Uponor PEX-a Installation Guide

Uponor PEX-a Installation Guide
is published by

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This piping systems installation guide is published for mechanical contractors, installers, and building officials interested in Uponor PEX piping systems. It describes general installation recommendations that use Uponor PEX piping products. Refer to local codes for additional requirements.

Uponor made reasonable efforts to collect, prepare, and provide quality information and material in this installation guide. However, system enhancements may result in modification of features or specifications without notice.

Uponor is not liable for installation practices that deviate from this installation guide or are not acceptable practices within the mechanical trades, codes, or standards of practice.

Prior to installing Uponor piping systems, Uponor recommends all installers attend Uponor piping systems installation training performed by an Uponor trainer or manufacturer's representative. To schedule a training session at your business or job site, contact your local Uponor representative or call 800.321.4739.

Direct any questions regarding the suitability of an application or a specific design to a local Uponor representative by calling 888.594.7726.

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Uponor PEX-a Pipe

Uponor manufactures Engel-method PEX-a pipe which reaches a degree of crosslinking that is more than 80%, resulting in a more uniform product with no weak links in the molecular chain.

The properties of PEX-a pipe make it the most flexible PEX on the market, allowing:

- Tightest bend radius (6X pipe diameter)
- Kink repairs with a simple shot of heat from a heat gun
- Thermal elasticity for expansion up to 3X the pipe diameter, providing exceptional resiliency in freeze/thaw cycles
- Shape memory for use with ProPEX® ASTM F1960 expansion fittings

Material Properties

Property	English Units	SI Units
Approximate modules of elasticity (Secant at 1% and 73°F/22.8°C)	91,350 psi	630 N/mm^2
Tensile yield strength at 68˚F (20˚C) per DIN 53455	2.76-3.77 psi	19-26 N/mm^2
Piping density	59 $lbs./ft^3$	936 Kg/m^3
Impact strength	Will not fail under impact at temperatures of -284°F/-140°C	
Water absorption	Room temperature = 0.01% Boiling for 40 days = 0.07%	
Coefficient of friction (surface-roughness factor)	0.000019 inches	0.0005 mm
Surface tension	0.00014 lbs./inches	25 dyne/cm
Coefficient of linear expansion at 135°F/57°C	Avg. = $9.2*10^{-5}$ in/in•°F	Avg. = $1.7*10^{-4}$ m/m•°C
Softening temperature	264°F to 268°F	129°C to 131°C
Specific heat	0.55 Btu/lb•°F	2302.3 J/kg•°C
Coefficient of thermal conductivity	0.219 Btu/(hr•ft•°F)	0.38 W/(m•°K)
Degree of crosslinking	70 to 89% (per ASTM F876)	
Minimum bend radius	Six times the outside diameter	

Table 1: Material Properties

Offerings

Uponor offers AquaPEX® White pipe for residential and commercial potable-plumbing applications as well as AquaSAFE™ residential fire safety systems. Uponor AquaPEX White with Red Print and Uponor AquaPEX Red pipe is available for hot-water plumbing lines. Uponor AquaPEX White with Blue Print and Uponor AquaPEX Blue pipe is available for cold-water plumbing lines. Refer to the chart below for details about Uponor potable-plumbing PEX-a pipe offerings.

Note: Hydrostatic temperature and pressure ratings are different from operating temperatures and pressures shown in the chart below.

Plumbing Pipe Offerings

Feature	Uponor AquaPEX White	Uponor AquaPEX White with Red Print Uponor AquaPEX White with Blue Print Uponor AquaPEX Red Uponor AquaPEX Blue
Hydrostatic temperature and pressure ratings	200°F (93°C) at 80 psi (550 kPa) 180°F (82°C) at 100 psi (690 kPa) 73°F (23°C) at 160 psi (1,100 kPa)	
Operating temperature, pressure, and velocity ratings	Domestic hot water piping maximum temperature of 140°F (60°C) at 80 psi (550 kPa) and 8 feet per second (fps)	
	Domestic hot water recirculation piping maximum temperature of 140°F (60°C) at 80 psi (550 kPa) and 2 fps	
Fitting compatibility	ProPEX ASTM F1960, ASTM F2098 clamp, ASTM F1807 crimp, ASSE 1061 push fit	
Warranty	25 years on pipe and ProPEX fitting system	
Pipe sizes	¼" to 3"	½" to 1"
Approved for use in AquaSAFE™ multipurpose fire sprinkler systems	Yes (¾" - 1¼" sizes only)	No
Codes, standards and listings	Comprehensive for both residential and commercial applications	

Table 2: Plumbing Pipe Offerings

UV Ratings

Product	Marking	UV Resistance
AquaPEX White	5106	1 month
AquaPEX White with Red Print	5106	1 month
AquaPEX White with Blue Print	5106	1 month
AquaPEX Red	5306	6 months
AquaPEX Blue	5306	6 months

Table 3: UV Ratings

Standards, Codes, and Listings

Uponor PEX piping is manufactured to meet the following requirements.

