

Installation Manual

Viega PureFlow® Commercial Water System

The Viega logo consists of the word "viega" in a bold, lowercase, sans-serif font, colored yellow. It is positioned above a solid yellow rectangular bar. The entire logo is enclosed within a white rectangular border.

viega

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1 About this Document

1.1 Disclaimers



This document is subject to updates. For the most current Viega technical literature, please visit www.viega.us.



Viega products are designed to be installed by licensed and trained plumbing and mechanical professionals who are familiar with Viega products and their installation. **Installation by non-professionals may void Viega LLC's warranty.**



It is the responsibility of the contractor, specifying engineer, or installer to appropriately design the PureFlow system, determine that the selection of components in the system are the proper ones for the intended application in the locale in which they will operate, and that employees working on the job site observe the proper installation practices.



This installation manual is intended for commercial installations of traditional (branch and tee) plumbing systems, combination plumbing systems using termination manifolds and ManaBloc and MiniBloc parallel/manifold plumbing systems.



References to Viega PureFlow PEX tubing made throughout this publication include the entire line of Viega crosslinked polyethylene products.



In the event of conflict or inconsistency between these installation guidelines and local building or plumbing codes, local codes should take precedence.



Failure to follow the installation instructions will void the Viega PureFlow Limited Warranty. Nothing in this publication is intended to create any warranty beyond Viega's applicable limited warranty. For additional information, contact Viega at 800-976-9819.

1.2 Symbols Used

The following symbols may be used within this document:

**DANGER!**

This symbol warns of possible life-threatening injury.

**WARNING!**

This symbol warns of possible serious injury.

**CAUTION!**

This symbol warns of possible injury.

**NOTICE!**

This symbol warns of possible damage to property.



Notes give additional helpful tips.



Limit direct UV exposure (sunlight) to products that have this warning symbol present. Maximum UV exposure durations may vary based on the type of product being installed. Review the warning and/or limitation listed with the product being installed.



Do not expose Viega products to any foreign substance that includes but is not limited to VOC (Volatile Organic Chemical) compounds, paints, solvents, glues, cleaners, and disinfectants.



Viega products that are exposed to these types of substances are at risk of having failures (leaks).



Hand-tighten only. Damage may result if over-tightened.

2 Product Information

2.1 PureFlow Systems

Viega PureFlow Commercial Systems are the most complete potable water solutions available. With tubing, fittings, and distribution manifolds, Viega provides everything you need for a total plumbing system that is not only easy to install but also helps reduce energy costs and water waste.

Viega provides the highest-quality PEX tubing with the best UV and chlorine ratings in the industry. Viega PureFlow Press fittings allow installers to make secure press connections in seconds. With Viega press technology, pressure testing can be completed immediately after connections are made without waiting for glues or solvents to dry or for expansions to contract. Viega PureFlow Press fittings are approved for potable water and hydronic heating applications and are available in sizes ranging from $\frac{3}{8}$ " through 2" in both zero lead and high-grade polymer materials. With a 25 year limited warranty and unmatched quality in the industry, Viega offers a complete system solution for all your plumbing needs.

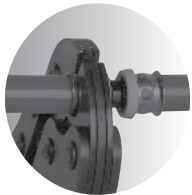
Viega press technology is consistent and reliable, providing the same quality pipe connections every time. Viega PureFlow Press polymer fittings incorporate Viega Smart Connect® technology, which helps installers identify unpressed connections easily. Viega PureFlow PEX tubing and Viega PureFlow Press polymer fittings are manufactured in the United States and provide secure, reliable connections for residential and light commercial projects, ranging from potable water to snow melting applications.

Viega PureFlow crosslinked polyethylene tubing is the ideal tubing choice for potable water systems. The smooth wall of Viega PureFlow tubing is resistant to corrosion and scaling. Viega is the only PEX manufacturer that is vertically integrated, meaning we manufacture our own raw PEX resin, controlling the entire manufacturing process from start to finish to ensure the highest quality.

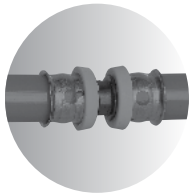
2.2 Viega Smart Connect Technology



1 Identify an unpressed connection during pressure testing



2 Upon identification, use the press tool to press the fitting, making a secure leak-proof connection.



3 Viega PureFlow press connections are fast, flameless, and reliable.

Viega Smart Connect technology provides the installer quick and easy identification of an unpressed fitting during a leak test. When the fitting is pressed, a secure, non-detachable, mechanical connection is created. Smart Connect technology provides the installer with an easy way to see connections that have not been pressed before putting the system into operation.



Testing for leaks using Viega Smart Connect is not a replacement for testing requirements of local codes and standards. If testing with compressed air, it is necessary to use an approved leak-detect solution.

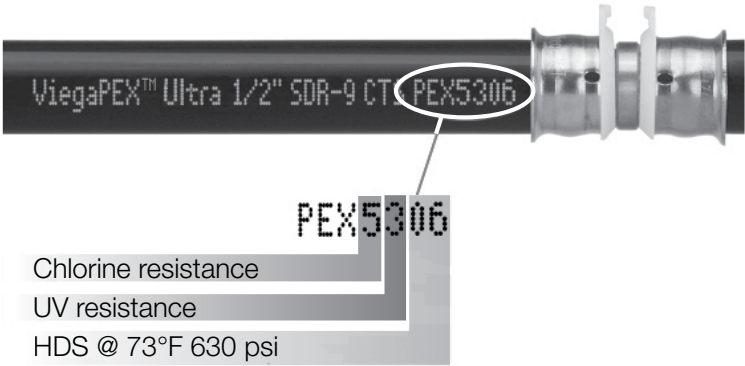
2.3 PEX

PEX is a material made up of molecules of high density (HDPE) that are permanently linked to each other by a process called crosslinking. This process allows PEX to withstand higher temperatures and pressures compared to standard HDPE tubing, making it ideal for hot and cold potable water applications as well as hydronic radiant heating and cooling systems. There are three common methods of crosslinking polyethylene, two of which are a chemical method and one of which is physical.

