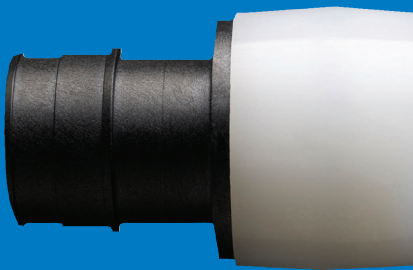


uponor



## ProPEX® connections instructional guide



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# Making ProPEX connections

Uponor ProPEX ASTM F1960 and 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 document shows how to make proper ProPEX connections using one of the following tools.

- Milwaukee M12, M18 or FORCELOGIC ProPEX expansion tools
- ProPEX 201 corded expander tools
- ProPEX hand expander tools

## General ProPEX connection tips

- 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.

- **Table 1** 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  $\frac{1}{8}$ " (1mm) between the ring and the shoulder of the fitting, the connection must be replaced. Square cut the piping 2" away from the fitting for  $\frac{1}{2}$ " to 1" pipe, 3" away for  $1\frac{1}{4}$ " to 2" pipe and 5" away for  $2\frac{1}{2}$ " and 3" pipe prior to making the new connection.
- 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 2**.

Piping size	Milwaukee ProPEX tools			Uponor ProPEX tools		
	M12	M18	FORCELOGIC	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"	12	5	—	14	7H	—
$1\frac{1}{4}$ "	—	7	—	—	7H	—
$1\frac{1}{2}$ "	—	6	—	—	8H	—
2"	—	—	4	—	—	5H
$2\frac{1}{2}$ "	—	—	5	—	—	—
3"	—	—	7	—	—	—

**Table 1: Recommended number of expansions for  $\frac{3}{8}$ " to 3" piping at 73.4°F (23°C)**

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

## Distance between fittings

Uponor requires a minimum distance between ProPEX fittings to ensure the fittings are not damaged during the expansion process by the expander head. Refer to **Table 2** for the minimum distance between fittings, which is expressed as cut length of pipe.



Nominal fitting size	Cut length of pipe
$\frac{1}{2}$ "	2"
$\frac{3}{4}$ "	3"
1"	3½"
$1\frac{1}{4}$ "	4½"
$1\frac{1}{2}$ "	4½"
2"	6"
$2\frac{1}{2}$ "	7½"
3"	9"

**Table 2: Minimum distance between ProPEX fittings**

# Making connections with Milwaukee M18 FORCELOGIC ProPEX expansion tools



## FORCELOGIC expansion head installation

The Milwaukee FORCELOGIC ProPEX Expansion Tool for 2", 2½" and 3" Uponor PEX pipe features an auto-rotating head with specially designed alignment cogs. This requires slightly different head installation than the M12 and M18 ProPEX expansion tools for ¾" to 1½" pipe sizes.

1. Remove the battery pack and place the FORCELOGIC tool in the upright position (cone up).
2. Verify the expansion cone is fully retracted.
3. Screw the head onto the tool (clockwise). Hand-tighten securely. Do not over-tighten. Ensure the

expansion head fits flush against the tool.

**Note:** When installing the new head, it is important to align the segments with the auto-rotate mechanism. Thread the collar down until it stops but not until it is tight. Then grip the segments and turn them until they set. This will be apparent by a tactile and audible click.

**Important!** Check the amount of grease on the tool frequently to ensure there is a proper amount of grease on the cone of the tool as well as the auto-rotate teeth. Check the amount of grease on the tool frequently. The FORCELOGIC tool consumes grease more rapidly than the M12 and M18 ProPEX expansion tools. Use caution

to not over-apply grease to the point it starts to come out between the head segments. If you notice the tool is sticking or the head is failing to return, the cause is most often due to lack of grease or improper head installation. Ensure the cone and auto-rotate teeth are properly greased and the head is properly on the tool.

4. Check the installation.

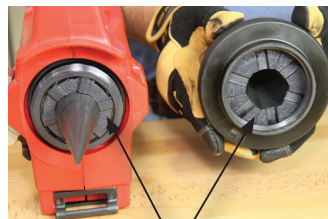
- a. Ensure the head segments do not "flower" (see **image 4a**).
- b. If the head flowers, correct the installation by loosening the head slightly and rotating the segments until they engage in the cogs. Re-tighten the head.