Standards

ASTM International

- ASTM F876 *Standard Specification for Cross-linked Polyethylene (PEX) Piping*
- ASTM F877 *Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems*
- ASTM F1960 *Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Piping*
- ASTM F2023 *Standard Test Method Evaluating the Oxidative Resistance of Cross-linked Polyethylene (PEX) Piping and Systems to Hot Chlorinated Water*
- ASTM F2657 *Standard Test Method for Outdoor Weathering Exposure of Cross-linked Polyethylene (PEX) Piping*
- ASTM E84 *Standard Test Method for Surface Burning Characteristics of Building Materials*
- ASTM E119 *Standard Test Methods for Fire Tests of Building Construction and Materials*
- ASTM E814 *Standard Test Method for Fire Tests of Through-Penetration Firestop Systems*

NSF International

- ANSI/NSF *Standard 14 Plastics Piping System Components and Related Materials*
- ANSI/NSF *Standard 61 Drinking Water System Components — Health Effects*
- ANSI/NSF *Standard 359 Valves for Crosslinked Polyethylene (PEX) Water Distribution Systems*

Underwriters Laboratories, Inc. (UL)

- ANSI/UL 263 *Standard for Safety for Fire Tests of Building Construction and Materials*
- UL 1821 *Standard for Safety for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service* (NFPA 13D applications only)
- UL 2846 *Standard for Safety for Fire Test of Plastic Water Distribution Plumbing Pipe for Visible Flame and Smoke Characteristics*

CSA Group (Canadian Standards Association)

- CAN/CSA B137.5 *Crosslinked Polyethylene (PEX) Piping Systems for Pressure Applications*
- CAN/CSA B214 *Installation Code for Hydronic Heating Systems*

Underwriters Laboratories of Canada (ULC)

- CAN/ULC-S102.2 *Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies*
- CAN/ULC-S101 *Standard Methods of Fire Endurance Tests of Building Construction and Materials*
- CAN/ULC-S115 *Standard Method of Fire Tests of Firestop Systems*

Plastics Pipe Institute (PPI)

- PPI Technical Report TR-4

Codes

- IECC
- IPC
- IMC
- IRC
- UPC
- UMC
- NSPC
- HUD
- UFGS
- NPC of Canada
- NBC of Canada

Listings

- cNSFus-fs
- cNSFus-rfh
- cNSFus-pw
- cQAIus
- UL
- CSA
- WH
- ETL
- PPI TR-4
- ICC-ES-PMG
- IAPMO
- BMEC
- CCMC

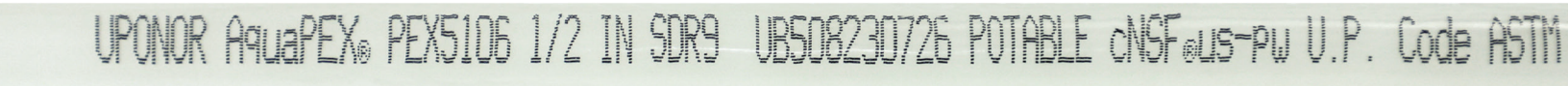


Figure 1: Uponor AquaPEX White Pipe Print String

Storing and Handling Guidelines

Although not comprehensive, the following highlights the most common guidelines when storing and handling Uponor PEX.

- Uponor PEX is approved for direct connection to electric water heaters as well as power-vented gas water heaters where allowed by local code.
- Do not store Uponor PEX piping outdoors.
- Keep Uponor PEX piping in the original packaging until the time of installation.
- Do not use Uponor PEX piping where temperatures and pressures exceed ratings.
- Do not use or store Uponor AquaPEX White, Uponor AquaPEX White with Red Print, or Uponor AquaPEX White with Blue Print piping where it will be exposed to direct sunlight for more than one month.
- Do not use or store Uponor AquaPEX Red or Uponor AquaPEX Blue piping where it will be exposed to direct sunlight for more than six months.
- Do not weld or glue to join Uponor PEX piping.
- Do not apply open flame to Uponor PEX piping.
- Minimum clearance from Insulation Contact (I.C.)-rated fixtures is 2". Minimum clearance from non-I.C. rated fixtures is 12". For distances closer than the above minimums, protect the pipe with an approved insulation.
- Do not install Uponor PEX within 5 ft. of direct view from fluorescent and LED lighting without protecting the pipe with a UV-blocking material.
- Do not use Uponor PEX piping to convey natural gas.
- Do not solder, braze, weld or fusion-weld within 18" of any Uponor PEX piping in the same water line. Make any heat-related connections prior to making the ProPEX connection.
- Do not install Uponor PEX piping between the tub/shower valve and tub spout.
- Do not use Uponor PEX piping for an electrical ground.
- Do not spray on or allow organic chemicals, strong acids or strong bases to come into contact with Uponor PEX piping.
- Do not use petroleum or solvent-based paints, greases or sealants on Uponor PEX piping.
- Use only approved and appropriate firestop materials with Uponor PEX piping.
- Do not allow rodents, insects or other pests to come into contact with Uponor PEX piping.
- Do not subject Uponor PEX piping to blunt impact.
- Do not install Uponor PEX piping in soil environments contaminated with solvents, fuels, organic compounds, pesticides or other detrimental materials that may cause permeation, corrosion, degradation or structural failure of the piping. In areas where such conditions are suspected, perform a chemical analysis of the soil or groundwater to ascertain the acceptability of Uponor PEX piping for the specific installation. Check local codes for additional requirements.
- Do not press standard ProPEX LF brass fittings or standard brass (i.e., copper press). Only press Uponor ProPEX copper press adapters.
- Do not install Uponor PEX pipe in steel-stud applications without the use of grommets to protect the pipe from abrasion.
- Do not install Uponor PEX within 6" (15.2cm) of a vent pipe for direct or gravity-vented appliances.*
- For chemical compatibility questions, contact Uponor Technical Services at 888.594.7726 (U.S.) or 888.994.7726 (Canada).