- Peroxide – Pressure/heat/chemical
- Silane – Moisture cure
- Radiation – Electron beam

Each method induces links between single strands of PE to form a denser network. The number of links between these strands determines the crosslink density and is an important factor in determining the physical properties of the material. The minimum percent crosslinking for each method is specified in the ASTM F876 standard. These methods are also known as PEX-a, PEX-b and PEX-c, respectively, but are not related to any type of a quality rating system.

The ASTM F876 manufacturing standard incorporates a material designation number that is a rating scale for chlorine resistance, UV resistance, and material strength. This designation consists of the tubing material type “PEX” followed by a four-digit number. These four digits break down as follows:



PEX tubing with a printed rating of 5306 indicates that it will be suitable for installation areas of constant hot water circulation and has a maximum UV exposure of six months.

The UV protection rating is important because certain construction practices and storage conditions subject PEX tubing to sunlight exposure for an extended period of time. UV testing confirms the longevity of the PEX tubing under various lengths of UV exposure.

Property	0	1	2	3	4	5	6
Chlorine resistance	Not tested	75% at 73° and 25% at 140°F	Reserved	50% at 73° and 50% at 140°F	Reserved	100% at 140°F	
Minimum UV resistance	Not tested	1 month	3 months	6 months			
HDS for water at 73°F							630

Viega’s silane crosslinked PEX (PEX-b) has the highest chlorine and UV resistance per this rating (PEX 5306). Another benefit is it has higher burst pressures than peroxide crosslinked PEX (PEX-a). This is due to the three-dimensional molecular bonding that occurs during the crosslinking process.

2.4 System Concepts

Viega PureFlow is a high-quality, flexible PEX system for hot and cold potable water distribution.

The Viega PureFlow plumbing system offers maximum security thanks to press and full-circle crimp fitting techniques. These fittings ensure the plumber quick installation, suitability for use in all types of applications at the construction site, and vast reductions in the required number of fittings and necessary installation time.

The systems incorporate:

- Viega PureFlow PEX tubing: red, white, and blue crosslinked polyethylene tubing designed with superior chlorine and UV resistance
- A range of zero lead bronze, Eco Brass®, or polymer fittings for PureFlow Press and PureFlow Crimp fitting systems
- Viega ManaBloc distribution system for use with Viega PureFlow PEX tubing
- A range of inline, manifold, and stop valves for Viega PureFlow fitting systems
- Viega press tools and jaws for the PureFlow Press fitting systems
- Viega crimp tools for the PureFlow Crimp fitting systems

2.5 Safety

Please read and understand the instructions before beginning installation to eliminate safety concerns and reduce risks associated with use and handling of Viega products.

2.6 Technical Assistance

Viega offers many tools to assist the specifying engineer, contractor, and installer to ensure Viega PureFlow systems are properly designed and installed. This can be done by referring to one of the resources listed below:

- Engineering specifications are available at www.viega.us.
- Viega guide specifications in Master Spec format are available upon request at (800) 976-9819.
- Contact your local Viega field sales representative.

Consult Viega's Customer Success Division for information on applications not listed or applications outside listed temperature and pressure ranges.

- Viega Technical Support: techsupport@viega.us
- Engineering Services: For more information on fire protection system design, radiant system design, and plumbing design services, contact engineeringservices@viega.us.

2.7 Listings and Certifications

The Viega PureFlow system has the following listings and certifications:

■ Plastic Pipe Institute (PPI)

- TR 4 Listed Materials: Listing of Hydrostatic Design Bases (HDB), Strength Design Bases (SDB), Pressure Design Bases (PDB), and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe. Pressure/Temperature Ratings: 160 psi at 73.4°F, 100 psi at 180°F, 80 psi at 200°F

■ NSF International

- NSF-pw certification mark: Product meets all applicable performance standards for pressure-rated potable water applications required in ANSI/NSF Standard 14 and complies with ANSI/NSF Standard 61 for health effects.
- cNSF[®]us pw-G: Product meets zero lead listing meeting California AB 1953 and Vermont Act 193
- CSA B137.5: This standard specifies requirements for thermoplastic pressure piping.
- NSF U.P. Code: Product meets requirements of the Uniform Plumbing Code[™].
- PEX 5306: Tested and certified to the NSF-pw 5306 chlorine resistance rating for an end-use condition of 100% @ 140°F per ASTM F876, which is the highest chlorine resistance rating available through ASTM. When the product is marked with the PEX 5306 designation it affirms the product is approved for use in continuous domestic hot-water circulation systems with up to 140°F water temperatures and has a maximum UV rating of six months.

■ Underwriters Laboratories Inc. (UL)

- ANSI/UL 263: Standard for Safety for Fire Tests for Building Construction and Materials

■ Underwriters Laboratories of Canada Inc. (cUL)

- CAN/ULC S101: Standard Methods of Fire Endurance Tests of Building Construction and Materials
- CAN/ULC S102.2: Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies
- CAN/ULC S115: Standard Method of Fire Tests of Firestop Systems
- CAN/ULC/ORD/C199P: Combustible Piping for Sprinkler Systems

■ International Association of Plumbing and Mechanical Officials Research and Testing (IAPMO R&T)

- Certificate of Listing: Product meets the requirements of the Uniform Plumbing Code[™]

■ International Code Council - Evaluation Services (ICC ES)

- ICC ES-PMG[™]: Product complies with International Plumbing Code



Certifications available at:

www.nsf.org

www.spec-direct.com (Intertek)

www.ul.com

www.canada.ul.com

2.8 Codes and Standards

The Viega PureFlow system conforms to the following codes:

- ICC – International Code Council
- IPC – International Plumbing Code
- IMC – International Mechanical Code
- IRC – International Residential Code
- UPC – Uniform Plumbing Code
- UMC – Uniform Mechanical Code
- NSPC – National Standard Plumbing Code
- HUD – Housing for Urban Development
- NPCC – National Plumbing Code of Canada
- NBCC – National Building Code of Canada

The Viega PureFlow system conforms to the following standards:

■ **ASTM — American Society for Testing and Materials**

- ASTM E119: Standard Test Method for Fire Testing of Building Construction and Materials
- ASTM E814: Standard Test Method for Fire Test of Through-Penetration Firestop Systems
- ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
- ASTM F876: Standard Specification for Crosslinked Polyethylene (PEX) Tubing
- ASTM F877: Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
- ASTM F2023: Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Pipe, Tubing and Systems to Hot Chlorinated Water
- ASTM F3347: Standard Specification for Metal Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Crosslinked Polyethylene (PEX) Tubing
- ASTM F3348: Standard Specification for Plastic Press Insert Fittings with Factory Assembled Stainless Steel Press Sleeve for SDR9 Crosslinked Polyethylene (PEX) Tubing

■ **NSF International**

- ANSI/NSF 14: Plastics Piping System Components and Related Materials.
- ANSI/NSF 61: Drinking Water System Components – Health Effects.

■ **American Water Works Association (AWWA)**

- AWWA C904: Crosslinked Polyethylene (PEX) Pressure Pipe, ½" through 2" for Water Service

■ **International Standards Organization (ISO)**

- ISO 9001



It is the responsibility of the installer or any other parties to adhere to all applicable local rules and regulations governing the nature of the installation.



CAUTION!

To maintain your limited warranty and be code compliant, use only Viega-approved fittings to connect Viega PureFlow PEX tubing to the ManaBloc.

3 Viega Manifolds

Viega offers several different manifolds to meet a variety of applications, whether it is a parallel water distribution system or combination installation.

3.1 Manifold Markings



Each Viega manifold is marked where space permits with the following information:

Manufacturer	Viega
ASTM Standard	ASTM F877/F1807/F2159/F3347/F3348
Temperature rating	180°F
Certifications	UPC®, cNSF®us pw-G, CSA B137.5, ICC-ES PMG™ 1038



It is possible that not all manifolds are listed with each organization shown.



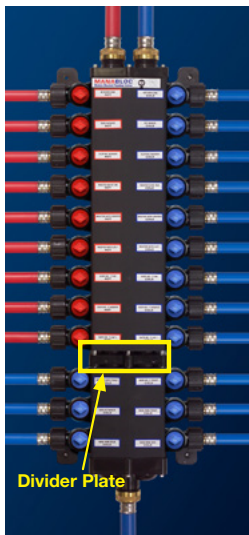
Viega polymer manifolds must be protected from UV exposure, which can damage them. In the event of incidental UV exposure during storage, installation and handling, combined exposure of Viega polymer manifolds must not exceed 15 days.



Do not expose Viega products to any foreign substance that includes but is not limited to VOC (Volatile Organic Chemical) compounds, paints, solvents, glues, cleaners, and disinfectants. Viega products that are exposed to these types of substances are at risk of having failures (leaks).



3.2 ManaBloc Sweep Adapter

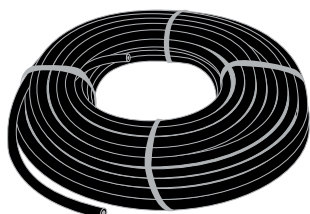


In the event that a ManaBloc purchased before May 2009 needs to be replaced, a ManaBloc Sweep Adapter is required to maintain the previously drilled hole spacing. This generation of ManaBlocs can be identified by the external divider plate as shown to the left. In old-style ManaBlocs, there was a space between the ports above and below the divider plate. Holes for tubing were drilled in adjacent studs according to where the ports were located. When an old-style ManaBloc is replaced with a new one, the ports will not line up with the previously drilled holes. A sweep adapter will be required for each port below the divider plate. For example, the replacement for the ManaBloc pictured would require 6 sweep adapters.

Description	Part number
1/2" Replacement ManaBloc Sweep – Polyalloy Crimp	50260
3/8" Replacement ManaBloc Sweep – Polyalloy Crimp	50261
1/2" Replacement ManaBloc Sweep – Polymer PEX Press	50262
3/8" Replacement ManaBloc Sweep – Polymer PEX Press	50263
1/2" PB Replacement ManaBloc Sweep	50264
3/8" PB Replacement ManaBloc Sweep	50265

4 Viega PureFlow Tubing

4.1 Viega PureFlow PEX Tubing



Viega PureFlow PEX crosslinked polyethylene is the ideal tubing choice for potable water systems. In addition, the smooth walls of Viega PureFlow PEX tubing are resistant to corrosion and scaling.

4.1.1 PureFlow PEX Properties and Performance

Linear expansion coefficient:

- 1.1 inch per 100 feet per 10°F

Temperature and pressure ratings:

- 180°F at 100 psi
- 73.4°F at 160 psi

UV resistance:

- Maximum exposure 6 months

Chlorine resistance:

- PEX 5306 – end-use condition of 100% at 140°F (approved for continuous domestic hot water circulation systems)



CAUTION!

Do not use PureFlow PEX for circulation lines exceeding 140°F.

Bend radius:

- Viega PureFlow PEX can be easily bent by hand, or with the use of Viega-approved bend supports to a radius as small as five times the tubing outer diameter.

SDR-9 PEX Tubing ASTM F876/F877/CTS-OD SDR-9					
Size	O.D.	Wall thickness	Nom. I.D.	Weight per foot	Volume (gallon) per 100 feet
3/8"	0.500±.003	0.070+.010	0.350	.0413	0.50
1/2"	0.625±.004	0.070+.010	0.475	.0535	0.92
3/4"	0.875±.004	0.097+.010	0.671	.1023	1.82
1"	1.125±.005	0.125+.013	0.862	.1689	3.04
1 1/4"	1.375±.005	0.153+.015	1.054	.2523	4.52
1 1/2"	1.625±.006	0.181+.019	1.244	.3536	6.30
2"	2.125±.006	0.236+.024	1.629	.6026	10.83

Dimensions are in English units. Tolerances shown are ASTM requirements. Viega PureFlow PEX is manufactured within these specifications.

