inches to provide protection around the tubing and prevent settlement that puts stress on the fittings and the tubing.

For additional information about proper embedment practices, refer to ASTM D2774, *Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping*, or AWWA report TR31, *Underground Installation of Polyolefin Piping*.

**Water System Disinfection**

Wirsbo AQUAPEX tubing meets the requirements of the following standard:

- ANSI/AWWA Standard C904-06 “Crosslinked Polyethylene (PEX) ½ inch (12mm) through 3 inches (76mm) for Water Service”

Please refer to the ANSI/AWWA Standard for information regarding the selection, use and proper application of PEX tubing in water service.
Section 7
Ground and Top-out Stage of Installation

After installing the service water line into the building, the next area to focus on is the ground work under and in the soon-to-be-poured concrete. The level of activity during the ground-work stage varies throughout the country. Areas doing primarily slab-on-grade construction may put the bulk of the tubing in the slab, below the slab or run it overhead in the attic. Traditional homes with basements will run the majority of tubing within the building framework.

Parts Inspection
Prior to starting a project, ensure all required material for that day is onsite to eliminate work delays. Contractors should be trained to evaluate component suitability for installation. Check for material defects, incomplete parts or shipping damage. Also check to see the correct amount and type of PEX tubing is onsite to start the project.

Installing Wirsbo AQUAPEX Tubing During Ground Work
• Secure tubing using Uponor wire ties at the intervals necessary to keep the tubing from floating up during the pour.

• Use continuous lengths of Wirsbo AQUAPEX tubing (no splices) when installing tubing within or under concrete slabs.

• When bending, entering or exiting the slab, Uponor recommends using 90-degree bend supports or PVC elbows or sleeves to reduce the possibility of kinking the tubing during the pour or subsequent construction. Supports also ensure proper tubing placement when exiting the slab.

Figure 8-1: Proper Installation of Wirsbo AQUAPEX Tubing
• When exiting a slab, a bend support is not required for abrasion protection.

• Maintain pressure on tubing installed in slab during the pour to facilitate leak detection.

• If you anticipate tubing will be exposed to sunlight for more than 30 days, sleeve it to protect against damage.

• At the entry and exit points of the slab, cover the end of the tubing with a suitable black poly sleeve to prevent dirt and debris from entering the system.

• Only EP or dezincification resistant (DZR) brass fittings are approved for direct burial in soil. EP fittings can be embedded directly into concrete. DZR brass fittings should be wrapped if embedded in concrete.

• If the tubing runs through an expansion joint, protect with a sleeve or dip below the joint. See Figures 8-2 and 8-3.

Caution: Uponor recommends using a ProPEX EP coupling to repair tubing that is damaged while pouring concrete. If using a brass ProPEX or APR coupling, wrap the coupling with a protective cover and make a note of the repair location in the concrete floor.

Installing Wirsbo AQUAPEX Tubing in Frame Construction

Tubing Runs
• Leave extra tubing at the beginning and end of runs to simplify the connection to manifolds and fittings. Immediate connection to the manifold simplifies installation.

• Ensure runs are as direct as possible between the manifold and the fixture it supplies.

• Insulate hot-water tubing runs where code requires or as necessary.
• Consult local building codes for information on where and how to drill through load-bearing construction.

• In residential or non-return plenum applications, you may bundle tubing runs together unless prohibited by local code.

Caution: When installing in attics, install the tubing below the insulation.

Recessed Lighting
There are two types of recessed lights: Type I.C. (Insulated Ceiling), which allows direct contact with thermal insulation, and Type Non-I.C. (Non-insulated Ceiling), which requires a 3-inch minimal clearance with thermal insulation.

• If there is not enough room in the joist cavity to meet the 12-inch restriction stated by Uponor, then insulation is required.

• The insulation must be rated to withstand the temperatures generated by the fixture.

• All tubing that is within 12 inches of the recessed light must be insulated with closed-cell polyethylene, polyolefin or other suitable pipe insulation for 12 inches on either side of the light.

• Insulation is required anytime a UV light source is used; tubing must be protected from direct UV exposure.

Tubing Supports
• Uponor recommends using plastic tubing supports or metal tubing supports designed for use with plastic tubing.

• Do not use supports that will damage the tubing. Inspect metal supports for sharp edges.

• The linear expansion rate for Wirsbo AQUAPEX tubing is approximately 1.1 inches per 10°F temperature change for every 100 feet of tubing.

• When installing tubing runs, allow $\frac{1}{6}$- to $\frac{1}{4}$-inch longitudinal clearance per foot of run to accommodate thermal expansion. Do not allow tubing to dip excessively between supports. Do not pull tubing tight during installation.

• Do not rigidly anchor Wirsbo AQUAPEX tubing with supports to allow tubing to expand and contract.

• Allow adequate clearance between PEX tubing and the structure (bored holes or sleeves) to allow tubing to move freely due to thermal expansion and contraction.
• Along horizontal runs, install supports every 32 inches for \( \frac{3}{8} \), \( \frac{1}{2} \), \( \frac{3}{4} \)" and 1" Wirsbo AQUAPEX tubing. If horizontal runs are continuously supported (truss-to-truss), place tubing supports at 6-foot intervals.

• Along vertical runs, install supports and a mid-story guide every 4 to 5 feet at each floor.

• Bends within 6 inches of a connection require a Tube Talon or Bend Support (for \( \frac{3}{8} \)" and \( \frac{1}{2} \" Wirsbo AQUAPEX tubing). For \( \frac{3}{4} \)" and 1" tubing, support is required for bends within 10 inches of a ProPEX connection.

**Manifold Placement**

• Refer to Section 10 for information concerning manifold placement and installation procedures.
Common Components

Bend Supports
• Use Bend Supports to hold the tubing in a 90-degree bend. Bend Supports are commonly used when exiting the slab to control the tubing’s direction above the slab.

• Bend Supports are available in metal and plastic for $\frac{3}{8}$", $\frac{1}{2}$" and $\frac{3}{4}$" PEX.

• Use PVC conduits for $\frac{3}{8}$" to 1" PEX. The PVC conduits are used primarily when exiting the slab with only a couple feet of tubing left to install.

• The PVC conduits sleeve over the PEX tubing. The metal and plastic bend supports can snap onto the tubing anywhere along the tubing.

Drop Ear Bend Supports
• Drop Ear Bend Supports provide a rigid, connection-free, 90-degree exit from a standard 2" x 4" or larger, stud wall or floor.

• Nail the flange to the front edge of the stud for support. A horizontal brace is required to position the Drop Ear Bend Support between two studs.

• Drop Ear Bend Supports are available in metal and plastic for $\frac{3}{8}$" and $\frac{1}{2}$" PEX.

• Use a standard $\frac{3}{4}$" outside diameter (O.D.) stop to provide a shut-off at the fixture. ProPEX stops are also available from Uponor.

Note: Drawing shows use of an optional chrome sleeve. The sleeve provides a protected, finished appearance.