*Maintain a minimum 1" (25mm) distance from double-wall B vents or zero-clearance plastic vents.

Note: When opening a new coil of pipe, be sure to cut off bent end of pipe, if present.

Note: When transitioning from Uponor PEX to other piping materials, follow the appropriate installation instructions for that product.

Bending PEX Piping

Uponor PEX Bend Radius

The minimum bend radius of Uponor AquaPEX pipe is six times the outside diameter. Bend supports are available for ⅜", ½", ¾", and 1" piping and may be used to facilitate 45-degree or 90-degree bends. Use large-diameter PVC conduit to facilitate 90-degree bends in larger-diameter Uponor PEX piping.

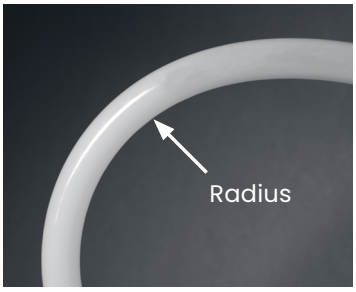


Figure 2: Bend Radius

Pipe Size	Pipe O.D.	Min. Bend Radius	2 x O.D.
½"	0.625"	3¾" (95mm)	1¼" (32mm)
¾"	0.875"	5¼" (133mm)	1¾" (44mm)
1"	1.125"	6¾" (171mm)	2¼" (57mm)

Table 4: Bending Uponor PEX

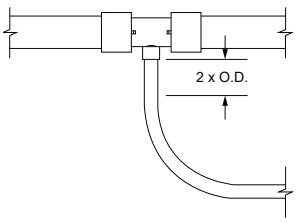


Figure 3: Correct Bending

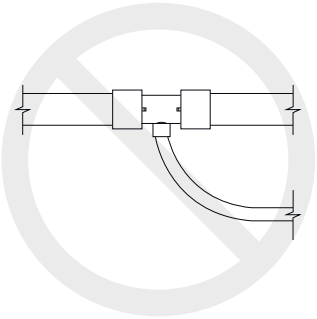


Figure 4: Incorrect Bending

To alleviate stress on ProPEX connections and fittings, do not change direction immediately after a ProPEX connection.

Uponor recommends a minimum of two times the outside diameter (O.D.) of the pipe as the minimum distance before changing direction; however, it is up to the installer to use best judgment. See **Figures 3** and **4** for guidance.

Note: When a proper bend is not possible, use a ProPEX elbow.

Note: Uponor recommends the use of elbows in sizes 1¼" and larger for directional changes unless adequate space is available for a proper bend.

Reforming Kinked Piping

If the piping is kinked and hinders flow, easily make repairs following the steps below.

1. Make sure the system is not pressurized.
2. Straighten the kinked portion of the piping.
3. Heat the kinked area to approximately 265°F/129.4°C with an electric heat gun (approximately 450 watts of power). Apply the heat evenly until the piping returns to its original size and shape. **Do not use an open flame** (see **Figure 5**).
4. Allow the repaired piping to cool undisturbed to room temperature. When the piping returns to its opaque appearance, the repair is complete.

Caution: The piping surface temperature must not exceed 338°F/170°C. Do not apply direct flame to Uponor PEX piping. Uponor PEX piping repaired according to these recommendations will return to its original shape and strength. If the piping is sliced, punctured or otherwise damaged beyond the capacity of the crosslinked memory, install a ProPEX coupling. Uponor PEX piping cannot be welded or repaired with adhesives.

Figure 5: Reforming Kinked Piping

Thawing Frozen Piping

Uponor PEX can withstand extreme freeze-thaw cycles better than other piping materials. In 2015, Uponor worked in partnership with standards developing organizations (SDOs) to establish a test method for performance under freeze/thaw conditions and subsequently developed a new standard for PEX piping applications. The test methodology included Uponor PEX pipe, ProPEX rings, and ProPEX fitting assemblies and subjected them to repeated freeze/thaw cycles. The assemblies were then evaluated for leaks under pressure after every cycle. Based on the samples provided and the testing performed, Uponor ½" PEX pipe, ProPEX rings, and ProPEX EP couplings passed the freeze/thaw cycling and subsequent burst tests without failure in accordance with the test method.