Minimum Burst Pressure (PSI) per ASTM F876/F877		
Size	73°F (23°C)	180°F (82°C)
3/8"	620	275
1/2"	480	215
3/4"	475	210
1"	475	210
1 1/4"	475	210
1 1/2"	475	210
2"	475	210

4.1.2 PureFlow PEX Markings

Viega PureFlow PEX tubing is marked every five feet with the following representative information.

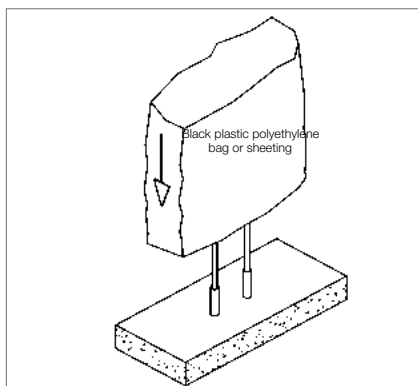
Print Line Markings	
Length marker	000 feet
Company	Viega
Product name	Viega PureFlow PEX
Nominal tubing size	1/2"
Standard dimension ratio tube size	SDR 9 CTS (copper tube size)
Material designation code	PEX 5306
Temperature and pressure rating	100 psi at 180°F 160 psi at 73°F
NSF listing (potable)	cNSF®us-pw
NSF chlorine listing	CL5
ASTM Tubing Standards Certification	F876/F877
Canadian Standards Association	CSA B137.5
Fittings system compatibility	PureFlow – ASTM F877/F1807/F2159/ F3347/F3348
IAPMO listing	UPC®
Plenum rating*	FS/SD 25/50 ASTM E84 CAN/ULC S102.2
Fire resistance ratings	CAN/ULC S101 ANSI/UL 263
ICC listing	ES-PMG™ – 1038
AWWA listing	C904
HUD listing	MR 1276
Manufacturer's date code	1/1/2010
Material code	X14.2
Country of manufacture	Made in the USA

* 2" and smaller tube sizes when wrapped with 1/2"-1" thick E84 rated insulation; 1/2" and smaller with no insulation per ULC S102.2 listing. Tubing may include fitting connections when wrapped.

4.2 Protecting Viega PureFlow PEX Tubing

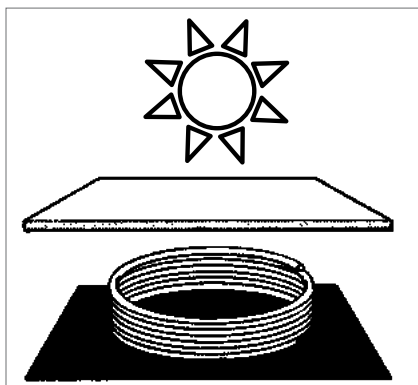


Protect tubing and fittings from UV exposure.



Due to the nature of slab-on-grade installation, tubing and fittings may be exposed to UV light for unspecified periods of time.

To prevent damage from UV exposure, all Viega PureFlow PEX tubing and polymer fittings must be protected with an opaque covering (black plastic polyethylene bag or sheeting) immediately after they have been installed.



PEX tubing must be stored under cover, shielded from direct and indirect sunlight when the material is stored for any length of time. Short exposure times of Viega PureFlow PEX and polymer fittings not exceeding the total accumulated recommended exposure time are permissible.

Informing the other trades of the presence of the lines may help prevent damage.

When the tubing penetrates at an angle in relation to the hole, it may be subject to a sharp edge that can damage the pipe. Acceptable sleeving materials include flexible plastic tubing, foam pipe insulation, or an approved plastic insulator.

It is not necessary to sleeve tubing when penetrating wooden framing members or non-metallic finished or unfinished walls. However, if there is a doubt, sleeve the pipe or install an insulator.

5 Viega PureFlow Press Fittings

Viega PureFlow Press fittings are available in zero lead bronze and polymer. They include a factory-assembled, stainless steel sleeve with three viewing holes and a tool locator ring to ensure a proper press connection. The following design criteria make Viega PureFlow Press fittings ideal for use in potable water applications:

- High corrosion resistance
- Excellent strength properties
- Resistant to stress corrosion
- Superior wear properties
- Compatible with all materials

All Viega PureFlow tubing, fittings, and manifolds are NSF certified for use in potable water systems.

5.1 PureFlow Press Bronze

Viega PureFlow Press bronze fittings are manufactured from a high-quality zero lead material specifically designed for press technology meeting or exceeding all manufacturing requirements.

5.2 PureFlow Press Polymer

Viega PureFlow Press polymer fittings are manufactured from polyphenylsulfone and incorporate Viega Smart Connect technology, which is designed to identify unpressed connections.

5.3 PureFlow Press Fitting Markings

Each Viega PureFlow Press fitting is marked where space permits with the following information:

Manufacturer	Viega
ASTM standard	ASTM F877/F3347 (ZL Bronze)/3348 (Polymer)
Temperature rating	180°F (potable) 200°F (hydronic heating)
Certifications	cNSF [®] us pw-G, CSA B137.5, UPC [®] or UP Code, cULus [®] , ICC-ES PMG [™] 1038/1015

Note: It is possible that not all fittings are listed with every organization shown.



Use only Viega stainless steel attached PureFlow Press sleeves and press tools with Viega PureFlow Press fittings.



Viega PureFlow Press polymer fittings must be protected from UV exposure, which can damage them. In the event of incidental UV exposure during storage, installation and handling, combined exposure of PureFlow Press fittings must not exceed 15 days.