Drop Ear Elbows
• Uponor Drop Ear Elbows provide a rigid 90-degree bend and the ability to secure $\frac{3}{8}$" or $\frac{1}{2}$" Wirsbo AQUAPEX where it exits a stud wall or connects to a showerhead.

Metal Straight-through Supports
• Uponor Straight-through Supports provide rigid straight-through support and the ability to secure Wirsbo AQUAPEX tubing as it exits a wood floor.
Steel-plate Protectors
- Steel-plate Protectors protect installed tubing from possible damage. If tubing is in danger of being pierced by drywall, paneling, trim screws or nails, etc. during or after construction, safeguard with suitable Steel-plate Protectors.
- If Wirsbo AQUAPEX tubing passes through hollow masonry walls or metal studs, always protect with suitable sleeves or grommets.

Water Hammer Arrestors
- Wirsbo AQUAPEX tubing withstands repeated pressure surges well beyond its rated pressure capacity.
- Wirsbo AQUAPEX tubing dampens sound eight times more than metallic pipe.
- Water hammer arrestors are only advisable if local code requires them.

Shower Valve Connections
ProPEX Copper Tub Ells
- ProPEX Copper Tub Ell provides a 90-degree transition from tub and shower valve to Wirsbo AQUAPEX tubing.

**Caution:** Do not use Wirsbo AQUAPEX tubing to connect the tub and shower valve to the tub downspout.

ProPEX Copper Stub Ells
- Uponor Copper Stub Ell provides a 90-degree transition from Wirsbo AQUAPEX tubing to copper.
- You may use a ProPEX Copper Stub Ell at the fixture to exit from the wall instead of a Drop Ear Bend Support.

Hose Bibs
- Connect Wirsbo AQUAPEX tubing to a standard hose bib using a ProPEX or APR Threaded or Sweat Adapter.
- Rigidly anchor the hose bib behind the wall to prevent it from loosening due to heavy use.

Pressure Testing the System
- Pressure-test the system to the system working pressure (40 to 60 psi) at the current ambient temperature. Pressure testing should not exceed 100 psi. Slight fluctuations of pressure are normal due to ambient temperature changes.
- Open the valves on the EP Valved Manifold prior to pressure testing. Ensure the valves remain open until the pressure test is complete.
Washing Machine Outlet Boxes
- Use the appropriate Uponor Washing Machine Outlet Box to transition Wirsbo AQUAPEX tubing to washing machine valves.
- Connect Wirsbo AQUAPEX tubing to the valves using a ¼" ProPEX or APR connection.

Water Supply Boxes
- Use the appropriate Uponor Water Supply Outlet Box to transition Wirsbo AQUAPEX tubing to the fixture.
- Connect Wirsbo AQUAPEX tubing using a ½" ProPEX or APR connection.

Ice Maker Boxes
- Use the appropriate Uponor Ice Maker Outlet Box or In-line Ice Maker Tee to supply an ice maker.
- Connect Wirsbo AQUAPEX tubing using a ¼" ProPEX or APR connection.

Optional Ice Maker Fittings
- Use the ProPEX In-line Ice Maker Tee (Q4455050) to supply an ice maker.
- Connect Wirsbo AQUAPEX tubing using the appropriate ½" ProPEX connection.
Section 8
Final Stage of Installation

During the final stage of installation the finishing items are installed in the structure. Lavs, tubs and water closets are set and connected. This section discusses the supporting components installed during this stage.

Straight and Angle Stop Valves
ProPEX and APR Straight and Angle Stop Valves allow Wirsbo AQUAPEX tubing to connect to stops with ProPEX and APR connections. Please refer to Section 4 to review ProPEX connections and Section 5 to review APR connections.

Compression Stop Valves (Straight and Angle)
Because Wirsbo AQUAPEX tubing has the same outside diameter as standard copper pipe, you can use standard Compression Straight and Angle Stop Valves with Wirsbo AQUAPEX tubing. An insert stiffener is required. The insert is included with the stop valves, or it may be purchased separately.

1. Square-cut the tubing perpendicular to the length of the tubing.
2. Place the nut and then the compression ring over the end of the tubing.
3. Use the brass compression ring included with the stop valve.
4. Install the insert into the tubing end. Be sure the insert is completely seated against the end of the tubing.
5. Wrap threads with polytetrafluoroethylene (PTFE) tape.
6. Slowly tighten the compression nut to the opposing thread.

Note: Re-tighten all compression fittings after initial installation. Wait 30 minutes to allow the tubing to relax, and then re-tighten each fitting.
Wirsbo AQUAPEX Risers
Install Wirsbo AQUAPEX ¾” O.D. Risers with acetal resin engineering plastic rings included with the risers. The risers are available in the following sizes:

- 12” Lav
- 20” Lav
- 30” Lav
- 36” Lav
- 12” Closet
- 20” Closet
- 36” Closet

Lav Risers
- Wirsbo AQUAPEX Lav Risers are sold with an acetal resin engineering plastic ring. Metal washers are sold separately.
- The metal washer assures that the riser is compatible with compression nuts with various hole sizes.
- If the acetal resin engineering plastic ring is used, do not use an insert. If a metal ring is substituted, a ¼-inch insert is required.
- Wirsbo AQUAPEX Lav Risers are listed to NSF 14 and 61.

Note: Uponor recommends ¼-inch Wirsbo AQUAPEX Riser Washers in hot-water applications.

Closet Risers
- Closet Risers are compatible with off-the-shelf compression nuts.
- Closet Risers are sold with an acetal resin engineering plastic ring.
- Closet Risers are not sold with the metal washer. Do not use the metal washer to connect to closets.
- If the acetal resin engineering plastic ring is used, do not use an insert. If a metal ring is substituted, a ¼-inch insert is required.

Note: Do not heat Wirsbo AQUAPEX Risers to remove kinks. Do not install kinked or damaged risers.
Uponor offers the D’MAND® Hot Water Delivery System to provide fast hot water delivery, resulting in energy and water savings for today’s new homes.

With the D’MAND system, hot water is delivered within seconds after turning on the faucet. The system uses a pump, which is activated by a motion sensor or pushing a button. Once the pump is activated, hot water reaches the faucet in just seconds. That means very little water is wasted down the drain while the homeowner waits for the water to warm up.

The D’MAND system uses a Structured Plumbing layout for quick and easy installation during new home construction. See page 59 for more information about Structured Plumbing.

**System Components**

The D’MAND system consists of a pump and an activation device.

- Model 100 Pump (Q6700070)
- Activation Button (Q6700101)
- Model 200 Pump (Q6700002)
- Motion Sensor (Q6700102)
Installation Considerations
Prior to installing the D’MAND Hot Water Delivery System, consider the following:

• The D’MAND system requires a minimum ¾" Wirsbo AQUAPEX tubing dedicated return line. The return line is connected only through those manifolds supplying fixtures supported by the D’MAND system then routed back to the water heater. This return line allows the cool water in the supply line and manifolds to be quickly replaced by hot water from the water heater.

• The most effective hot-water delivery system should employ Structured Plumbing®. That is, the layout design of the plumbing system should effectively take advantage of the benefits of recirculation. See Structured Plumbing on page 59 for more information.

