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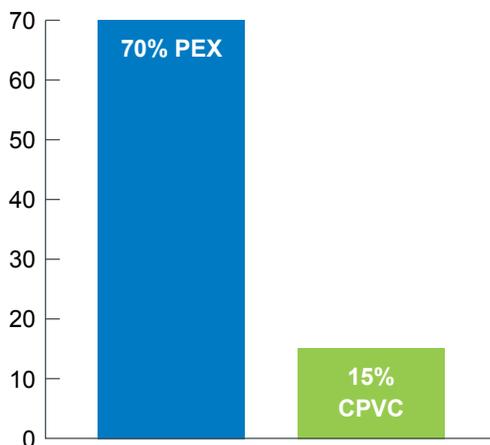
Crosslinked polyethylene (PEX) versus chlorinated polyvinyl chloride (CPVC)

Crosslinked polyethylene (PEX) and chlorinated polyvinyl chloride (CPVC) are both used for plumbing systems. The PEX manufacturing process chemically joins individual polyethylene molecules through an extrusion process to create a highly flexible tubing product. With CPVC, the manufacturing process starts with PVC resin and adds additional chlorine molecules to create a much more rigid tubing product.

Market share

Currently, PEX holds more than 70% of the residential plumbing market share while CPVC has less than 15%. Although both products are listed to their own respective ASTM standards for use in plumbing systems, CPVC falls greatly behind PEX not only in market share, but also in regards to features, installation characteristics and longevity.

Plumbing market



Troublesome CPVC connections

CPVC systems are usually created by bonding the tubing and fittings together using solvent cement — a mixture of CPVC resin and liquid solvents. This poses several problems when it comes to making a fitting that is safe, fast and reliable.

Leaks or fittings blow off

The most common installation practice is to dry fit CPVC fittings and tubing. This can cause major problems with leaking or fittings blowing off months after the install because the plumber neglected to cement the joint. In fact, dry-fitted joints are capable of holding system test pressures without leaking. Unfortunately, the fitting eventually blows off at a later time, causing major damage.

Inconsistent cement application

If the plumber does remember to apply the solvent cement, there is no practical way of knowing how much solvent is needed to make a good connection. Excess cement will continue to soften the interior wall of the system until the wall balloons and ultimately ruptures. Inadequate cement leaves gaps in the joint, providing an access for water leaks.

Up to 40% more fittings

Since CPVC is more rigid and cannot bend around corners like PEX, it requires more joints and fittings with each change of direction — on average up to 40% more when compared with PEX. This adds additional time and cost to the plumbing installation, as well as a greater opportunity for leaks.

Weather conditions hinder cement effectiveness

Watch out for weather conditions — rain and high humidity can hinder CPVC connections because the presence of moisture dilutes the cement before the joint can properly seal. Also, high humidity can lengthen the drying time of the cement.

Reliable PEX connections watertight, leak-resistant

The unique shape memory of PEX tubing allows it to make watertight, leak-resistant connections without the use of torches, glues or gauges.

Easy-to-make connections

With Uponor's exclusive ProPEX® fitting system, for example, an expander tool expands a ProPEX ring and the tubing to insert a fitting. Then the tubing and ring simply shrink around the fitting as they return to their original shape.

Complete connections

And because Uponor's ProPEX fitting system is not a dry-fit connection, there is never a question if the connection is complete.

Air pressure testing

CPVC air testing is dangerous

CPVC manufacturers do not recommend air testing because the product is quite brittle. If CPVC is accidentally impacted during air testing, the tubing can explode — leading to severe personal injury or damage to property. If air testing is necessary, it can only be performed at very low pressures. Essentially, installers must wait until water is in the plumbing system to check for leaks.

PEX air testing is safe and consistent

PEX, however, can be air-tested at normal operating pressures. This allows plumbers a safe method of testing the system before water enters the tubing.

Bend radius

The minimum allowable bend radius for CPVC is 18" for ½" and ¾" tubing and 24" for 1" tubing. Since PEX tubing is so flexible, it offers a much tighter bend radius — as little as 3½" for ½" tubing.

Given that CPVC has such a large bend radius, it can succumb to tiny cracks along the bend radius when installers try to meet space or alignment requirements and push the tubing beyond its limits. These tiny cracks eventually lead to major leaks in a plumbing system.

PEX and CPVC comparisons

Features	PEX	CPVC
Torches, glues, solvents and gauges necessary	No	Yes
Visual connection	Yes	No
Flexible for a tight bend radius	Yes	No
Rain and high humidity affect connections	No	Yes
Quick and simple fitting connections	Yes	No
Dry-fit connections	No	Yes
Air testing recommended	Yes	No



Bend radius for ½" tubing: CPVC = 18"; PEX = 3½"

CPVC cement limitations

- If accidentally frozen, CPVC cement is ruined and cannot be used.
- If a can of CPVC cement is not sealed properly, some of the solvent will evaporate and the cement may become unusable.
- CPVC cement has a defined shelf life and should not be used after the expiration date.
- CPVC cement cannot be restored by adding solvent.
- The fumes from CPVC cement are somewhat noxious due to the solvent and should only be used in open, well-ventilated areas.
- Some people's skin is sensitive to CPVC cement, causing irritation and inflammation when in contact with the product.
- Accidental ingestion of the cement or contact with eyes is a safety and health hazard.
- If CPVC cement is spilled on clothing or other porous surfaces, it can be very difficult to remove.
- Because CPVC cement contains solvent, users must follow governing environmental regulations to dispose of the cans.
- Prior to inserting CPVC into a fitting, manufacturers recommend chamfering the tubing, adding additional time and cost to installations.
- Prior to making a CPVC connection, manufacturers also recommend wiping the tubing and fitting with a clean rag to avoid weak joints from dirty tubing or fittings.

Uponor Inc.

5925 148th Street West
Apple Valley, MN 55124
USA

T 800.321.4739
F 952.891.2008

Uponor Ltd.

6510 Kennedy Road
Mississauga, ON L5T 2X4
CANADA

T 888.994.7726
F 800.638.9517

uponor

uponorpro.com