Do not expose Viega products to any foreign substance that includes but is not limited to VOC (volatile organic chemical) compounds, paints, solvents, glues, cleaners, and disinfectants.



Viega products that are exposed to these types of substances are at risk of having failures (leaks).

5.4 Viega PureFlow Press Tools

5.4.1 PureFlow Press Hand Tools



The Viega PureFlow Press connection must always be carried out with the aid of a Viega PureFlow Press tool. The hand tool incorporates a forced compression mechanism to complete a secure connection each time. A ratchet inside the tool prevents the tool from being opened until the proper force has been applied to the press sleeve. A safety release screw allows the tool to be opened at any time, but any connection made without full tool compression must be repressed. The tool handles are color coded to match the PureFlow Press tool locator rings.

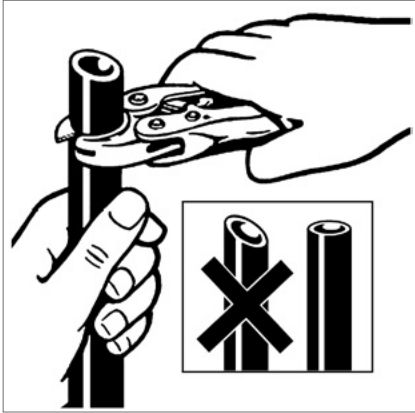
The reduced grip feature permits one-handed operation, making the Viega PureFlow Press system ideal for tight spaces and awkward locations. The compression of the tool also allows press connections to be made in temperatures as low as -4°F.

5.4.2 PureFlow Press Power Tools



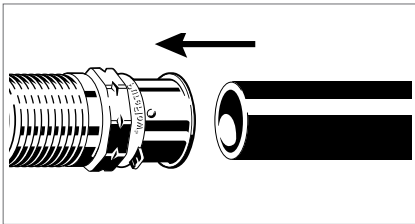
The Viega PureFlow Press connection may also be carried out with a Viega power tool. These tools are designed to make the same consistent press as the Viega PureFlow Press hand tools and has interchangeable jaws that can be easily changed out as needed. The compression of the tool also allows press connections to be made in temperatures as low as 23°F.

5.5 Preparing the Tubing

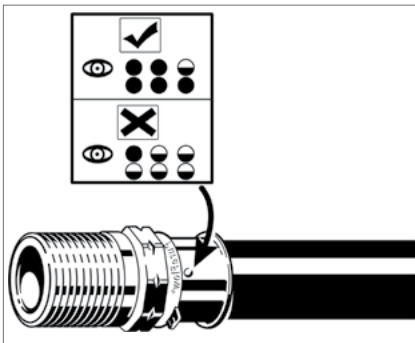


- Square off tubing to proper length. Uneven, jagged, or irregular cuts will produce unsatisfactory connections.

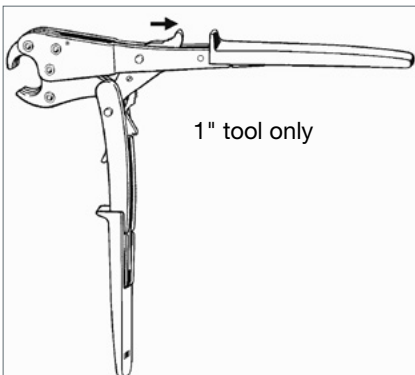
5.6 Making Connections with the PureFlow Hand Tool



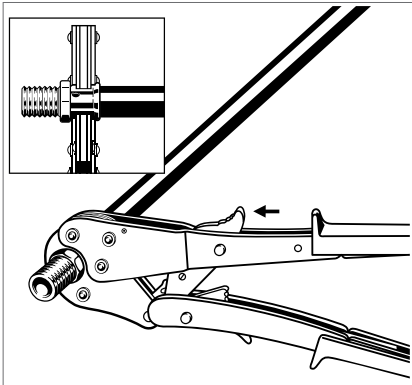
- Insert PureFlow Press fitting with attached sleeve into tubing and engage fully.



- Ensure full tubing insertion at view holes in attached press sleeve. Full insertion means tubing must be completely visible in at least two view holes and partially visible in the one.



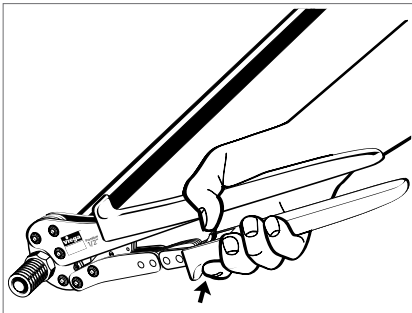
- For the 1" tool, open the tool handles fully (thumb grip is available to maintain open jaw). Then close tool jaws to engage ratchet (ensure that thumb grip is returned fully forward before closing jaws). For other tools, go to the next step.



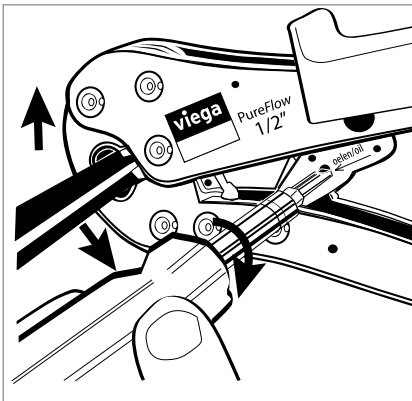
- Position the PureFlow press tool perpendicular over the press sleeve, resting it against the tool locator ring. For 1" tool, close tool jaws to engage ratchet (ensure that thumb grip is returned fully forward before closing jaws). Make sure the PureFlow press tool is properly aligned.



The tool locator ring must be in the factory-installed position while making a press to ensure a consistent leak-proof connection. It may be necessary to rotate the tool locator ring to avoid interference between the ring and tool.



- Close handles, using trigger to reduce grip span if desired.