• In Uponor plumbing systems, the D’MAND pump is located on the return line near its terminus where it intersects the cold-water supply line to the water heater. A tee fitting on the cold-water supply line into the water heater connects the return line from the D’MAND system.

• Mount the D’MAND pump on the wall at a stud, or securely affix to another supporting structure near the water heater.

• The D’MAND pump has an integral temperature sensor that senses a rise in the recirculating line’s water temperature. Once the temperature sensor reaches a pre-set temperature rise, it will deactivate the pump.

• The D’MAND pump incorporates an integral check valve, thus eliminating the need for a separate valve.

• The D’MAND system uses activation devices that are connected to the pump with low-voltage wiring.

  **Important:** Install the wiring before the wall cavities are closed.

• Low-voltage wire, required to connect the pump to the activation device, is not provided with the D’MAND system. The installer must provide the wiring.

• Choose the type of activation device (button or motion sensor) that is best suited for the requirements for hot water in the location where the activation device will be installed. See Activation Devices on page 55 for more information.

• The D’MAND pump requires an electrical connection. The pump is equipped with a 6-foot grounded plug (110 volt). Thus, a grounded receptacle is needed within 6 feet of the pump.
**Warning:** A properly sized expansion tank is required when installing the D’MAND pump in an Uponor plumbing system that uses a pressure-reducing valve with backflow prevention.

### Model Sizing and Selection

Prior to installation, select the proper pump model. Uponor offers two pumps in the D’MAND Hot Water Delivery System: Model 100 (Q6700070) and Model 200 (Q6700002).

The Model 100 Pump is more appropriate for systems in which the total tubing distance from the hot-water supply to the farthest fixture is less than 100 feet. The Model 200 Pump is more appropriate for systems in which the total tubing distance from the hot-water supply to the farthest fixture is more than 100 feet. However, it can be used for distances less than 100 feet, if desired.

The D’MAND system works by purging ambient-temperature water from the hot-water loop so that it may be filled by hot water from your water heater.

**Note:** The return line between the last fixture and the D’MAND inlet must be 3⁄4" or larger Wirsbo AQUAPEX tubing. Using a smaller return line may increase the time necessary for hot water to reach the desired fixture.

### D’MAND System Model 100 Pump

The Model 100 Pump is equipped with 1⁄2-inch NPT male threads for connection purposes. Although the Uponor Model 100 pump is very reliable and should not require maintenance, the installer may install isolation flanges or valves on either side of the pump. This allows easy removal of the pump in the event it needs servicing in the future.

### D’MAND System Model 200 Pump

The Uponor Model 200 Pump is equipped with standard connection flanges with 3⁄4-inch female NPT threaded connectors on the removable half of each flange. For isolation purposes, the threaded connectors feature integral ball valves, which may rotate (i.e., open and close) with either an Allen wrench, a wide-blade screwdriver or the handle on the isolation ball valve.

**Note:** During normal operation, ensure the ball valves are in the full-open configuration.

Thread ProPEX® Male Adapters (3⁄4-inch male NPT by 3⁄4-inch ProPEX) into the female inlets on the flanges so that Wirsbo AQUAPEX tubing may be connected to the adapters.
Installing the D’MAND Pump

The D’MAND pump operates at 110 volts and is supplied with a 6-foot power cord terminated with a grounded three-prong plug. It is necessary to locate a grounded 110-volt, 60 Hz AC electrical outlet less than 6 feet from the pump. See Figure 9-1.

Securely mount the pump to a wood stud or other sturdy supporting structure. Screw holes are pre-machined into the mounting bracket to facilitate mounting. See Figure 9-2.

For best configuration of the plumbing system, mount the pump above the water heater.

Note the arrow cast into the side of the pump housing as shown in Figure 9-3. Water must flow through the pump in the direction as the arrow indicates. Therefore, the return line coming from the last plumbing fixture should connect at the top (inlet) of the pump, and the line from the pump to the water heater should connect to the bottom (outlet) of the pump.

Always mount the pump so that the cartridge housing is horizontal. Do not mount the pump so that the cartridge housing is vertical. Additionally, do not mount the control box below the cartridge housing. See Figure 9-4.

For a convenient and professional installation, mount a wiring box within 12 to 24 inches of the pump to use as a junction box. See Figure 9-4.
Section 9 – D’MAND® Hot Water Delivery System

Figure 9-2: Secure with screws.

Mount the pump so the cartridge housing is horizontal.

Figure 9-3

Wiring and Junction Box

Figure 9-4
During installation when running the low-voltage wires for the activation devices, leave sufficient wire at the junction box so the connections can be made outside the junction box. Connect the pump control wires and the activation devices wires at the junction box. See Figure 9-6. Coil the completed connections into the junction box and attach a solid cover plate over the junction box.

Using appropriate fittings, connect the return line from the system to the inlet side of the pump. See Figure 9-7.
From the outlet side of the pump (the bottom in this example), extend the return line back to the cold-water inlet to the water heater. Tee the return line into the cold-water supply line. See Figure 9-8.

**Note:** In all cases, consult the water-heater installation instructions to determine if the water heater manufacturer has any special instructions regarding the attachment of return lines.

The D’MAND pump features an internal check valve that prevents reverse flow through the pump; therefore, no additional check valves are required.

To maximize the efficiency of the system, insulate the hot-water supply line from the water heater to the point where the last fixture on the loop is supplied. See Figure 9-9.
Activation Devices
An activation device turns on the D’MAND pump. There are two types of activation devices available with the D’MAND system:

• Activation Button (See Figure 9-10.)
• Motion Sensor (See Figure 9-11.)

Any D’MAND system can use either device or a combination of both devices based on the customer’s requirements.

Choosing an Activation Device
Prior to wiring the activation devices, determine which activation device to use at each faucet where rapid delivery of hot water is desired. Some considerations are outlined below:

• Activation buttons are best located near faucets where the majority of users are aware that the D’MAND system is installed. That’s because they will know that they will need to push the button to receive hot water quickly.

• An activation button is also a good choice when a user may not necessarily want hot water each time the faucet is used (e.g., a kitchen sink).

• Use motion sensors in locations where many of the users may not know that the D’MAND system is installed, such as a guest bathroom or a powder room.

• Using motion sensors in high-traffic areas, like the kitchen, is not an ideal location, because the motion sensor will detect movement, and hot water may not always be required. A button is more appropriate for the kitchen.

• A motion sensor is a good choice when hot water is usually required each time someone approaches the faucet (e.g., master bathroom).

• Mount the motion sensor so that it does not detect movement outside the area where the faucet is located.

Note: The D’MAND system has an internal temperature sensor and control logic to ensure the pump cannot be activated repeatedly or when hot water is already in the system.
Wiring the Activation Device
The activation button requires a two-wire thermostat wire (18-gauge) in order to connect to the junction box at the pump location. The Motion Sensor requires a three-wire thermostat wire (18-gauge) in order to connect to the junction box at the pump location.

