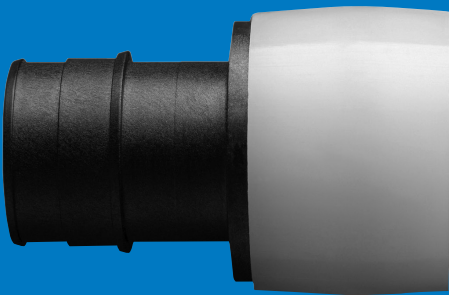




# uponor

PLUMBING, FIRE SAFETY,  
AND RADIANT HEATING  
AND COOLING SYSTEMS

INSTRUCTIONAL GUIDE



## Making ProPEX® Connections



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# Making ProPEX® Connections

Uponor ProPEX® F1960 cold-expansion fittings make solid, permanent, manufactured connections without the need for torches, glues, solder, flux or gauges. The unique shape memory of Uponor crosslinked polyethylene (PEX-a) tubing forms a tight seal around the fitting, creating a strong, reliable connection.

This document shows how to make proper ProPEX connections using one of the following tools.

- Milwaukee® M12™ or M18™ Expansion Tools
- ProPEX 201 Corded Expander Tool
- ProPEX Hand Expander Tool

## General ProPEX Connection Tips

- 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 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.

- Ensure the ProPEX Ring rests snugly against the fitting shoulder. If there is more than  $\frac{1}{16}$ " (1 mm) between the ring and the shoulder of the fitting, square cut the tubing 2" away from the fitting, and make another connection using a new ProPEX Ring and fitting. Brass ProPEX fittings can be disconnected and reused. Engineered polymer (EP) fittings must be discarded. Be sure to follow the recommended minimum distance between ProPEX fittings chart in **Table 2**.



| Tubing Size      | Milwaukee ProPEX Tool |     | Uponor ProPEX Tool |           |     |
|------------------|-----------------------|-----|--------------------|-----------|-----|
|                  | M12                   | M18 | Manual             | 100 & 150 | 201 |
| $\frac{3}{8}$ "  | 8                     | 9   | 5                  | 7         | —   |
| $\frac{1}{2}$ "  | 5                     | 6   | 4                  | 4         | —   |
| $\frac{3}{4}$ "  | 9                     | 8   | 9                  | 9H        | —   |
| 1"               | 13                    | 5   | 14                 | 7H        | —   |
| $1\frac{1}{4}$ " | —                     | 7   | —                  | 7H        | —   |
| $1\frac{1}{2}$ " | —                     | 6   | —                  | 8H        | —   |
| 2"               | —                     | —   | —                  | —         | 5H  |

**Table 1: Recommended Number of Expansions for  $\frac{3}{8}$ " to 2" Tubing at 73.4°F (23°C)**

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

| Nominal Fitting Size | Cut Length of Pipe |
|----------------------|--------------------|
| $\frac{1}{2}$ "      | 2 $\frac{1}{2}$ "  |
| $\frac{3}{4}$ "      | 3 $\frac{1}{2}$ "  |
| 1"                   | 4 $\frac{1}{2}$ "  |
| $1\frac{1}{4}$ "     | 5 $\frac{1}{2}$ "  |
| $1\frac{1}{2}$ "     | 6 $\frac{1}{2}$ "  |
| 2"                   | 7 $\frac{1}{2}$ "  |

**Table 2: Minimum Distance Between ProPEX Fittings**





## Making ProPEX Connections with Milwaukee ProPEX 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.

**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.

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 until it reaches the stop edge. If using a ProPEX Ring without a stop edge, extend the ring over the end of the tubing no more than  $\frac{1}{16}$ " (1mm).



**Important!** If making a  $\frac{3}{8}$ " ProPEX Connection, you must first expand each side of the ring before placing it on the tubing. Refer to the "Making  $\frac{3}{8}$ " ProPEX Connections" instructions on **page 8** for further information.

### With Auto Rotation (Standard Milwaukee Heads)

3. Milwaukee ProPEX Expansion Tools come with built-in auto rotation. If using a Milwaukee expansion head, simply hold the tubing and tool in place while holding the trigger to expand the tubing. The head will automatically rotate to ensure the tubing is evenly expanded. Continue expanding until the tubing and ring are snug against the shoulder on the expander head. See **Table 1** on **page 1** for the recommended number of expansions for each tubing size.