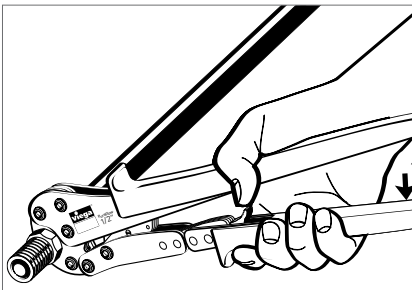


- If the PureFlow press tool is not properly aligned with the locator ring, use the emergency release (using a screw driver to turn the emergency release) to open the press tool. Once released, align the PureFlow press tool properly and go back to the previous step.



WARNING!

The connection is not leak-proof when the tool has been opened by emergency release. The tool locator ring must be present to ensure a proper PureFlow Press connection.



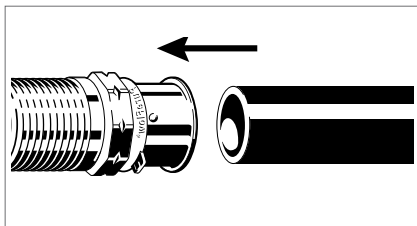
- Extend the PureFlow press tool handle and continue ratcheting until automatic tool release occurs at the proper compression force.



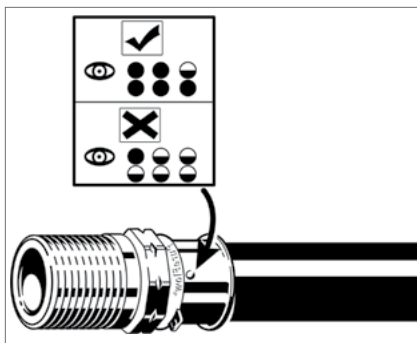
CAUTION!

Do not press twice.

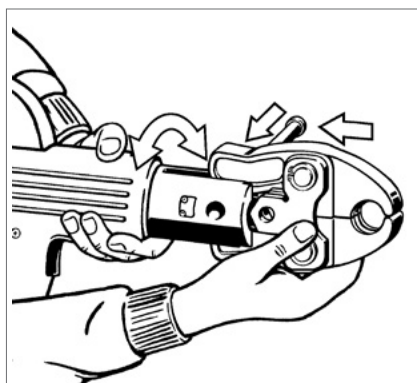
5.7 Making Connections with the PureFlow Press Power Tool



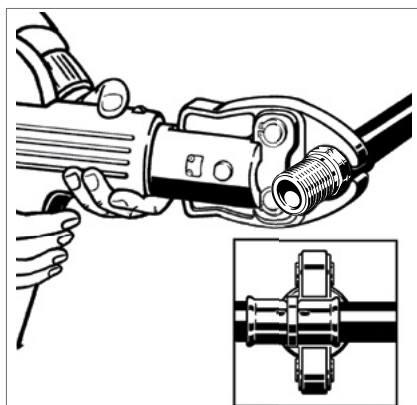
- Insert PureFlow Press fitting with attached sleeve into tubing and engage fully.



- Ensure full tubing insertion at view holes in attached press sleeve. Full insertion means tubing must be completely visible in at least two view holes and partially visible in the one.



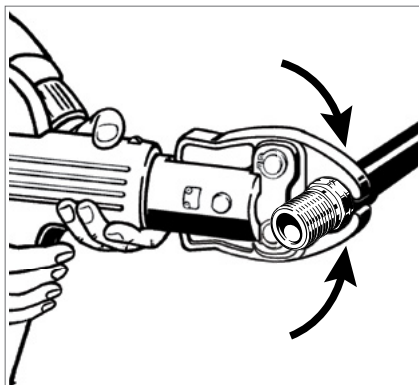
- Insert the appropriate PureFlow press jaw into the press tool and push in the holding pin until it locks.



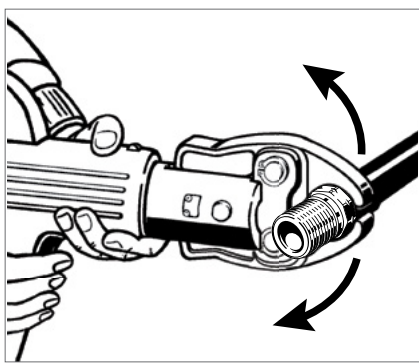
- Open jaw and position perpendicular over press sleeve, resting it against the tool locator ring.



The tool locator ring must be in the factory-installed position while making a press to ensure a consistent leak-proof connection. It may be necessary to rotate the tool locator ring to avoid interference between the ring and tool.



- Start the pressing process; hold the trigger until the jaw has automatically released.



- When press connection is complete, open and remove the jaw.

**WARNING!**

The tool locator ring must be present to ensure a proper PureFlow Press connection.

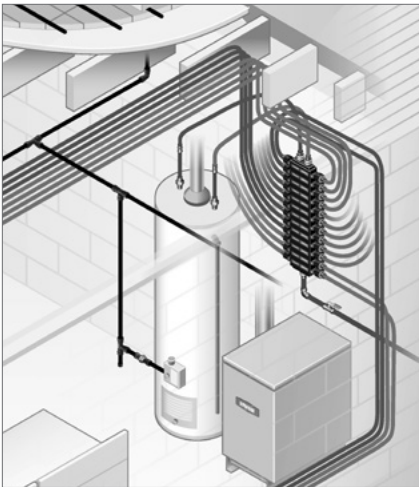
**CAUTION!**

Do not press twice.

6 Viega PureFlow System Design Considerations

While a branch-and-tee system design is still the most common method used for water distribution systems, when possible, Viega recommends using more efficient system design methods that promote water and energy savings as well as reducing the number of fittings in the system. These methods consist of the home run and combination systems. The following sections provide information to help select the best system based on the application.