If freezing occurs, the installer should advise the end user to correct the lack of insulation or heat to eliminate the problem from reoccurring. Should Uponor PEX piping experience an ice blockage, thaw the piping using one or more of the following methods.

- Pour hot water over the affected portion of piping.
- Wrap hot towels around the affected portion of piping.
- Place a small portable heating unit in the area to heat the space and thaw the ice blockage from the piping.
- Slowly heat the affected area with a hair dryer. Rub a hand over the area while heating to ensure the piping does not get too hot.

Pipe Support Requirements

When determining support types and distances, it is important to take into account both the local code requirements, as well as the specific manufacturer's requirements for their product. This is because the manufacturer may have requirements above and beyond code to protect the integrity of the piping system due to its unique properties (e.g., thermal expansion or contraction control).

General Requirements

- Use copper tube size (CTS) supports and clamps whenever possible.
- Use supports and clamps that are free of any sharp edges.
- Do not overtighten clamps.
- Isolate piping from other mechanical, electrical, and plumbing (MEP) systems.
- Do not strap pipe directly to DWV piping systems.

Code Requirements

As a minimum, follow local code requirements when supporting Uponor PEX piping. Note that these code requirements do not account for linear growth or movement due to expansion or contraction. See **Table 5**.

Note: In fire-rated assemblies, the penetration is not acting as support for the pipe. The pipe will still need to be supported per **Table 5**.

Nominal Pipe Size	Maximum Horizontal Spacing		Maximum Vertical Spacing		
	IPC/IMC/ UPC/UMC	National Plumbing Code of Canada	IPC/IMC	UPC/UMC	National Plumbing Code of Canada
PEX Pipe 1" and Smaller	32 inches	0.8 m	10 feet[1]	Base and each floor; provide mid-story guides	Support at the base and at the floor of alternate stories; not to exceed 7.5 m[2]
PEX Pipe 1¼" and Larger	4 feet				

Table 5: Support Requirements for Crosslinked Polyethylene (PEX) Pipe by Code

[1] For sizes 2 inch and smaller, a guide shall be installed midway between required vertical supports. Such guide shall prevent pipe movement in a direction perpendicular to the axis of the pipe.

[2] Although not required by the National Plumbing Code of Canada, Uponor recommends the use of vertical supports at five feet for sizes 2 inch and smaller to minimize pipe movement.

PEX-a Pipe Support

PEX-a Pipe Support is a 23-gauge galvanized-steel channel for PEX piping with a CTS (copper tube size) controlled outside diameter. It features a profile that is over half-round, making it self-gripping. It provides continuous, uninterrupted support of PEX piping, allowing increased hanger spacing over bare PEX. Each bundle of PEX-a Pipe Support includes nylon strapping that is temperature rated to 180°F (82.2°C), UV rated, carries a 120-lb. tensile rating, and is tested for Uponor-supported applications.

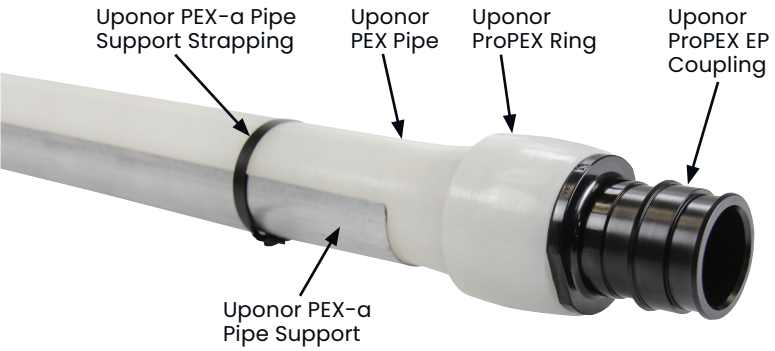


Figure 6: Uponor PEX-a Pipe Support

Important Tips for Installing Uponor PEX-a Pipe Support

- Always follow local code for general piping support requirements.
- Use the included 120-lb. nylon straps to secure the support channel to the pipe. If the straps are misplaced, use a nylon strap of equal or greater strength that is temperature rated for the application.
- Due to expansion characteristics of Uponor PEX piping, it is important to use a minimum 120-lb. nylon cable tie or equivalent for securing the support to the piping. Ensure ties are intended for applications up to 180°F (82.2°C) and are UV-rated.

