

SUBSTITUTION OF PEX TUBING

ASTM F876

This specification covers crosslinked polyethylene (PEX) tubing that is outside diameter controlled, made in standard thermoplastic tubing dimension ratios, and pressure rated for water at three temperatures. This specification covers one PEX tubing material in one standard dimension ratio and having pressure ratings for water of three temperatures. The pressure ratings decrease as the temperature is increased. PEX tubing shall be made from polyethylene compounds which have been crosslinked by peroxides, Azo compounds, or silane compounds in extrusion, or by electron beam after extrusion, or by other means such that the tubing meets the performance requirements. The following tests shall be performed: dimensions and tolerances; density; sustained pressure test; burst pressure; environmental stress cracking test; degree of crosslinking; stabilizer functionality; and oxidative stability in potable chlorinated water applications.

PEX Tubing Manufacturer	PEX Product Name	Tubing Type	Compatible PEX Connections			Compression Fittings
			Standard Crimp Ring	SSC (Stainless Steel Clamp)	Proprietary Connection Types	
IPEX	Kitec XPA	PEX-Al-PEX	Compatible	Compatible		Compatible
IPEX	CTS SDR9 PEX Tubing	PEX	Compatible	Compatible	Compatible	Compatible
Rehau	RAUPEX®	PEX	Compatible	Compatible	Compatible	Compatible
Upanor / Wirsbo	Wirsbo AquaPEX®	PEX	Compatible	Compatible	Compatible	Compatible
Vanguard	Vanex	PEX	Compatible	Compatible	Compatible	Compatible
Vanguard	COMPAX-L	PEX-Al-PEX	Compatible	Compatible		Compatible
Viega	Pexcel	PEX	Compatible	Compatible	Compatible	Compatible
Viega	FostaPex	PEX-Al-PEX	Compatible	Compatible		Compatible
Viega	Pextron (Oxygen Barrier)	PEX	Compatible	Compatible	Compatible	Compatible
Weil-McLain	Qual-Pex (Oxygen Barrier)	PEX	Compatible	Compatible	Compatible	Compatible
Weil-McLain	AlumiPex	PEX-Al-PEX	Compatible	Compatible		Compatible
Zurn	Zurn PEX (Non Barrier)	PEX	Compatible	Compatible	Compatible	Compatible
Zurn	Zurn PEX (Oxygen Barrier)	PEX	Compatible	Compatible	Compatible	Compatible

Table 1: PEX Tubing Compatibility

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This specification covers requirements, test methods, and marking requirements for system components when tested with nominal SDR9 crosslinked polyethylene tubing as a system. Systems are intended for 100 psi (0.69 MPa) water service up to and including a maximum working temperature of 180°F (82°C). Requirements and test methods are included for materials, workmanship, dimensions and tolerances, burst pressure, sustained pressure, excessive temperature and pressure, and thermo-cycling tests. The components covered by this specification are intended for use in residential and commercial, hot and cold, potable water distribution systems or other applications such as municipal water service lines, radiant panel heating systems, hydronic baseboard heating systems, snow and ice melting systems, and building services pipe.

ASTM F2023

This test method describes the general requirements for evaluating the long-term oxidative resistance of cross-linked polyethylene (PEX) tubing produced in accordance with ASTM F876 or PEX tubing/fitting systems produced in accordance with ASTM F877 by exposure to hot, chlorinated water used in hot and cold water distribution systems. This test method

PEX Fitting Manufacturer	PEX Fitting Product Name	Fitting Type	Compatible PEX Connections			
			Standard Crimp Ring	SSC (Stainless Steel Clamp)	Proprietary Connection Type	Compression Fittings
IPEX	Kitec K1	Brass w/ O-ring	No	No		Kitec K1
IPEX	Kitec K2	Brass w/ O-ring	No	No	Kitec K2	
Rehau	Everloc® Fittings	Brass	No	No	Everloc	
Sloux Chief	PEX Fittings	Copper	Yes	Yes		
Tradesmen Supply	PEXCaliber™ Fittings	Brass	Yes	Yes		
Upanor / Wirsbo	ProPEX Fittings	Brass or Plastic	No	No	ProPEX	QS-style
Vanguard	CrimpSert	Brass	Yes	Yes		
Viega	ProPress	Copper	No	No	ProPress	
Viega	CombiFlex Fittings	Bronze	No	No	Viega Press	
Viega	PureFlow Fittings	Bronze	No	No	Viega Press	
Zurn	Quick/Sert™ 1 Fittings	Brass	Yes	Yes		
Zurn	PolyAlloy Fittings	Plastic	Yes	Yes		
Zurn	QuickTite Fittings	Plastic	No	No		QuickTite
Zurn	Polymer Fittings	Plastic	No	No	QuickClamp	

Table 2: PEX Fittings Compatibility

is applicable to PEX tubing and systems used for transport of potable water containing free-chlorine for disinfecting purposes. The oxidizing potential of the test-fluid specified in this test method exceeds that typically found in potable water systems across the United States.

ASTM F2657

This test method describes the procedure for exposing crosslinked polyethylene (PEX) tubing produced in accordance with Specification F876 to natural (sunlight) ultraviolet (UV) radiation and evaluating the effects of the exposure. This test method outlines the requirements for specimen size and preparation, exposure orientation, minimum UV exposure energy, post exposure testing, and reporting.