6.1 Home-run Systems



Home-run installation

Connections	Low
Installation time	Medium
System efficiency	High

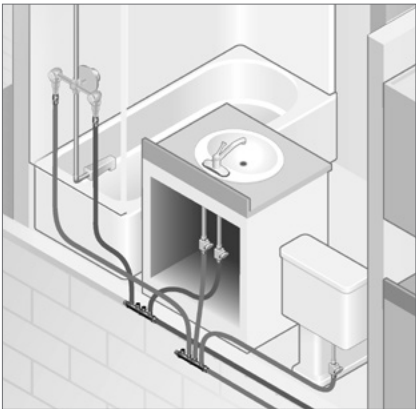
The home-run system, also know as a parallel system, is a unique method of plumbing that provides water and energy savings and can reduce water waste by up to 40% compared to traditional systems.

This system consists of a centralized manifold with individual distribution lines that run to each fixture (hot and cold). These lines are sized to the specific fixture demand using $\frac{3}{8}$ " for low-demand fixtures (2.5 gpm or less) and $\frac{1}{2}$ " for higher-demand fixtures (up to 4 gpm).

Features that the home run system offers over branch-and-tee plumbing systems include:

- Faster hot water delivery – Properly sized lines deliver hot water up to four times faster.
- Dedicated lines to each fixture use fewer fitting connections behind walls.
- Balanced water delivery – Multiple fixtures can be used simultaneously without noticeable pressure or temperature changes.
- Better control of the plumbing System – Individual $\frac{1}{4}$ -turn shutoff valves provide a simple way of servicing a fixture or adding on to the system.

6.2 Combination Systems



Combination installation

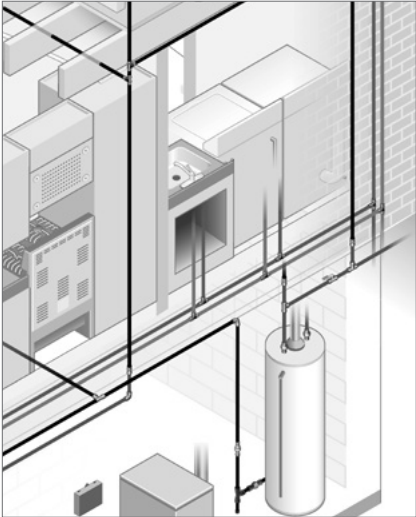
Connections	Medium
Installation time	Low
System efficiency	Medium

A combination system uses multiple manifolds combined with a branch-and-tee supply system.

This system uses various sizes of manifolds located throughout a structure placed near each main fixture group and are supplied by the main hot and cold supply lines similar to the branch-and-tee system. Multiple branch lines are connected to a manifold in a common location in lieu of multiple tees spread throughout the system. This takes advantage of benefits from both types of systems and helps keep hidden fittings to a minimum.

- Ideal for areas with multiple fixtures grouped together
- Uses fewer connections behind walls compared to branch-and-tee

6.3 Branch-and-tee Systems



Branch-and-tee installation

Connections	High
Installation time	Low
System efficiency	Low

This method of plumbing is commonly referred to as a conventional plumbing system or branch-and-main systems.

This system uses a large-diameter “main” supply line for both hot and cold water supplies that runs throughout a structure to or near each fixture group, with smaller “branch” lines teeing off the main to supply each fixture.

- Ideal for condensed floor plans
- Less installation time

6.4 Hybrid Systems



Viega PureFlow tubing installed in a potable water distribution system with metallic tubing is considered a hybrid system. Hybrid systems can give the installer and/or designer more versatility in their designs while staying price competitive. An example of this type of installation method would be using a copper riser as the main supply with PureFlow PEX tubing on each level as distribution tubing.

6.4.1 Connecting PEX to Metal Tubing

PEX can be connected directly to metal tubing with the use of Viega ProPress by PureFlow Press adapters, threaded adapters, flare adapters, female union adapters, or the use of solder adapters. Viega is the only manufacturer that offers a solution for connecting PEX tubing directly to copper tubing using press technology.

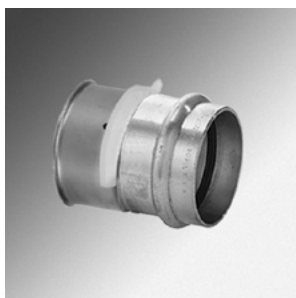


Figure 8.3 Model 2813PZL
PureFlow Press x ProPress



Figure 8.4 Model 2811ZL
PureFlow Press x M NPT



Figure 8.5 Model 2813.5ZL
PureFlow Press x Female Copper Tube Size



Figure 8.6 Model 2892ZL
PureFlow Press x Flare

6.5 Hot Water System Design

There are several types of hot water circulation systems to choose from as well as considerations for designing each of them. These can range from building size and/or layout to the required water delivery temperature for a specific application. It is the responsibility of the designer/specifier to select the appropriate system based on the application while ensuring the system temperatures and pressures don't exceed the ratings for the plastic tubing being used.

Viega's PureFlow PEX tubing is tested and listed to the requirements of ASTM F876 with a material designation code of PEX 5306. The first digit of this code (5) is the PEX tubing chlorine resistance rating, which means the PEX product is approved for 100% end use condition at 140°F. This is the highest chlorine rating available per the ASTM F876 standard. Products marked with the (5) designation are approved for continuous domestic hot water circulation systems not to exceed 140°F.



CAUTION!

Do not use PEX for circulation lines exceeding 140°F.

6.5.1 Recirculation Systems

There are three main types of hot water circulation systems.

- Continuous
- Timer
- On demand

These systems have their own strengths and weaknesses so it is important to understand their differences in order to specify the right one. Below is an overview of what these systems entail.

Continuous – The system operates 24 hours a day, seven days a week. This being said there is a noticeable cost of operation. This system should be used only where hot water is necessary all the time throughout the system. These can have high operating costs and premature component wear.

Timer – The system can be programmed to activate during peak hours of usage, limiting how often the pump runs throughout the day. Some of these systems incorporate an aquastat to limit pump use even more. This reduces the operating cost and wear and tear on those components.