Note: It is common practice to increase the number of low-voltage wires within the bundle to provide redundancy should one of the wires break or short out. Should a failure take place, simply identify the broken wire and change the connections to the spare wire in the bundle. If two-wire, low-voltage wiring is required for the operation, consider installing three-wire instead. Three-wire, low-voltage operations will usually employ five-wire.

From the control box on the D’MAND pump, there are two low-voltage wire bundles. See Figure 9-12. The two-wire bundle is used to connect to the activation button. The three-wire bundle is used to connect to the motion sensor. Both bundles are labeled respectively. These bundles are connected to their corresponding activation device and wired in the junction box at the pump location.

It is possible to install more than one activation button or motion sensor in a system. To do so, wire the devices in parallel, not in series. The schematics on page 54 show direct parallel wiring for the two different devices. (See Figures 9-13 and 9-14.)

At the junction box near the pump location, wire all the activation buttons into the two-wire lead from the pump control box and all the motion sensors into the three-wire lead from the pump control box.

Install the low-voltage wiring for the activation devices after the rough-in, but before the wall cavities are closed with drywall. Leave some excess wire where the activation device will be installed so that insufficient wire length does not limit where the device is positioned and mounted.

Figure 9-12
To Control Box on Pump

Junction Box

Black Wire Connection

Red Wire Connection

Black Wire

Red Wire

Black Wire

Red Wire

Activation Button

Figure 9-13

Junction Box

Green Wire Connection

Black Wire Connection

White Wire Connection

Green Wire Connection

Black Wire Connection

White Wire Connection

Junction Box

Motion Sensor

To Control Box on Pump

Figure 9-14
Installing the Motion Sensor
Mount a wiring box in the wall cavity where the motion sensor will be mounted. Run low-voltage wire (three conductor) from the junction box (see Figure 9-14) to the sensor wiring box. Cut the low-voltage wire so that there is about 10 inches of excess. Coil the excess wire in the box to protect it while drywall is installed.

Install drywall (or other wall material) and make a cut-out to expose the box and low-voltage wiring. See Figure 9-15.

On the back of the motion sensor, affix two pieces of hook-and-loop tape (with pressure-sensitive adhesive backing). Position the pieces so that the pigtail protrudes from the space between the pieces approximately midpoint of the sensor. Leave the backing on the exposed side of the tape. See Figure 9-16.

Slide a wall plate with a standard \( \frac{3}{8} \)-inch circular opening over the pigtail. The finished side of the plate should face the back of the motion sensor. See Figure 9-17.

Using wire nuts or other suitable connectors, attach the pigtails from the sensor to the low-voltage wire that was terminated at the electrical box. Maintain proper polarity by connecting like-colored conductors to one another. See Figure 9-18.
Push the connected section of the wires into the box and attach the wall plate. Remove the backing from the hook-and-loop tape. Push the remaining wire through the wall plate opening into the box. See Figure 9-19.

Affix the motion sensor to the wall plate by pressing the exposed adhesive on the hook-and-loop tape onto the plate. Position the sensor so that it is centered on the plate.

**Note:** If the motion sensor is mounted above head-height (as recommended), affix the motion sensor to the wall plate so that the lens is on the bottom. See Figure 9-20.
Installing the Activation Button in a Cabinet Rail

In most installations, the activation button is installed in a cabinet rail just below the countertop overhang. See Figure 9-21.

For this type of installation, install a sufficient length of two-conductor, low-voltage wiring to allow the end of the wire to extend several inches beyond the front of the cabinet.

Drill a 5/8-inch hole in the rail where the button will be mounted. Pull the excess wire through the drilled hole and attach the wires to the screw terminals on the back of the button. See Figure 9-22.

Push the wire back through the drill hole, and press the button into place. See Figure 9-23. If necessary, the tension tabs on the outside edge of the button may be adjusted to assure that the button mounts securely in the drilled hole.
Installing the Activation Button in Other Locations

If installing the activation button where it is not convenient to mount in a cabinet rail (e.g., a pedestal sink), Uponor recommends mounting the button in a wall plate. See Figure 9-24. The plate should have a \( \frac{5}{8} \)-inch hole that is attached to a wiring box (previously mounted in the wall cavity).

**Note:** The activation button has a spring-tension ring around its outside edge that holds the button in place after it is pushed into the \( \frac{5}{8} \)-inch hole.

Lace the low-voltage wire through the hole in the plate. See Figure 9-25. Next attach the wires to the screw terminals on the button. Then push the button into the hole. Coil the excess wire in the wiring box, and attach the plate to the wiring box.
Structured Plumbing®

Structured Plumbing® is essentially the system layout. When employing D’MAND hot-water delivery, a Structured Plumbing layout incorporates a loop of tubing that starts at the hot water supply line (i.e., the line that moves hot water away from the heater) and returns to the heater where it tees into the main line, supplying cold water to the heater. Within practical considerations, that loop should supply all the hot-water fixtures in the building.

For an effective system, make sure the individual lengths of tubing or drops that branch off the main loop to supply hot water to the individual fixtures are as short as possible. To accomplish this, route the main supply line, or loop, as close as possible to each fixture or fixture group. Routing the loop close to the fixtures minimizes water waste as well as the waiting time for hot water. Ideally, the length of an individual drop should not exceed 6 feet. However, in some layouts, especially where fixtures in a group are supplied with drops attached to a common manifold, some drops may need to be longer than others. In those instances where drops of varying lengths originate from a common manifold, situate the manifold so that the shortest drop is designated for that fixture with the highest flow rate (e.g., shower). This also minimizes wasted water while waiting for the water to heat up. See Figure 9-26.

Figure 9-26: Structured Plumbing — Remote Manifolds with D’MAND or Timed Recirculation
Two-loop System
Depending on the layout of a building, it may be more practical and cost effective to supply fixtures with more than one loop. In such a case, install a D’MAND pump in each loop. Each pump must have its own segregated activation devices. However, the tubing attached to the outlets of the individual pumps may merge into a single return line before it is teed into the cold water supply line. See Figure 9-27, which illustrates a hot-water system.

Figure 9-27: Remote manifolds provide a significant reduction in the number of individual connections.
System Start-up, Testing and Troubleshooting

Start-up and Testing
Once the system is fully installed, turn the water supply on and plug in the system.

Note: The pump will automatically turn on when it is initially plugged in without activating the D’MAND button.

The D’MAND system will continue to operate until the sensor signals that hot water has arrived. Then it will automatically shut off.

To test the system again, wait until the return line cools down (approximately 20 minutes). You can test the system by pushing the button or moving in front of a motion sensor.