### Without Auto Rotation (Standard Uponor Heads)

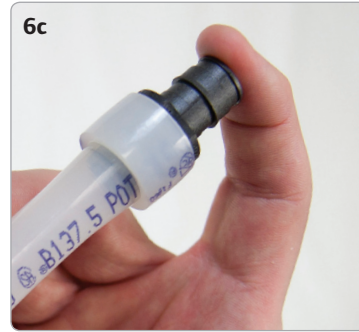
4. Press the trigger to expand the tubing.
5. Release the trigger, remove the head from the tubing, rotate it  $\frac{1}{8}$  turn and slide the head back into the tubing. Continue expanding and rotating until the tubing and ring are snug against the shoulder on the expander head. See **Table 1** on **page 1** for the recommended number of expansions.

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



Expansion with Milwaukee M12 ProPEX Expansion Tool





**ProPEX Fitting Inserted into 1/2" Uponor PEX Tubing. Make the Fitting with a Milwaukee M12 ProPEX Expansion Tool.**



**ProPEX Fitting Inserted into 1" Uponor PEX Tubing. Make the Fitting with a Milwaukee M18 ProPEX Expansion Tool.**

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

**Important!** You should feel some resistance as the fitting goes into the tubing. If you do not feel any resistance, the tubing may be over expanded

and will require additional time to shrink over the fitting.



**Expansion with Milwaukee M18 ProPEX Expansion Tool**





## Making ProPEX Connections with the ProPEX 201 Corded Expander Tool

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 until it reaches the stop edge. If using a ProPEX Ring without a stop edge, extend the ring over the end of the tubing no more than  $\frac{1}{16}$ " (1mm).
3. Slide the expander head into the tubing until it stops. Full expansions are necessary to make a proper connection.
4. Press the trigger to expand the tubing.





5. Release the trigger, remove the head from the tubing, rotate it  $\frac{1}{8}$  turn and slide the head back into the tubing. Continue expanding and rotating until the tubing and ring are snug against the shoulder on the expander head. See **Table 1** on **page 1** for the recommended number of expansions.

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

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



ProPEX Fitting Inserted into 2" Uponor PEX Tubing



ProPEX Tee Inserted into 2" Uponor PEX Tubing



ProPEX Brass Fitting Inserted into 2" Uponor PEX Tubing

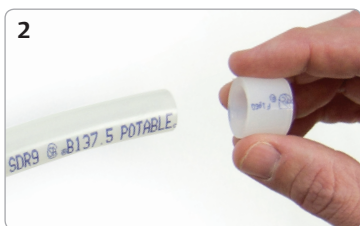




## Making ProPEX Connections with the ProPEX Hand Expander Tool

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 until it reaches the stop edge. If using a ProPEX Ring without a stop edge, extend the ring over the end of the tubing no more than  $\frac{1}{16}$ " (1mm).

**Important!** If making a  $\frac{3}{8}$ " ProPEX Connection, you must first expand each side of the ring before placing it on the tubing. Refer to the "Making  $\frac{3}{8}$ " ProPEX Connections" instructions on **page 8** for further information.



### Without Auto Rotation

3. When using a ProPEX Hand Expander Tool without the ProPEX Auto Rotation Adapter, 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, rotate it  $\frac{1}{8}$  turn and slide the head back

into the tubing. Continue expanding and rotating until the tubing and ring are snug against the shoulder on the expander head. See **Table 1** on **page 1** for the recommended number of expansions for each tubing size.

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



ProPEX Hand Expander Tool without Auto Rotation Adapter

### With Auto Rotation

4. When using a ProPEX Hand Expander Tool with the ProPEX Auto Rotation Adapter, simply hold the tubing and tool in place while separating and closing the handles to expand the tubing. The Auto Rotation Adapter will automatically rotate to ensure the tubing is evenly expanded. Continue expanding until the tubing and ring are snug against the shoulder on the expander head. See **Table 1** on **page 1** for the recommended number of expansions for each tubing size.

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

**Important!** You should feel some resistance as the fitting goes into the tubing. If you do not feel any resistance, the tubing may be over expanded and will require additional time to shrink over the fitting.



ProPEX Hand Expander Tool with Auto Rotation Adapter



ProPEX Fitting Inserted into 1/2" Uponor PEX Tubing. Make the Fitting with a ProPEX Hand Expander Tool.