Uponor PEX-a Connection Methods

ProPEX Expansion

Making ProPEX Connections

Uponor ProPEX ASTM F1960 (CAN/CSA B137.5) cold-expansion fittings make solid, permanent, manufactured connections without the need for torches, glues, solder, flux, or gauges. The unique shape memory of Uponor PEX piping forms a tight seal around the fitting, creating a strong, reliable connection. This section shows how to make proper ProPEX connections using Milwaukee® M12™, M12 FUEL™, M18™, and M18 FUEL™ tools.

Distance Between Fittings

Uponor requires a minimum distance between ProPEX fittings to avoid damaging the fittings during installation and to protect against elevated stress on the pipe and fittings. Refer to **Table 6** for the minimum distance between fittings, which is expressed as cut length of pipe.

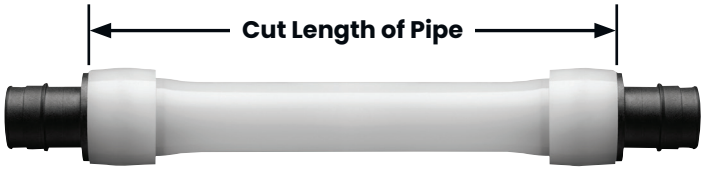


Figure 7: Distance Between Fittings

Nominal Fitting Size	Cut Length of Pipe
½"	2"
¾"	3"
1"	3½"
1¼"	4½"
1½"	4½"
2"	6"

Table 6: Minimum Distance Between ProPEX Fittings

General ProPEX Connection Tips

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

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

2. **Table 7** shows 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 piping and the shoulder of the fitting to fit snugly together.

- Ensure the ProPEX ring rests snugly against the fitting shoulder. If there is more than 1/16" (1 mm) between the ring and the shoulder of the fitting, the connection must be replaced. Square cut the piping 2" away from the fitting for 3/8" to 1" pipe and 3" away from the fitting for 1¼" to 2" pipe.
- Brass ProPEX fittings can be disconnected and reused. EP fittings must be discarded. Be sure to follow the recommended minimum distance between ProPEX fittings shown in **Table 6**.

Pipe Size	Milwaukee ProPEX Expansion Tools					Uponor ProPEX Expander Tools		
	M12 with Standard Heads (2432)	M12 FUEL with RAPID SEAL™ Heads (2532)	M18 (2632)	M18 FUEL 2" (2932)	M18 FORCE LOGIC (2633)	Manual	100/150	201
3/8"	6-7	6-10	5	5-7	—	5	7	—
½"	7-8	5-8	9	7-9	—	4	4	—
5/8"	9-10	6-10	9	8-9	—	9	9H	—
¾"	11-12	7-12	10	9-11	—	14	7H	—
1"	17-18	12-18	19	12-13 (or 7-8H)	—	—	7H	—
1¼"	—	—	9	9-10H	—	—	8H	—
1½"	—	—	10	8-9H	—	—	—	—
2"	—	—	—	9-10	4	—	—	5H

Table 7: Recommended Number of Expansions for 3/8" to 2" Piping at 73.4°F (23°C)

Note: "H" in the table refers to Uponor H-series expander heads.

Making ProPEX Connections with Milwaukee M12, M12 FUEL, M18, or M18 FUEL Expansion Tools

Note: All standard Uponor expander heads are compatible with the M12 and M18 tools. Uponor expander heads will not auto-rotate on the Milwaukee tools (only Milwaukee expansion heads will auto-rotate on the M12 and M18). H-heads are not compatible with Milwaukee tools and Milwaukee heads are not compatible with Uponor tools. Milwaukee heads are easily distinguished by color coding and the Milwaukee logo.

Figure 8: ⅜" and ½" Milwaukee Expansion Heads

Figure 9: ¾" to 2" Milwaukee Expansion Heads

Important! Making expansions are slightly different when using a tool that features auto rotation. When making a ProPEX connection, be sure to follow the guidelines for the tool you are using in your application.

3. Square cut the PEX piping perpendicular to the length of the piping. Remove all excess material or burrs that might affect the fitting connection.
4. Slide the ProPEX ring over the end of the piping until it reaches the stop edge. If using a ProPEX ring without a stop edge, extend the ring over the end of the piping no more than 1/16" (1mm).

Important! If making a ⅜" ProPEX connection, first expand each side of the ring before placing it on the piping. Refer to the "Making ⅜" ProPEX Connections" instructions on **page 12** for further information.

With Auto Rotation (Standard Milwaukee Heads)

5. Milwaukee ProPEX expansion tools come with built-in auto rotation. If using a Milwaukee expansion head, simply hold the piping and tool in place while holding the trigger to expand the piping. The head will automatically rotate to ensure the piping is evenly expanded. Continue expanding and rotating until the piping and ring are snug against the shoulder on the expander head. See **Table 7** for the recommended number of expansions for each piping size.

Note: Do not force the pipe onto the expander head. Ensure the expander head is rotating during each expansion.