To test the temperature sensor independently, place a hot towel over the sensor located on the pump housing. The unit should shut off immediately. When the hot towel is removed, the system can be operated by one of the activation devices.
## Troubleshooting the D’MAND System

To diagnose common problems, refer to **Table 9-28**.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| The pump does not run when the activation button is pressed. | A. No power at electrical outlet  
B. The controller is plugged into an electrical outlet controlled by a wall switch (such as the outlet under many kitchen sinks that controls the garbage disposal).  
C. The power cord is not secured to the pump and valve.  
D. The wire to the activation button is not connected well.  
E. The temperature setting is already sensing hot water, so the pump is not activating. | A. and B. Plug the controller into a hot outlet.  
C. and D. Shut off power, and then make sure wires have good contact.  
E. Call Uponor at (800) 321-4739 to reset sensitivity setting. |
| The water is not hot enough.                      | A. Pump or valve was installed with water flow going in the wrong direction.  
B. Something is blocking the flow of water in the tubing. | A. Check the arrows on the housing of the valve and pump to make sure they point in the correct direction.  
B. Check the piping for obstruction. |
| Water is not hot enough when pump shuts down.     | A. The temperature sensitivity setting now in place is too low, and the pump is turning itself off too soon. | A. Call Uponor at (800) 321-4739. |

**Table 9-28**: Troubleshooting the D’MAND System
Section 10
Manifold Installation

Uponor offers a full line of manifolds for all plumbing applications. The Engineered Plastic (EP) family of valved and valveless manifolds is made from advanced engineered plastic materials, which is suitable for hot and cold-water distribution systems. That same durable material is also used in Uponor’s EP Branch and Flow-through Multi-port Tees. Complementing the EP manifolds are Uponor Copper Manifolds — branch, flow-through, valved and valveless.

This section discusses the installation of all Uponor manifolds used with Wirsbo AQUAPEX tubing. The EP Valved Manifolds have very detailed assembly, placement, mounting and testing instructions due to their versatility of installation.

**Manifold Placement**

Review the installation options shown in Section 2 to determine the best method for the building construction. With the exception of EP Manifolds and the ProPEX and APR Valved Manifolds, most manifolds are located near their intended use. In a smaller structure, a basic home-run method works best because the point-of-use fixtures are within 12 to 15 feet of the utility room. Larger structures are likely to incorporate the combination method with remote manifolds.

Before installing any Uponor manifolds, review the following guidelines and local plumbing and building codes.

**EP Manifold Placement Guidelines**

- Install the EP Valved Manifold in a fully accessible location. The opening should be large enough to allow complete servicing of the manifold (mounting screws, distribution lines, etc.).
• When local code allows, mount the EP Valved Manifold in a fire-rated wall, provided that the access door meets the same rating requirements as the wall and is installed over the access opening.

• To maximize potential water and energy savings, mount the EP Valved Manifold as close as is practical to the hot-water source.

• Do not install the EP valved manifold within a continuously recirculating hot-water plumbing loop. However, the EP Valved Manifold may be supplied from a recirculating hot-water loop.

• When the home requires more than one unit due to the number of fixtures or size of the home, consider sub-manifolds and locating a remote EP manifold near an outlying group of fixtures. Also consider dividing high-demand fixtures between the units.

**EP and Copper Manifolds Placement Guidelines**

• ProPEX EP and ProPEX and APR Copper Manifolds do not require access since the connections are classified as manufactured instead of mechanical fittings.

• ProPEX and APR Copper Valved Manifolds should have access to adjust the outlet valves.

**EP Valved Manifolds**

EP Valved Manifolds are used in home-run installation methods. Place the fixture stop valve at the manifold location instead of at the point-of-use. PEX lines run directly to each fixture from the manifold, reducing the number of required fittings.

**Installation**

Before you begin, gather appropriate tools and materials.

**Tools Required**

• Screw gun or electric drill
• ProPEX Expander Tool (Q6295075, Q6301000 or Q6261500)
• ProPEX Expander Tool Heads
• Tubing Cutter (E6081125 or E6081128)
• \(\frac{3}{4}\)" and \(1\frac{1}{4}\)" wood drill bits

**Materials Required**

• 1" wood screws (for valved manifold mounting)
• \(\frac{1}{8}\)" or \(\frac{3}{4}\)" plywood (only required when mounting between studs)
• Wirsbo AQUAPEX tubing
• EP Valved Manifold Kit (includes Valve-turning Tool and hot/cold labels)
• ProPEX Swivel Adapters (\(\frac{1}{8}\)" or \(\frac{3}{4}\)" for \(\frac{1}{2}\)" NPSM-threaded outlets only)
• Tube Uncoiler (recommended)
Assembling the EP Valved Manifold

The EP Valved Manifold can either be assembled prior to or while it is being mounted.

1. Determine the total number of outlets required for both the hot and cold manifold assemblies and the appropriate inlet/end cap arrangement.

2. EP Valved Manifolds are assembled with Flow-through Couplings (Q2121313) or Stop Couplings (Q2121251).

3. Insert the coupling into the end of the manifold until it stops. Attach the next manifold to the coupling and install the Assembly/Mounting Bracket (Q2120020).

4. Insert the 3⁄4” ProPEX Inlet (Q2120750) or 1” ProPEX Inlet (Q2121000) into the appropriate end of the manifold assembly. Install the Assembly/Mounting Bracket.

5. Insert the End Cap (Q2121250) into the other end of the manifold assembly. Install the Assembly/Mounting Bracket.

6. Ensure that all Assembly/Mounting Brackets are fully locked, and the release tabs are located on the front (valve) side of the manifold.
7. For hot-water distribution, install the Red Valve Clips (Q2120001) prior to the manifold installation. Remove the Blue Valve Clips (Q2120002) by grasping the clip and pulling up and away from the outlet. Rotating the clip away from the tab on the valve while pulling may simplify removal.

**Note:** If insertion of components is difficult, lubricate the o-rings with a soapy water solution.

**Mounting EP Valved Manifold** (see photos at right)

1. Always mount manifolds in locations that are easily accessible, and allow valves to face outward.

2. Ensure the release tab on the Assembly/Mounting Bracket is accessible.

3. Make provisions to support the tubing runs as they exit the EP Valved Manifold. Any bend within 6 inches of a ProPEX connection to 3/8” and ½” Wirsbo AQUAPEX tubing requires a tube talon, bend support or stud. For 3/4” and 1” tubing, support is required for bends within 10 inches of a ProPEX connection.

4. Do not overtighten mounting screws. Overtightening may cause the Assembly/Mounting Brackets to fail.

5. When mounting on a stud, center the Assembly/Mounting Bracket on the stud to allow the bracket to open sufficiently.

6. When surface-mounting, mount the manifolds with fasteners appropriate for the wall surface. If surface-mounting to sheetrock, brackets should align with as many studs as practical.

7. Extended driver bits simplify Assembly/Mounting Bracket installation and allow mounting of the manifold in a fully assembled configuration.

8. To run distribution lines through studs, the drill guide provided may be helpful.

9. When mounting the EP Valved Manifold above a water heater, install a minimum of 36 inches of connecting tubing between the water heater and the EP Valved Manifold due to chance of heat stacking.

10. When mounting the EP Valved Manifold beside a water heater and connecting it with tubing incorporating a horizontal flow, connect with at least 18 inches of tubing.
Section 10 – Manifold Installation
Using the Drill Guide

The drill guide, included with each EP Valved Manifold, is used to mark locations of distribution holes that are drilled through the studs. The distribution lines may pass through these holes as they are attached to the EP Valved Manifold ports. Use one drill guide to mark all studs.