- c. Rotate the six expansion segments in the clockwise direction. They will rotate freely. They should not rotate counter clockwise.
- d. The expansion head collar will fit flush against the tool.

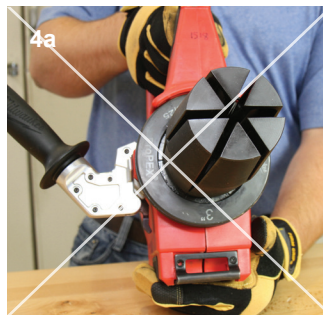
## Confirming correct head installation

Grasp the segments of the head and try to rotate them by hand.

- The head segments will not turn inside the collar when the head is properly installed and the auto-rotate teeth are properly engaged.
- The segments will turn freely inside the collar when the head is improperly installed and the auto-rotate teeth are not engaged.



Auto-rotate teeth



Incorrect expansion head "flowering"



Correct expansion head alignment



## Making a connection with the FORCELOGIC tool

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. Slide the ProPEX ring over the end of the piping until it reaches the stop edge.
3. The Milwaukee tool comes with built-in auto rotation, meaning the head will

automatically rotate to ensure the piping is evenly expanded.

**Note:** To cancel the expansion process quickly, pull and release the trigger.

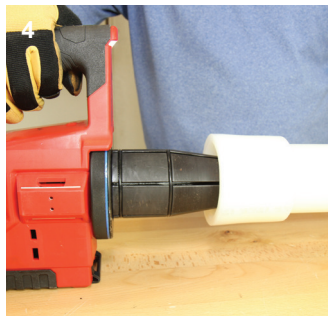
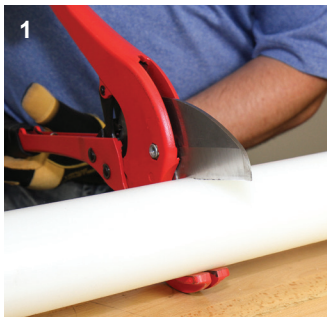
4. Press the trigger to initiate the rotation of the head. A green light will turn on and the work light will blink. Insert the pipe and ring and release the trigger. When the expansion head has reached its maximum diameter, it will retract.

**Important!** Do not force the pipe and ring on the head during any expansion.

5. After the tool has retracted, the green indicator light blinks three times. Press the trigger and repeat the expansion process.
6. Repeat the process until the pipe and ring are snug against the shoulder of the expansion head. Repeat the expansion one or two more times depending on the ambient temperature.

**Note:** Fewer expansions are required in colder temperatures.

7. After final expansion, immediately remove the tool and insert the fitting.



### Tool runtime

- Provided the tool is properly maintained and greased, it should complete 50 to 60 expansions on a single charge (which equals approximately 10 connections for 3" pipe).
- An M18 4.0 pack will recharge in about an hour.

- Uponor recommends one battery pack on the charger at all times. This will ensure enough runtime from a battery pack to stay productive while the other battery pack charges.

- If experiencing challenges with runtimes, contact a Milwaukee rep about options. Milwaukee offers a wide range of battery packs and charging solutions to ensure there is no downtime on the job.



## Making connections with Milwaukee M12 and M18 ProPEX expansion tools

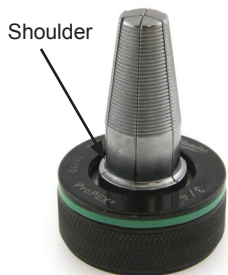
**Note:** All standard Uponor expander heads are compatible with the M12 and M18 tools. Uponor expander heads will not auto rotate on the Milwaukee tools (only Milwaukee expansion heads will auto rotate on the M12 and M18). H-heads are not compatible with Milwaukee tools and Milwaukee heads are not compatible 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 piping perpendicular to the length of the piping. Remove all excess material or burrs that might affect the fitting connection.



3/8" and 1/2" Milwaukee expansion heads



3/4" to 1 1/2" Milwaukee expansion heads

2. 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 3/8" ProPEX connection, you must first expand each side of the ring before placing it on the piping. Refer to "Making 3/8" ProPEX connections" on page 10 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



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 until the piping 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 piping size.