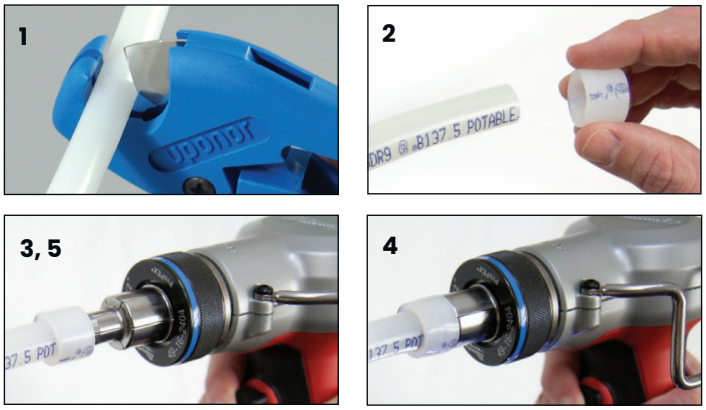


Figure 10: ProPEX Connection Steps

Without Auto Rotation (Standard Uponor Heads)

6. Press the trigger to expand the piping.
7. Release the trigger, remove the head from the piping, rotate it 1/8 turn and slide the head back into the piping. Continue expanding and rotating until the piping and ring are snug against the shoulder on the expander head. See **Table 7** for the recommended number of expansions.

Important! Rotating the tool between expansions will provide smooth, even expansion of the piping. Failure to rotate the tool will cause deep grooves in the piping which can result in potential leak paths.

8. After the final expansion, immediately remove the tool and insert the fitting. Ensure the piping and ring seat against the shoulder of the fitting.

Important! Only perform the necessary number of expansions. DO NOT over expand the pipe. You should feel some resistance as the fitting goes into the piping. If you do not feel any resistance, the piping may be over expanded and will require additional time to shrink over the fitting.

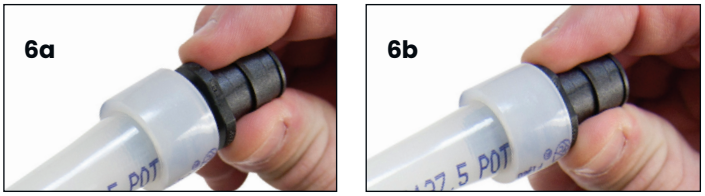


Figure 11: Inserting ProPEX Fitting into ½" Uponor PEX Piping

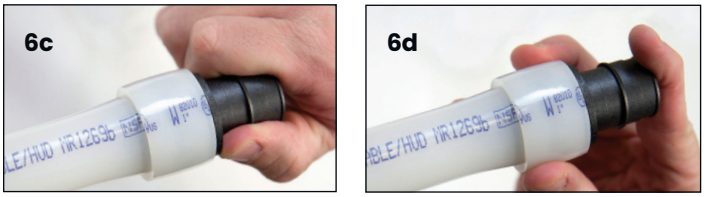


Figure 12: Inserting ProPEX Fitting into 1" Uponor PEX Piping

Figure 13: Expansion with Milwaukee M18 ProPEX Expansion Tool

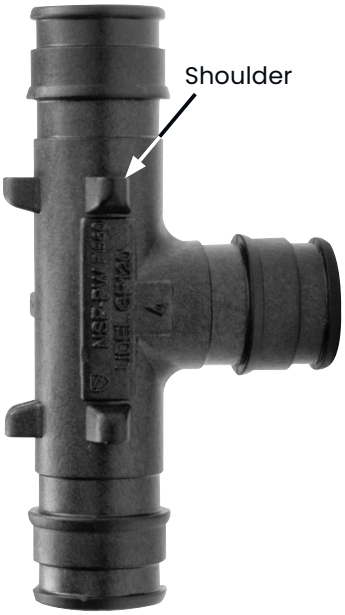


Figure 14: ProPEX Tee

Figure 15: ProPEX Coupling

Making ⅜" ProPEX Connections

When making a ⅜" ProPEX connection, expand the ring once on each side to properly fit over the piping. Refer to the following instructions to make a ⅜" ProPEX connection.

1. Square cut the PEX piping perpendicular to the length of the piping. Remove all excess material or burrs that might affect the fitting connection.
2. Expand each side of the ring once.
3. Slide the expanded ring over the end of the piping. Extend the end of the ring over the end of the piping no more than 1/16" (1 mm).
4. After the ring is on the piping, continue with the regular steps for making a proper connection with your specific tool.