ASTM F2788

This specification covers metric-sized, crosslinked polyethylene (PEX) pipe that is outside diameter controlled, made in nominal pipe dimension ratios, and pressure rated for water at three temperatures. Included are requirements and test methods for material, workmanship, dimensions, burst

PEX Tool Manufacturer	PEX Tool Name	Compatible PEX Connections		
		Standard Crimp Ring	SSC (Stainless Steel Clamp)	Proprietary Connection Type
Mil3	Compact Crimpmaker	Yes	No	
Rehau	Comboloc, Versaloc, RAUPEX	No	No	Everfoc
Ridgid	Viega ProPress Tool	No	No	ProPress
Ridgid	Viega Press Tool	No	No	Viega Press
Sioux Chief	PEX Crimp Tools	Yes	No	
Sioux Chief	PEX Cinch Tools	No	Yes	
Tradesmen Supply	PEXCalliber™ Crimp Tools	Yes	No	
Tradesmen Supply	PEXCalliber™ Cinch Tools	No	Yes	
Upanor / Wirsbo	ProPEX Expander Tool	No	No	ProPEX®
Viega	Viega ProPress® Tool	No	No	ProPress
Viega	Viega Press Tool	No	No	Viega Press
Wheeler Rex	PEX Ring Crimper	Yes	Yes	
Zurn	PEX Crimp Tools	Yes	No	
Zurn	PEX Cinch Tools	No	Yes	

Table 3: PEX Tool Compatibility

pressure, hydrostatic sustained pressure, excessive temperature-pressure, environmental stress cracking, stabilizer functionality, bent-pipe hydrostatic pressure, oxidative stability in potable chlorinated water, and degree of crosslinking. Requirements for pipe markings are also given. The pipe covered by this specification is intended for buried pressure piping applications (such as industrial and general-purpose pipelines, potable water pipelines, fire extinguishing pipelines). This specification also includes carbon black requirements for PEX pipe used for above ground pressure piping applications.

ASTM F2818

This specification covers requirements and test methods for material dimensions and tolerances, hydrostatic burst strength, chemical resistance, and impact resistance of PEX pipe and tubing for use in fuel gas mains and services for direct burial applications.

ASTM F2829

This specification covers performance requirements, test methods, and marking requirements for metric-sized system



Figure 5: 1/2" Rigid Viego Press Tool

components (electrofusion and mechanical fittings) when joined with metric-sized PEX pipe (Specification F2788) as a system, intended for use up to and including a maximum working temperature of 200°F (93°C). The following performance requirements are described for the fittings: 68°F (20°C) hydrostatic strength, 176°F (80°C) hydrostatic strength, short-term internal pressure resistance, resistance to tensile loads, cohesive resistance for electrofusion fittings at both the minimum and maximum recommended temperatures, impact resistance for saddle fittings, and leak tightness and pull out tests for mechanical fittings. The metric-sized components covered by this specification are intended for the above ground and buried pressure piping applications, such as industrial and general-purpose pipelines, potable water pipelines, and fire extinguishing pipelines.

AWWA C904

This standard describes crosslinked polyethylene (PEX) pressure pipe made from material having a standard PEX material designation code of PEX 1006 in ASTM F876 for use as underground water service lines in sizes 1/2" (12mm) through 3" (76mm) that conform to a standard dimension ratio of SDR9. The purpose of this standard is to provide the requirements for materials, design, testing, inspection, and

shipping of PEX pipe for use as service lines in the construction of underground water distribution systems. This standard can be referenced for purchasing and receiving PEX pressure pipe and as a guide for manufacturing PEX pressure pipe.

CSA B137.5

This standard specifies requirements for crosslinked polyethylene (PEX) tubing systems, comprised of tubing and fittings. Tubing covered by this standard is made in Standard Dimensional Ratio 9 (SDR 9). Systems are pressure rated at three temperatures: 1105 kPa at 23°C, 690 kPa at 82°C, and 550 kPa at 93°C, with a maximum working pressure of 690 kPa at 82°C. Systems are intended for use in potable water distribution systems or other applications, including municipal water service lines, reclaimed water distribution, radiant panel heating and cooling systems, hydronic baseboard heating systems, snow and ice melting heating systems, building services piping, compressed air distribution, and ground source geothermal systems, provided that the PEX tubing systems covered herein comply with the applicable code requirements. Residential and commercial systems are included.

PPI TR-3

This technical report presents the policies and procedures used by the HSB (Hydrostatic Stress Board) of the PPI (Plastics Pipe Institute) to develop recommendations of estimated long-term hydrostatic strength for commercial thermoplastic piping materials. Recommendations are published in PPI technical report TR-4, “PPI Listing of Hydrostatic Design Basis, and Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe.”

Listings are developed from data submitted to the HSB by the manufacturer. These data are obtained according to the basic method outlined in ASTM D1598, “Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.” The general method used to evaluate the data is described in ASTM D2837, “Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe

Materials,” with additional requirements as specified in PPI TR-3.

TR-3 and TR-4 also provide the recommended pipe material designation codes for PEX materials. An example of this pipe material designation code is as follows:

PEX 1006 is a crosslinked polyethylene (the PEX abbreviation is in accordance with ASTM D1600) which has a 630 psi maximum recommended HDS (0.5 design factor) at 73°F (23°C).

The first digit of the PEX material designation code is for chlorine resistance tested in accordance with ASTM F2023.

The second digit of the PEX material designation code is used to indicate the level of UV resistance for the PEX material when tested in accordance with ASTM F2657.

The last two digits of the PEX material designation code represent the PPI recommended HDS (0.5 design factor) at 73.4°F (23°C) divided by 100.

NSF/ANSI STANDARD 14

This standard establishes minimum physical, performance, quality assurance, marking, and recordkeeping requirements for plastic piping components and related materials.

NSF/ANSI STANDARD 61

This standard is intended to cover specific materials or products that come into contact with drinking water, drinking water treatment chemicals, or both. The primary focus of the standard is on contaminants or impurities imparted indirectly to drinking water. PEX tubing used in the transport of potable water must be marked “POTABLE” or have the seal of a lab that has evaluated the tubing against the requirements of NSF/ANSI Standard 61.