1. Fasten the drill guide template so that the holes are in the center of the stud.

2. Mark the appropriate number of holes on the stud by lancing a pencil through the crosshairs of the drill guide.

3. Remove the guide and drill holes.

Caution: When installing the EP Valved Manifold prior to wall-finishing operations, protect the unit from paint, texture compounds and drywall dust.

Connecting Wirsbo AQUAPEX Tubing to the EP Valved Manifold

1. The manifold is available with \( \frac{3}{4} \)" or 1" ProPEX supply connections and either \( \frac{1}{2} \)-inch threaded outlets (to connect with a ProPEX Swivel Adapter) or direct ProPEX connections.

2. Please refer to Section 4 for instructions on making a proper ProPEX connection.

3. If using the Swivel Adapter to thread onto the manifold, start thread and hand-tighten until snug, plus one-quarter turn. Do not overtighten the swivel connections. Hand-tighten only; do not use a tool (e.g., wrench).

4. Open all valves after completing each connection.

Note: Valves are one-quarter turn only. Turn valves counterclockwise to open and clockwise to close. Do not turn past the valve stop. Use the EP Valved Manifold Valve-turning Tool (Q2120010) to open and close valves.
Caution: Turning the valves past the stop will cause the valve body to blow off under pressure.

5. Label each valve handle with the hot and cold fixture labels supplied with the EP Valved Manifold.

6. Cap any unused outlet and turn it to the off position.

7. Attach the manifold supply tubing to the appropriate end using proper ProPEX connection procedures.

Caution: Do not use thread sealant on the connections. The carriers present in these compounds can crack the plastic port connections, resulting in leaks and water damage.

Filling and Testing the EP Valved Manifold System

System Test
Air-pressure testing of an EP Valved Manifold is acceptable and preferred to hydrostatic testing in areas where cold temperatures could freeze the system or where water is not available. Uponor recommends that the installer pressurize the system with compressed air after installing and capping distribution lines.

Note: EP Valved Manifold valves must be in the open position prior and during the test, which should use a pressure of not less than the working system pressure. Test the system for a minimum of 15 minutes. During the test, system pressure should drop no more than 8 psi in a one-hour period.

Filling the System
- Open all connected port valves before filling the system with water and pressurizing.
- Use care when opening a port valve to an empty or unpressurized line. Ensure the fixture to which the line is connected is in the off position. Open the valve slowly until water starts to flow into the line.
- Valve Cylinders (Q2120050) are replaceable.

Note: Test the system to a minimum of working pressure.
Warning! Pressures used in testing can blow unmade or incomplete connections apart with tremendous force. This force is many times greater when air is used as the test media. To reduce the risk of personal injury, ensure that all connections are completed before testing. Use only the pressure and time required to determine that the system is leak-free.

System Disinfection

EP manifolds and Wirsbo AQUAPEX tubing should be disinfected in accordance with AWWA C651-86, “Standard for Disinfecting Water Mains,” or in accordance with the local codes.

Warning! To prevent reduced service life of system components, disinfection solutions should not stand in the system longer than 24 hours. Flush the system with potable water after disinfection. Do not allow fluids to freeze in the EP Valved Manifold System.

EP Valve Replacement

Caution: Make sure there is no pressure on the EP Valved Manifold system prior to repair or replacement of any system components. All EP Valved Manifolds come with assembled valves and necessary o-rings. O-rings are required for proper valve operation.

1. Shut off water to manifold and bleed.
2. Remove the Red or Blue Valve Clip by hand or using a small flat-head screwdriver.
3. Push the valve down (into the manifold) as far as it will go and turn clockwise past the indent on the manifold.
4. Use pliers to grip the handle of the valve if removal is difficult.
5. Pull the valve out of the manifold.
6. Place a small amount of soap and water solution on the o-rings on the replacement valve.
7. Locate the tab on the valve so that it clears the indent on the manifold, and completely push in the valve.
8. Turn the valve past the indent on the manifold and pull up until it hits the stop.
9. Slide a Red or Blue Valve Clip with the appropriate label between the manifold and the valve until the clip snaps into place.
Caution: Failure to install the Valve Clip could result in the valve blowing off when the system is pressurized.

Handling Guidelines for EP Valved Manifolds
Although not comprehensive, the following highlights the most common guidelines:

- EP Valved Manifold threaded outlets seal with a gasket and do not require joint compound or polytetrafluoroethylene (PTFE) tape.
- Do not overtighten connections by using tools. Tighten swivel nuts by hand until snug, plus one-quarter to one-half turn.
- Do not subject EP Valved Manifolds to impact.
- Distribution lines should exit the EP Valved Manifold in straight lines perpendicular to the length of the EP Valved Manifold.
- Supply lines should enter or exit the EP Valved Manifold in a straight line parallel to the length of the EP Valved Manifold.
- Do not expose EP Valved Manifolds to open flame.
- Do not allow solder, flux, solvents or urethane foams to come into contact with EP Valved Manifolds, as immediate damage may result.
- Do not assemble or disassemble the EP Valved Manifold while pressurized. Be sure that the water supply is turned off and that pressure has been relieved from the system.
- Do not conceal EP Valved Manifolds behind permanent walls, floors or ceilings.
- Keep Valve-turning Tool in an accessible location near the EP Valved Manifold.
- Hang or fasten the manifold kit supplied with the EP Valved Manifold nearby for future reference.
- Always inform the homeowner where the EP Valved Manifold is located if fixture stops are omitted.
- Do not spray on or allow organic chemicals, strong acids or strong bases to come into contact with EP Valved Manifolds.
- Do not use petroleum or solvent-based paints on EP Valved Manifolds.
- Do not allow rodents, insects or other pests to come into contact with EP Valved Manifolds.
EP Valveless Manifold
The EP Valveless Manifold is available with four, six, eight, 10 or 12 outlets with \( \frac{3}{4} \)-inch inlet. The EP Valveless Manifold is also available in eight, 10 or 12 outlets with a 1-inch inlet. All outlets have \( \frac{1}{2} \)" ProPEX connections. The EP Valveless Manifold requires no assembly.

- The manifold connects directly to \( \frac{3}{4} \)" Wirsbo AQUAPEX using \( \frac{3}{4} \)" ProPEX Rings (Q4690751, Q4690752) or 1" Wirsbo AQUAPEX using the 1" ProPEX Ring (Q4681000).
- Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets on the manifold.

EP Flow-through Valveless Manifold
The EP Flow-through Valveless Manifold is available with four, six, eight, 10 or 12 outlets and \( \frac{3}{4} \)- or 1-inch inlet.

The EP Flow-through Valveless Manifold is also available in four and six outlets with 1-inch inlets. All outlets have \( \frac{1}{2} \)" ProPEX connections. The EP Flow-through Valveless Manifold requires no assembly.

- The manifold connects directly to \( \frac{3}{4} \)" Wirsbo AQUAPEX using \( \frac{3}{4} \)" ProPEX Rings (Q4690751 and Q4690752) or 1" Wirsbo AQUAPEX using the 1" ProPEX Ring (Q4681000).
- Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.