Figure 16: Uponor Pipe Cutter

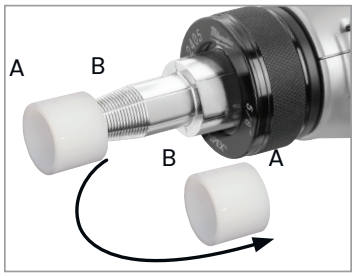


Figure 17: Expand Each Side of the Ring

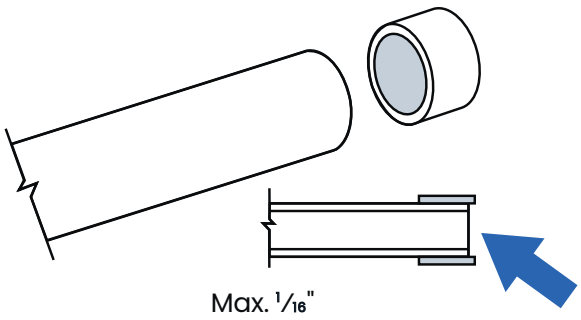


Figure 18: Slide the Expanded Ring over the End of the Piping

Important Tips for a Proper ⅜" ProPEX Connection

- The thicker ⅜" ProPEX Ring shrinks over the fitting faster than larger-sized rings.
- When the temperature is below 40°F (4.4°C), fewer expansions are required.

Disconnecting a ProPEX Brass Fitting

ProPEX brass and EP fittings are manufactured connections that can be concealed in walls, ceilings, and floors. When necessary, ProPEX brass fittings can be disconnected.

Important! EP fittings cannot be reclaimed.

Refer to the following guidelines for disconnecting a ProPEX brass fitting.

1. Ensure the system is not pressurized.
2. Use a utility knife to carefully cut through the ProPEX ring.

   Important! Do not heat the ring prior to cutting it. Take care to cut only the ring and not the piping or fitting. Gouges in the fitting may result in leaks. If you accidentally damage the fitting, you must discard it.

Figure 19: Cut Ring

3. Remove the ProPEX ring from the piping.

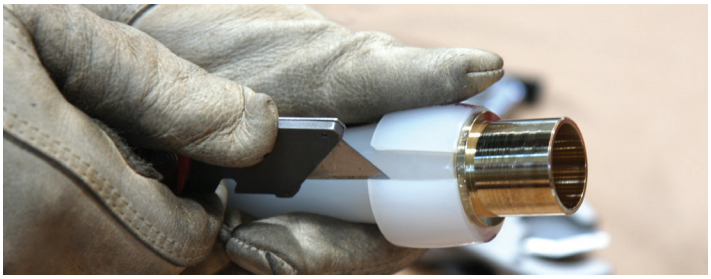


Figure 20: Remove Ring

4. After removing the ring, apply heat directly around the fitting and piping connection. **Do not use open flame**. Gently work the piping back and forth while pulling slightly away from the fitting until the piping separates from the fitting.

Figure 21: Heat Connection

Figure 22: Work Piping Back and Forth

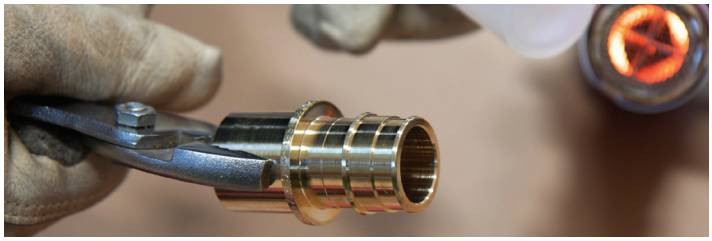


Figure 23: Remove Fitting

5. After removing the fitting, measure:
   2" (50.8 mm) minimum for ⅜" to 1" pipe
   3" (76.2 mm) minimum for 1¼" to 2" pipe

Figure 24: Measure from End of Pipe

6. Square cut the piping at the proper marking.

Figure 25: Cut Pipe at Marking

7. Allow the fitting to cool before making the new connection.
8. Use a new ProPEX ring and follow the steps to make a new connection.

Troubleshooting ProPEX Connections

Trouble-free ProPEX installations begin with a 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. Refer to the following guidelines to assist with challenges in the field.

Fittings Won't Seal

- Make sure the expander head is securely tightened onto the tool.
- Ensure the segment fingers are not bent. If the head does not completely close when the 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 connections.
- Check the fitting for damage. Nicks and gouges 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. You should feel some resistance as the fitting goes into the piping. If you do not feel any resistance, the piping may be over expanded and will require additional time to shrink over the fitting.
- Be sure to rotate the tool ⅛ turn after each expansion to avoid deep grooves in the piping which can result in potential leak paths.

Expansion is Difficult

- Make sure the internal cone is properly greased.

Expansion Head Slips Out of Piping when Making Expansions

- Ensure the piping and ProPEX ring are dry.
- Make sure that grease is not getting into the piping.
- Examine the segment fingers to ensure they are not damaged or bent.

ProPEX Ring Slides Down Piping During Expansion

- Ensure your hands are clean while handling the piping. 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 down the piping during expansion.
- If you anticipate the ProPEX ring may possibly slide down, position the ring slightly farther over the end of the piping and make the first couple of expansions slowly. Once the ring and the piping begin to expand together, continue with the normal number and type of expansions.