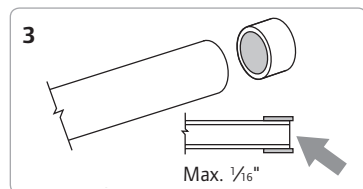
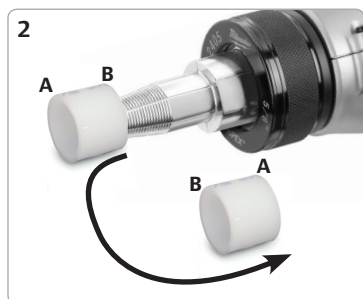
## Making $\frac{3}{8}$ " ProPEX Connections

The  $\frac{3}{8}$ " ProPEX Ring must be expanded once on each side to properly fit over the tubing. Refer to the following instructions to make a  $\frac{3}{8}$ " ProPEX connection.

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. Expand each side of the  $\frac{3}{8}$ " ProPEX Ring once.
3. Slide the expanded ring over the end of the tubing. Extend the end of the ring over the end of the tubing no more than  $\frac{1}{16}$ " (1mm).
4. After the ring is on the tubing, continue with the regular steps for making a proper connection with your specific tool.



E6081128 Tube Cutter (plastic)



### Important Tips for a Proper $\frac{3}{8}$ " ProPEX Connection

- The thicker  $\frac{3}{8}$ " 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 tubing or fitting. Gouges in the fitting may result in leaks. If you accidentally damage the fitting, you must discard it.

3. Remove the ProPEX Ring from the tubing.
4. After removing the ring, 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.
5. After removing the fitting, measure 2" (minimum) from the end of the tubing.
6. Square cut the tubing at the 2" 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

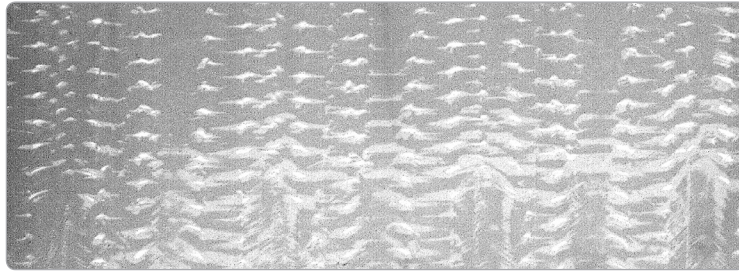
Trouble-free ProPEX installations begin with a tool that is maintained in proper working condition. If the tool or segment fingers are damaged, it is very difficult to make a proper connection. Refer to the following guidelines to assist with challenges in the field.

### Fittings Won't Seal

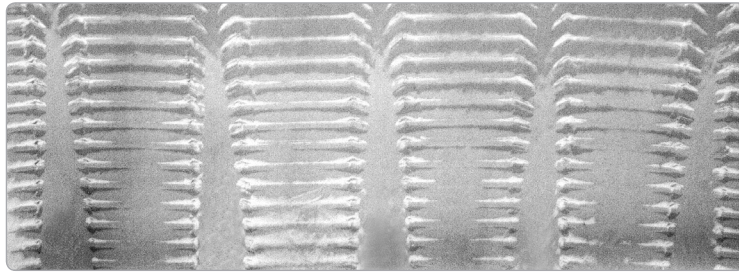
- Make sure the expander head is securely tightened onto the tool.
- Ensure the segment fingers are not bent. If the head does not completely close when the drive unit is fully retracted or the handles of the manual tool are open, replace the head.
- Examine the tool for excess grease on the segment 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 tubing. If you do not feel any resistance, the tubing may be over expanded and will require additional time to shrink over the fitting.
- Be sure to rotate the tool  $\frac{1}{8}$  turn after each expansion to avoid deep grooves in the tubing which can result in potential leak paths.

### Expansion is Difficult

- Make sure the internal cone is properly greased.



Expansion with Proper Rotation



Expansion without Proper Rotation

### Expansion Head Slips Out of 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 ensure they are not damaged or bent.

### ProPEX Ring Slides Down 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 down the tubing during expansion.
- If you anticipate the ProPEX Ring may possibly slide down, position the 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, 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, you can slide the

ring up the tubing 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

- 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 (4.4°C).



**Uponor, Inc.**  
 5925 148th Street West  
 Apple Valley, MN 55124 USA  
 Tel: 800.321.4739  
 Fax: 952.891.2008  
[www.uponorpro.com](http://www.uponorpro.com)

**Uponor Ltd.**  
 2000 Argentia Rd., Plaza 1, Ste. 200  
 Mississauga, ON L5N 1W1 CANADA  
 Tel: 888.994.7726  
 Fax: 800.638.9517  
[www.uponorpro.com](http://www.uponorpro.com)

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