ProPEX EP Multi-port Tees
EP Branch Multi-port Tee
The assembled EP Branch Multi-port Tee is available in either \( \frac{3}{4} \)- or 1-inch inlets with \( \frac{1}{2} \)-inch ProPEX branch outlets. The four-outlet manifold features a \( \frac{3}{4} \)-inch inlet with \( \frac{1}{2} \)-inch ProPEX outlets. The six-outlet manifold features a 1-inch inlet with \( \frac{1}{2} \)-inch ProPEX outlets.
• The manifold connects directly to $\frac{3}{4}$" Wirsbo AQUAPEX using $\frac{3}{4}$" ProPEX Rings (Q4690751 and Q4690752) or 1" Wirsbo AQUAPEX using the 1" ProPEX Ring (Q4681000).

• Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.

**EP Flow-through Multi-port Tee**
The EP Flow-through Multi-port Tee features a combination of inlet configurations with $\frac{1}{2}$-inch ProPEX branch outlets. The first configuration is a $\frac{3}{4}$" ProPEX inlet on either end of the manifold body. The second configuration consists of $\frac{3}{4}$- and 1-inch inlets at the manifold body ends. The last configuration is a 1-inch inlet on either end of the manifold body.

• The manifold connects directly to $\frac{3}{4}$" Wirsbo AQUAPEX using $\frac{3}{4}$" ProPEX Rings (Q4690751 and Q4690752) or 1" Wirsbo AQUAPEX using the 1" ProPEX Ring (Q4681000).

• Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.

**Handling Guidelines for EP Multi-port Tees**
Although not comprehensive, the following highlights the most common guidelines:

• Do not subject EP Multi-port Tees to impact.

• Do not expose EP Multi-port Tees to open flame.

• Do not allow solder, flux, pipe dope, solvents or urethane foams to come into contact with EP Multi-port Tees, as immediate damage may result.

• Do not use EP Multi-port Tees where temperatures and pressures exceed ratings.

• Do not spray on or allow organic chemicals, strong acids or strong bases to come into contact with EP Multi-port Tees.

• Do not use petroleum or solvent-based paints on EP Multi-port Tees.

• Do not allow rodents, insects or other pests to come into contact with EP Multi-port Tees.
**ProPEX Copper Manifolds**

**ProPEX 1” Copper Branch Manifold**
The fully assembled ProPEX Copper (type L) Branch Manifold features \( \frac{1}{2} \)" ProPEX brass fittings brazed to the manifold body. One end of the manifold body is flared to accept 1-inch fitting adapters. The other end of the manifold is spun closed. Adequate space is available on the manifold body to cut the spun end off should the manifold require augmentation. The manifolds are available with four, six, eight, 10 or 12 outlets. Do not exceed acceptable flow rates for 1-inch nominal copper.

The manifold inlet transitions to Wirsbo AQUAPEX tubing using a ProPEX fitting adapter.

- \( \frac{3}{4} \)” PEX — Use ProPEX Brass Fitting Adapter, \( \frac{3}{4} \)” PEX x 1” Copper (Q4507510).
- 1” PEX — Use ProPEX Brass Fitting Adapter, 1” PEX x 1” Copper (Q4501010).
- The manifold connects directly to \( \frac{3}{4} \)” Wirsbo AQUAPEX using \( \frac{3}{4} \)” ProPEX Rings (Q4690751 and Q4690752) or 1” Wirsbo AQUAPEX using the 1” ProPEX Ring (Q4681000).
- Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.

**ProPEX 1” Copper Branch Manifold with \( \frac{3}{4} \)” ProPEX Inlet**
The fully assembled ProPEX 1” Copper (type L) Branch Manifold with \( \frac{3}{4} \)” ProPEX inlet has \( \frac{1}{2} \)” ProPEX brass fittings brazed to the manifold outlets. One \( \frac{1}{2} \)” ProPEX adapter fitting is brazed to one end of the manifold. The other end of the manifold is spun closed. Adequate space is available on the manifold body to cut the spun end off should the manifold require augmentation. The manifolds are available with three, four, six, eight, 10 or 12 outlets. Do not exceed acceptable flow rates for 1-inch nominal copper.

- The manifold connects directly to \( \frac{3}{4} \)” Wirsbo AQUAPEX using \( \frac{3}{4} \)” ProPEX Rings (Q4690751 and Q4690752).
- Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.
ProPEX 1" Copper Flow-through Manifold
The fully assembled ProPEX 1" Copper (type L) Flow-through Manifold features ½" ProPEX brass fittings brazed to the manifold outlets. A ¾" ProPEX adapter fitting is brazed to each end of the manifold. The manifolds are available with four, six, eight, 10 or 12 outlets. Do not exceed acceptable flow rates for 1-inch nominal copper.

• The manifold connects directly to ¾" Wirsbo AQUAPEX using ¾" ProPEX Rings (Q4690751 and Q4690752).

• Use a short piece of Wirsbo AQUAPEX (3 inches minimum) with a ProPEX Plug and ProPEX Ring to cap unused outlets.

ProPEX 1" Copper Valved Manifold
The fully assembled ProPEX 1" Copper (type L) Valved Manifold features ½" ProPEX valved outlets. Valved connections allow for isolation of individual outlets to fixtures. The manifold is available with four, six, eight, 10 or 12 outlets.

Both 1-inch ends are copper pipe size and require a copper end cap, coupling or transition fitting to make the proper connection. Sections can sweat together to extend the number of valved outlets using a standard 1-inch copper coupling. Do not exceed acceptable flow rates for 1-inch nominal copper.

APR Copper Manifolds
APR 1" Copper Branch Manifold
The fully assembled APR Copper (type L) Branch Manifold features ½" APR brass fittings brazed to the manifold body. One end of the manifold body is flared to accept 1-inch fitting adapters. The other end of the manifold is spun closed. Adequate space is available on the manifold body to cut the spun end off should the manifold require augmentation. The manifold is available with four, six, eight, 10 or 12 outlets. Do not exceed acceptable flow rates for 1-inch nominal copper.
The manifold inlet transitions to Wirsbo AQUAPEX tubing using an APR fitting adapter.

- ¾” PEX — Use APR Brass Fitting Adapter, ¾” PEX x 1” Copper (K4507510).
- 1” PEX — Use APR Brass Fitting Adapter, 1” PEX x 1” Copper (K4501010).
- The manifold connects directly to ¾” Wirsbo AQUAPEX using the ¾” APR Brass Sleeve (K4680750) or 1” Wirsbo AQUAPEX using the 1” APR Brass Sleeve (K4681000).
- Use a short piece of Wirsbo AQUAPEX (4 inches minimum) with an APR Brass Plug and Brass Sleeve to cap unused outlets.

**APR 1” Copper Valved Manifold**
The fully assembled APR 1” Copper (type L) Valved Manifold features ½” APR valved outlets. Valved connections allow for isolation of individual outlets. The manifolds are available with four, six, eight, 10 or 12 outlets.