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

### Without auto rotation (standard Uponor heads)

4. Press the trigger to expand the piping.



5. 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 1 on page 1 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.

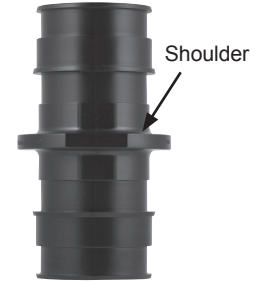
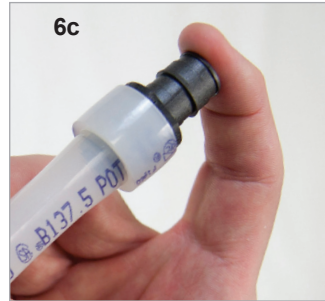


Expansion with Milwaukee M12 ProPEX expansion tools





6a Inserting ProPEX fitting into 1/2" Uponor PEX piping



ProPEX coupling



6d Inserting ProPEX fitting into 1" Uponor PEX piping



ProPEX tee

6. 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.



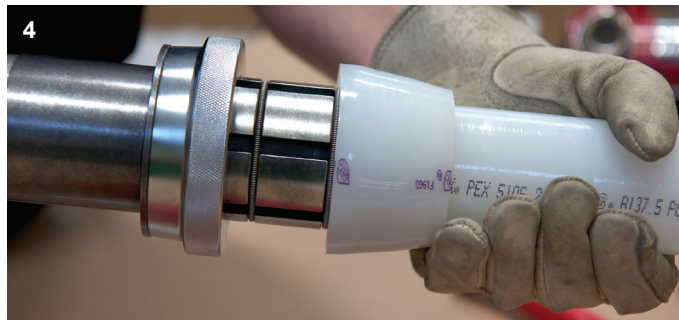
Expansion with Milwaukee M18 ProPEX expansion tools





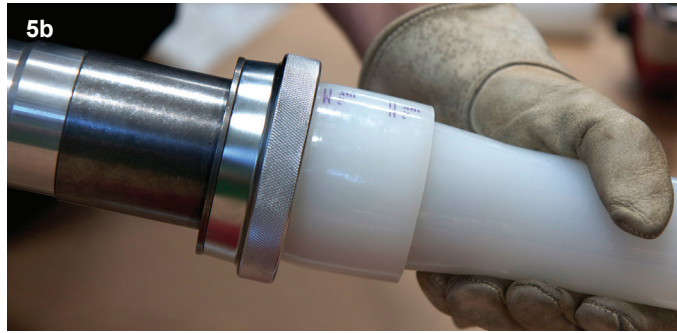
## Making connections with ProPEX 201 corded expander tools

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. 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  $\frac{1}{16}$ " (1mm).
3. Slide the expander head into the piping until it stops. Full expansions are necessary to make a proper connection.
4. Press the trigger to expand the piping.





5. Release the trigger, remove the head from the piping, rotate it  $\frac{1}{8}$  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 1** on **page 1** 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.



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



Inserting ProPEX fitting into 2" Uponor PEX piping



ProPEX EP tee inserted into 2" Uponor PEX piping



ProPEX brass fitting inserted into 2" Uponor PEX piping



## Making connections with ProPEX hand expander tools

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. 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  $\frac{1}{16}$ " (1mm).

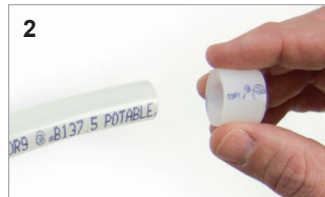
**Important!** If making a  $\frac{3}{8}$ " ProPEX connection, you must first expand each side of the ring before placing it on the piping. Refer to "Making  $\frac{3}{8}$ " ProPEX connections" on **page 10** for further information.

3. 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 piping until it stops. Full expansions are necessary to make a proper connection. Bring the handles together to expand. Separate the handles, rotate the head from the piping, rotate it  $\frac{1}{8}$  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 1** on **page 1** for the recommended number of expansions for each piping size.