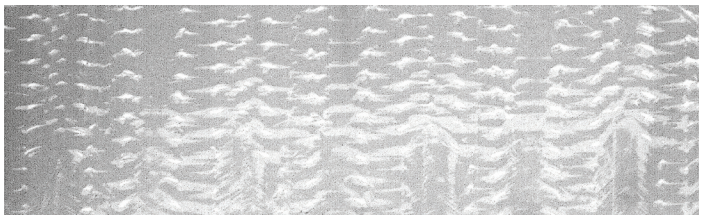


Figure 26: Expansion with Proper Rotation

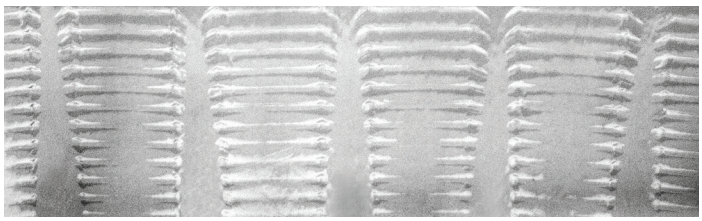


Figure 27: Expansion without Proper Rotation

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

More than the Recommended Number of Expansions are Needed to Make a Connection

- Ensure the head is hand-tightened to the expander tool.
- Examine the segment fingers for damage.
- Be sure to completely cycle the tool on each expansion (i.e., close the manual tool handle or release the trigger).

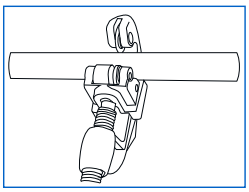
Cold-Weather Expansions

- Uponor recommends the use of the Milwaukee M12 FUEL ProPEX expansion tool with RAPID SEAL™ heads for cold-weather installation of ⅜" to 1" Uponor piping systems.
- Temperatures affect the time required for the piping 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.
- Fewer expansions are necessary in temperatures below 40°F (4.4°C).

Note: Do not use a heat gun on EP fittings to speed up the contraction time as this could result in damage to the fitting.

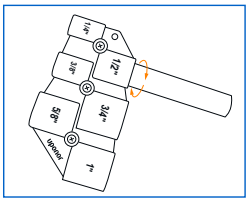
Figure 28: Milwaukee RAPID SEAL 1" head

TotalFit Push-to-Connect



Making a TotalFit Connection

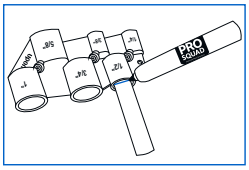
1. Square cut the piping perpendicular to the length of the pipe.



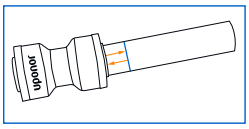
2. Remove excess material or burrs using the deburr and depth tool.

   Important! Be sure to protect the pipe from nicks, scratches, and gouges during install as those can affect the integrity of the fitting connection.

   Note: Only use the Uponor TotalFit Deburr and Depth Tool. Other manufacturers' deburr and depth (or gauge) tools are not compatible with Uponor TotalFit.



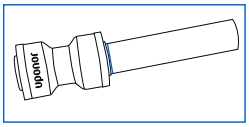
3. Continue using the deburr and depth tool to mark the appropriate insertion depth on the pipe. Below are the recommended depths.
   - ½": 0.875" (⅞")
   - ¾": 1"
   - 1": 1.125" (⅛")



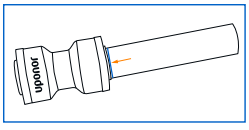
4. If using flexible PEX or PE-RT, install the insert inside the pipe first before making the connection. The insert provides added strength to the connection for flexible pipe.

   Note: Failure to use the insert will void the warranty.

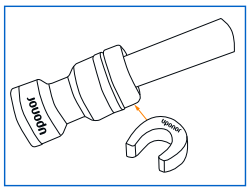
   Important! The PEX/PE-RT insert adds about 1/16" to the pipe length. Keep this in mind when making the insertion depth marking on PEX and PE-RT pipe.



5. Insert the pipe into the fitting.



6. Confirm the fitting is fully inserted by aligning the edge of the fitting depth mark on the pipe.



Removing a TotalFit Connection

1. Attach the appropriately sized removal tool to the pipe.
2. Press it back against the release collar on the fitting. This will disengage the grab ring.
3. Remove the pipe from the fitting.

Important! Be sure to inspect the fitting for any damage before using it on a future connection. Also, while it is acceptable to disconnect and reuse TotalFit push-to-connect fittings, Uponor does not recommend installing fittings with repeated reuse in permanent applications.

General Guidelines

- Do not store outdoors; keep in the original packaging until ready for installation.
- Do not use to convey natural gas or compressed air.
- Do not use where temperatures and pressures exceed limits.
- Do not weld, glue, use adhesives, or adhesive tape.
- Do not solder, braze, weld, or fusion-weld within 18".
- Do not apply heat with a heat gun or open flame.
- Do not subject to blunt impact.
- Do not allow rodents, insects, or other pests to come into contact with the product.
- Do not expose to bending loads greater than 100 lbs.
- Do not use other manufacturers' deburr and depth (or gauge) tools.

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