Both 1-inch ends are copper pipe size and require a copper end cap, coupling or transition fitting to make the proper connection. Sections can sweat together to extend the number of valved outlets using a standard 1-inch copper coupling. Do not exceed acceptable flow rates for 1-inch nominal copper.

**Blank Copper Manifold Bodies**

**2” Valveless Manifold**
The 2” Copper (type L) Manifold with ¼” copper outlets is 60 inches long. The manifold is available with 24 outlets at 3 inches on center.

Both ends of the manifold are copper pipe size and require a copper end cap, coupling or transition fitting to make the proper connection. Sections can sweat together to extend the number of outlets using a standard 2-inch copper coupling. This manifold can accept either ProPEX or APR adapters for the inlets and outlets. Do not exceed acceptable flow rates for 2-inch nominal copper.
1½” Valveless Manifold

The 1½” Copper (type L) Manifold with ½” copper outlets is 60 inches long. The manifold is available with 24 outlets at 3 inches on center.

Both ends of the manifold are copper pipe size and require a copper end cap, coupling or transition fitting to make the proper connection. Sections can sweat together to extend the number of outlets using a standard 1½-inch copper coupling. This manifold can accept either ProPEX or APR adapters for the inlets and outlets. Do not exceed acceptable flow rates for 1½-inch nominal copper.

1” Copper Valveless Manifold

1” Copper (type L) Valveless Manifold features either ½- or ¾-inch copper outlets. The manifold with ½-inch outlets is available with two, three and four outlets. The manifold with ¾-inch outlets is available with two and three outlets. Both manifold types have outlet spacing of 1½-inches on center. These manifolds can accept either ProPEX or APR adapters for the inlets and outlets.

One end of the manifold body is flared to accept 1-inch fitting adapters. The other manifold end is 1” copper pipe size and requires a copper end cap, coupling or transition fitting to make the proper connection. Do not exceed acceptable flow rates for 1-inch nominal copper.

The manifold inlet transitions to Wirsbo AQUAPEX tubing using a ProPEX fitting adapter.

- ¾” PEX — Use ProPEX Brass Fitting Adapter, ¾” PEX x 1” Copper (Q4507510).
- 1” PEX — Use ProPEX Brass Fitting Adapter, 1” PEX x 1” Copper (Q4501010).

The manifold inlet transitions to Wirsbo AQUAPEX tubing using an APR fitting adapter.

- ¾” PEX — Use APR Brass Fitting Adapter, ¾” PEX x 1” Copper (K4507510).
- 1” PEX — Use APR Brass Fitting Adapter, 1” PEX x 1” Copper (K4501010).
Section 11
Plumbing Inspector’s Checklist

This checklist is only intended to serve as a guideline to the local authority. It is not intended to include all applicable requirements. Please review the codes and standards guidelines in this Installation Guide as well as local code for additional guidelines and restrictions. Where any conflict exists between the information in this Installation Guide and local code, the local code takes precedence.

Tubing and Fittings
- Wirsbo AQUAPEX tubing — ASTM F876, ASTM F877, CSA B137.5, NSF-pw
- ProPEX fittings — Manufactured and listed to ASTM F1960 and CSA B137.5
- APR fittings — Manufactured and listed to ASTM F2080 and CSA B137.5

EP Valved Manifolds
- EP Valved Manifolds are NSF Certified to ASTM F1960, NSF-PW.
- An EP Valved Manifold system, which has valves on all the outlet ports, does not require stop valves at the fixtures. However, the code official may require stop valves at some fixtures.
- Provide access to the EP Valved Manifold and its mounting screws, the port valves, distribution-line connections and supply-line connections.
- When the EP Valved Manifold is mounted above the water heater, install a minimum of 36 inches of connecting tubing between the water heater and the EP Valved Manifold due to possible heat stacking.
- The main service line to the EP Valved Manifold should include a main shut-off valve.
- When the EP Valved Manifold is mounted beside the water heater and is connected with tubing incorporating a horizontal flow, connect with at least 18 inches of tubing.
- Individual fixture shut-off valves at the manifold should identify the fixture being supplied.
**Tubing Limitations**

- Do not expose Wirsbo AQUAPEX tubing to direct sunlight for more than 30 days.

- Do not install Wirsbo AQUAPEX tubing within 6 inches of any gas appliance vents, with the exception of double-wall B-vents (with a minimum clearance of 1 inch).

- Do not install Wirsbo AQUAPEX tubing within 12 inches of recessed light fixtures, unless the PEX line is protected with suitable insulation.

**Joints and Connections**

- Square-cut all tubing ends and ensure they are free of burrs and debris before a connection is made.

- Ensure fittings and connections comply with the manufacturers’ recommendations.

- Make transition joints with manufacturer-approved fittings.

**ProPEX Fittings**

- Fully seat the Wirsbo AQUAPEX tubing and ProPEX Ring against the shoulder of the fitting. The maximum gap should be no more than the thickness of a credit card.

- If an improper connection is made, cut 2 inches from the end of the tubing and use a new ProPEX Ring.

**APR Fittings**

- The maximum gap between the brass sleeve and the shoulder of the fitting should not exceed \( \frac{1}{32} \) inch.

- If an improper connection is made, cut 2 inches from the end of the tubing and use a new APR sleeve and fitting.
**Tubing Supports**

- Use plastic or metal supports designed for use with plastic tubing.
- Place horizontal support every 32 inches for \( \frac{3}{8} \), \( \frac{1}{2} \), \( \frac{3}{4} \) and 1" PEX tubing.
- Provide vertical support every 4 to 5 feet with a mid-story guide placed between floors.
- Bends within 6 inches of a ProPEX or APR connection to \( \frac{3}{8} \)" to \( \frac{1}{2} \)" tubing and within 10 inches of a ProPEX or APR connection to \( \frac{3}{4} \)" to 1" tubing require support.
- Allow \( \frac{1}{8} \) to \( \frac{3}{16} \) inches of slack per foot of run on installed Wirsbo AQUAPEX tubing for expansion and contraction.
- Wirsbo AQUAPEX tubing should not be rigidly anchored. Anchor the tubing to allow freedom of movement for expansion and contraction.

**General Recommendations**

- Protect Wirsbo AQUAPEX tubing passing through hollow masonry walls or metal studs with sleeves or grommets.
- Protect Wirsbo AQUAPEX tubing from damage (e.g., nail, screw, etc.) with suitable steel-plate protectors.
- The minimum bend radius of PEX is six times the outside diameter.
- Only EP or DZR fittings are suitable for burial.

**Pressure Testing**

- Open the valves on the EP Valved Manifold prior to pressure testing. These valves are to remain open until the pressure test is complete.
- Pressure-test the system with air or water to the system working pressure (40 to 60 psi) at the current ambient temperature. Pressure testing should not exceed 100 psi. Slight fluctuations of pressure are normal due to ambient temperature changes.

**Caution:** If using water to pressure-test the system, purge all water from the system prior to ambient air temperatures nearing 32°F (0°C). Failing to remove the water from the system can result in damage to the tubing and associated equipment.