

So You Think You Know PEX?

As cross-linked polyethylene piping has grown in popularity, it helps to understand the differences between the various types of PEX tubing

By Andrew Shipp



Cross-linked polyethylene (PEX) has become the go-to piping for residential water delivery systems, providing a cost-effective, dependable alternative to copper and chlorinated polyvinyl chloride (CPVC). PEX is a popular choice in new construction because it offers flexibility and corrosion resistance, and it's easy to install.

According to Home Innovation Research Labs' Annual Builder Practices Survey, PEX piping now commands more than a 70% share of the new-home market, while CPVC and copper have dipped below 20% and 10% market share, respectively.

There are three kinds of PEX piping on the market: PEX-A, PEX-B, and PEX-C. Each has its own advantages and disadvantages, but PEX-A and -B are the most used by far, so we'll focus on them here.

What Is PEX Piping and Why Use It?

PEX pipe starts as high-density polyethylene (HDPE). Its molecular structure is modified by either a chemical or physical process to create cross-linking that results in a stronger bond between the polymer chains. The result delivers the following advantages:

- **Increased durability:** Cross-linking strengthens the polymer structure, so it's more resistant to cracking and impact.
- **Higher temperature resistance:** PEX can handle temperatures up to 200° F, making it suitable for hot-water applications.
- **Flexibility:** Unlike rigid pipe, such as CPVC or copper, PEX is flexible and can be bent without breaking, which reduces the number of fittings (and thus labor and materials) needed. Even so, some types of PEX are more flexible than others.

- **Improved chemical resistance:** PEX pipe resists chlorine, scaling, and corrosion.
- **Memory effect:** Some types, such as PEX-A, have "shape memory" that allows the material to return to its original shape after temporary expansion caused by heated water.

PEX Installation Tips

The following best practices apply to both PEX-A and -B pipe installations.

- Use a PEX-specific pipe cutter to make clean, straight cuts.
- Make sure fittings are spaced per manufacturer guidelines.
- Follow manufacturer recommended spacing when installing pipe supports.
- Minimize UV light exposure. PEX degrades if exposed to sunlight for long periods.



- Use multiport tees (photo ❶) and 90-degree elbows (photo ❷) to greatly decrease the number of fittings needed.

What Is PEX-A?

PEX-A is manufactured using the “Engel method,” which mixes peroxide into the polyethylene before the forming process (extrusion). At high temperatures, the peroxide decomposes to initiate cross-linking between polymer chains. The tubing is then melted and extruded at around 390° F to 480° F.

As the extruded tube cools, the cross-linking reaction continues, creating a three-dimensional polymer network that gives PEX-A enhanced durability and flexibility.

This is the type of piping manufactured by brands such as Uponor, Rehau, and SharkBite, among others.

PEX-A Installation

In addition to the tips already mentioned:

- Expand the pipe end using an expansion tool and the correct size expansion ring. Rotate the tool slightly after each expansion to ensure an even stretch around the circumference of the pipe.
- Be sure to follow the recommended number of expansions per pipe size. If the connection slides into the PEX with no friction, this can be a sign of overexpansion.
- Bends cannot exceed six times the outside diameter of the pipe.
- Avoid kinking the pipe. While PEX-A tubing can usually be re-rounded using heat, excessive kinking weakens the material.
- PEX-A naturally tightens around the fitting, eliminating crimping or clamping.

- Ensure fittings are fully seated into the pipe, with the shoulder of the fitting in contact with the pipe and expansion rings.
- Avoid using metal clamps or nails, which can damage or puncture the pipe.

PEX-A Advantages

Compared with PEX-B and -C, the Engel process

creates greater cross-linking (70% to 85%) within the material, which results in:

- Superior flexibility
- More uniform cross-linking: PEX-A is less prone to weak spots or inconsistencies.
- Superior shape memory. PEX-A can usually be repaired or reshaped using heat.
- Increased resistance to stress, pressure, and chemical exposure
- No need for continual calibration of expansion tools
- Consistent inner diameter, even after expansion to accommodate fittings, ensuring full water flow

PEX-A Disadvantages

It costs more than PEX-B and PEX-C.

What Is PEX-B?

PEX-B is manufactured using the “silane method” in which high-density polyethylene is melted and mixed with a silane-based compound to serve as a cross-linking agent. (Silane is a colorless, flammable gas made up of silicon and hydrogen atoms.)

The molten polyethylene with silane is shaped into pipes through an extrusion die and is cooled to maintain its form.

The extruded pipe is exposed to water, which triggers a chemical reaction that causes cross-linking (65% to 70%) between the polymer chains.

Manufacturers that offer PEX-B piping include Viega, SharkBite, Apollo, and NIBCO, among others.

PEX-B Installation

In addition to the tips already mentioned:

- Typically, crimp or clamp (cinch) fittings are used to connect sections of PEX-B

pipe. If you see expansion fittings being used, verify that with the manufacturer guidelines immediately.

- PEX-B fittings require specialty crimp tools, with most recommending calibration at least daily.
- Use a crimp gauge to ensure proper sealing.
- Any bends must not exceed eight times the outside diameter of the pipe. For example, a 1/2-inch-diameter PEX-B pipe (actually .625 inches) allows a minimum 5-inch bend radius.
- If kinking occurs, cut out the damaged section and use a coupling fitting.

PEX-B Advantages

- More affordable than PEX-A
- Easier installation than copper piping
- Increased flexibility compared with copper and CPVC
- Increased resistance to chemicals and scaling compared with copper
- More resistant to freezing than both copper and CPVC, as it can expand slightly without cracking
- Stronger resistance to chlorine and oxidation, making it suitable for areas that have high chlorine content in the water

PEX-B Disadvantages

- Less flexible than PEX-A pipe
- Less shape memory than PEX-A. For example, if PEX-B tubing is kinked, the damaged area can't be repaired with heat.
- The tool for installing the crimp fittings must be calibrated regularly to ensure proper installation.
- Slightly reducing the pipe's diameter at fitting locations can hinder water flow.
- PEX-B fittings require more force than PEX-A.
- More difficult to install in tight spaces

Given all of the advantages PEX offers, it's easy to see why it has become the water piping of choice across the country.

PB+ probuilder.com/primer-pex-pipe

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