

PPI RECOMMENDATION F

Testing PEX and PE-RT Tubing Systems with Compressed Air or Inert Gas

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Pressure testing of a completed piping system is typically required by local code regulations and the pipe or tubing¹ manufacturer to ensure pressure-tightness. In the construction of piping systems such as hot- and cold-water plumbing distribution, fire protection, water service, hydronic heating and cooling, and snow and ice melting systems, it is sometimes difficult to test systems using pressurized water because of freezing conditions, insufficient water supply, or insufficient water pressure. In such cases, pressure testing using compressed air or inert gas (e.g., helium, nitrogen) is a preferred solution.

While some types of plastic pipe and fitting materials are not suitable and not permitted to be tested with compressed air or gas, crosslinked polyethylene (PEX) and polyethylene of raised temperature (PE-RT) are flexible tubing materials and not subject to brittle failure.

Therefore, it is the recommendation of The Plastics Pipe Institute (PPI) that PEX tubing systems produced in accordance with ASTM F876, ASTM F3253, AWWA C904, or CSA B137.5 and PE-RT tubing systems produced in accordance with ASTM F2623, ASTM F2769, or CSA B137.18 be permitted to be tested with compressed air or inert gas, provided that the manufacturer's instructions are followed and that all testing is performed in accordance with local codes^{2, 3, 4} and regulations.

When an air pressure test is performed on-site to check for pressure-tightness, the test pressure and temperature for PEX and PE-RT tubing systems shall be in accordance with the manufacturer's instructions. The test pressure is recommended to be at least equal to the expected working pressure of the system, not less than 50 psi (345 kPa)⁵ and not greater than 160 psi at 73 °F (1,103 kPa at 23 °C), or as recommended by the tubing manufacturer.

¹ In the pipe industry, "tubing" refers to products whereby the actual Outside Diameter is 1/8 inch larger than the nominal size and "pipe" refers to products whereby the actual Outside Diameter matches that of steel pipe of the same nominal size, or products where the actual OD matches the nominal size (e.g., metric DN-sized pipes).

² IAPMO's Uniform Plumbing Code (UPC), Uniform Mechanical Code (UMC), and Uniform Solar, Hydronics and Geothermal Code (USHGC) each permit PEX and PE-RT tubing to be pressure tested using air.

³ ICC's International Plumbing Code (IPC), International Mechanical Code (IMC), and International Residential Code (IRC) each permit PEX tubing to be pressure tested using air.

⁴ The National Plumbing Code of Canada permits the use of air pressure tests unless "...a manufacturer states that an air pressure test is not recommended...".

⁵ The 2021 IAPMO UMC Sec. 1205.2 states that "System piping and components shall be tested with a pressure of not less than one and one-half times the operating pressure but not less than 100 psi (689 kPa)." The 2021 IAPMO USHGC Sec. 405.2 includes the same requirement.

For systems that incorporate plastic fittings, valves, or manifolds, air testing shall be in accordance with each component manufacturer's instructions. If the manufacturer of any pressurized component does not recommend air pressure testing at the required pressure, then that component must be isolated or removed from the system prior to an air pressure test.

WARNING: Compressed air or inert gas used for pressure testing has high potential (stored) energy. Any uncontrolled release of that energy can present serious safety hazards.

ASTM F2786 Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Gaseous Testing Media Under Pressure (Pneumatic Leak Testing) provides several recommendations for safely testing polyethylene pipes in a wide variety of sizes and situations. Since both PEX and PE-RT are produced using polyethylene materials, several of those recommendations are applicable to PEX and PE-RT tubing systems. For example:

- Because of the flexible nature of PEX and PE-RT tubing, failure or separation of the tubing from a fitting or restraint may cause unrestrained tubing to whip or lash about as the energy of the suddenly decompressing air or gas escapes. Tubing must be properly restrained to prevent or limit whipping in these cases. All fastening and securing requirements of the PEX or PE-RT tubing manufacturer and local codes must be followed.
- Any incomplete or unrestrained fitting could become a projectile during pressure testing. Therefore, all fittings must be installed correctly and inspected before testing.
- Take precautions to protect people near systems which are being tested with air or gas.
- Only authorized people should be in the proximity of the tubing systems during the testing procedure and must be wearing the appropriate personal protective equipment (PPE).
- Tubing systems which are being tested with air or gas should be labelled as being under pressure to indicate that air pressure testing is underway.
- PEX and PE-RT tubing systems must be depressurized before any work is performed on any portion of the system, such as adjusting or inspecting a fitting or adding additional restraints to the tubing.

PPI recommends strictly following the PEX or PE-RT tubing manufacturer's published instructions for pressure testing with air or inert gas as well as the published guidance regarding other components of the tubing system (e.g., fittings or manifolds).