**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.

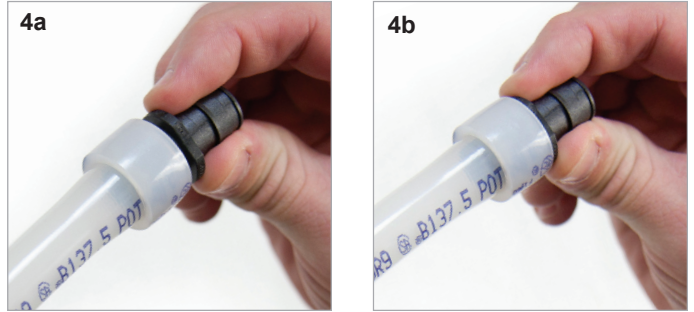


Expansion with ProPEX hand expander tools



4. 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!** 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.



Inserting ProPEX fitting into Uponor PEX piping

### Hand expander tool and head maintenance

Use a lint-free cloth to apply a light coat of lubricant to the cone prior to making any ProPEX connections.

If used regularly, apply the lubricant daily to the cone of the hand expander tool as well as ProPEX auto rotation adapters. Failure to keep these tools lubricated may result in improper connections.

The handles of the hand expander tool will open and close smoothly if properly lubricated.



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

Keep all other parts of the tool free from lubricant.

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



# Making 3/8" ProPEX connections

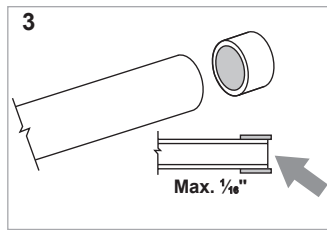
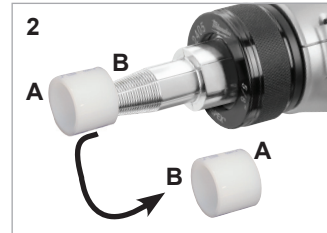
The 3/8" ProPEX ring must be expanded once on each side to properly fit over the piping. Refer to the following instructions to make a 3/8" ProPEX connection.

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.

- Expand each side of the 3/8" ProPEX ring once.
- 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" (1mm).
- After the ring is on the piping, continue with the regular steps for making a proper connection with your specific tool.



E6081128 Pipe Cutter (plastic)



## Important tips for a proper 3/8" ProPEX connection

- The thicker 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 ProPEX brass fittings

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.

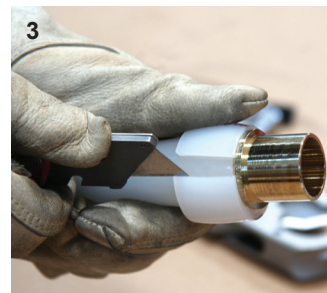
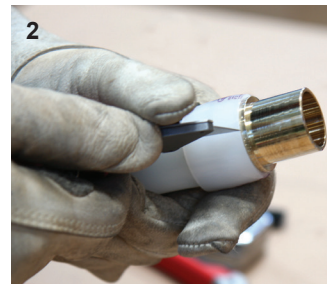
**Important!** EP fittings cannot be reclaimed.

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

- Ensure the system is not pressurized.
- 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.

- Remove the ProPEX ring from the piping.
- 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.
- After removing the fitting, measure 2" away from the fitting for 1/2" to 1" pipe, 3" away for 1 1/4" to 2" pipe and 5" away for 2 1/2" and 3" pipe.
- Square cut the piping at the proper marking.
- Allow the fitting to cool before making the new connection.
- 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  $\frac{1}{8}$  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

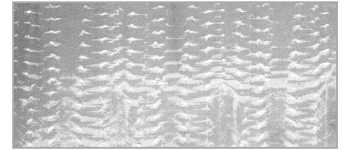
- Ensure your hands are clean while handling the piping. Any sweat or oils on your hands can act as a lubricant. Due to the smoothness of PEX, any form of lubricant can cause the ProPEX ring to slide down the piping during expansion.
- If you anticipate the ProPEX ring may possibly slide down, position 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.
- 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

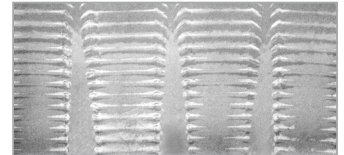
- Ensure the head is hand-tightened to the expander tool.
- Examine the segment fingers for damage.
- Be sure to completely cycle the tool on each expansion (i.e., close the manual tool handle or release the trigger).

## Cold-weather expansions

- 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).



Expansion with proper rotation



Expansion without proper rotation







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