On Demand – The system is activated manually when hot water is needed. These systems are probably the most efficient but require the end user to be accustomed to operating them effectively. There is a priming period once the system is activated, causing a slight delay prior to hot water being present.

6.5.2 Balancing/Velocity

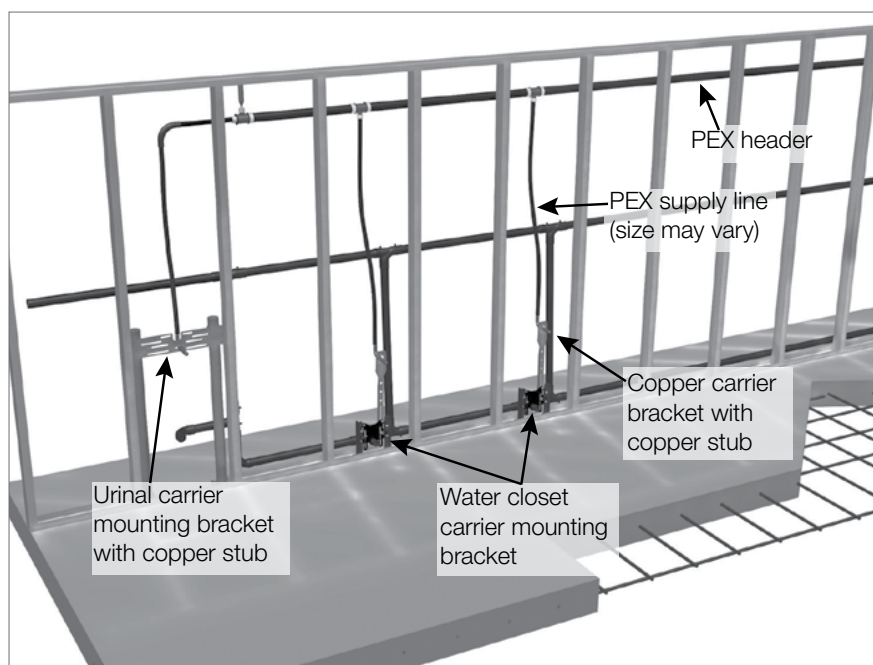
Industry agencies like American Society of Plumbing Engineers (ASPE) provide design criteria for hot water systems that include balancing and velocity guidelines. Proper balancing eliminates uneven water temperatures and delivery times caused by the water naturally taking the path of least resistance known to happen on shorter loops. Also, as a general design practice for hot water circulation systems, you should not exceed velocities of 2 fps, including circulation lines. Viega provides the necessary product specifications to design efficient hot water systems.

6.5.3 Insulation

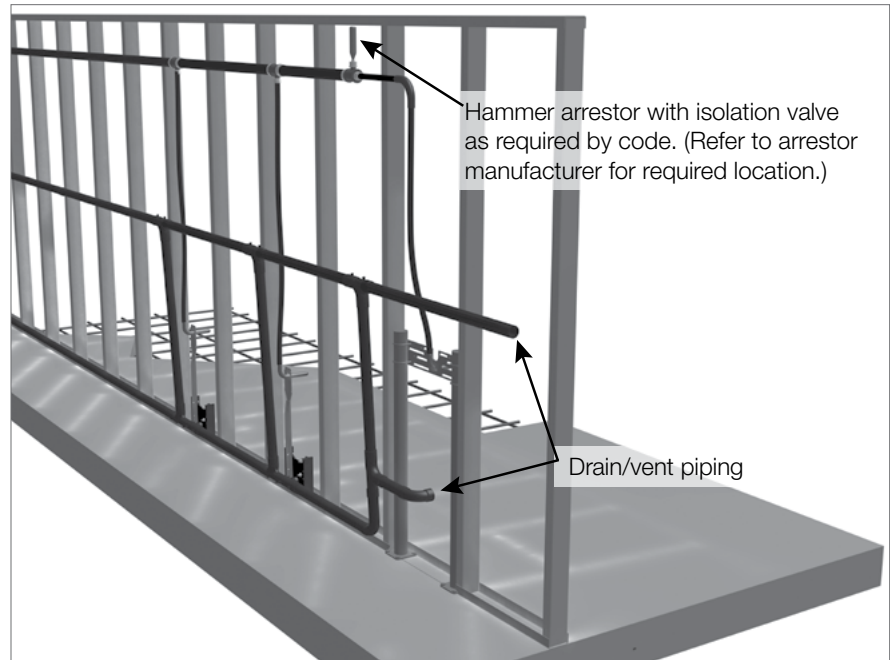
While plastic tubing has some insulation properties (R-value), it generally is not enough to meet most thermal performance requirements as outlined in hot water plumbing or energy codes. As a general practice, anywhere metal piping requires insulation, plastic piping will too. Always check code for necessary insulation requirements.

6.6 Fixture Connections – Carrier Systems

Carrier systems that utilize flush valves are commonly used in commercial applications. The detail below shows a typical bank installation of multiple flush valves and PEX supply piping.



PureFlow PEX piping to flush valves – front view



PureFlow PEX piping to flush valves – rear view

6.7 Water Quality

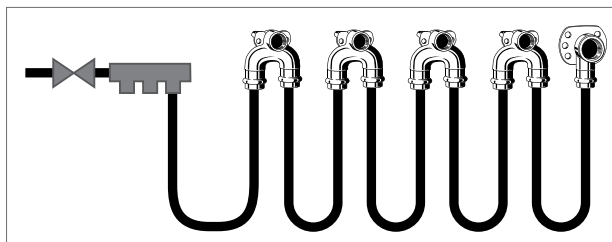
In recent years, the focus in the USA has split between drinking water treatment and pollution prevention prior to treatment. While both improve drinking water, by focusing on the cleanliness of the source water, the EPA is able to ensure cleaner water for the environment as well as people. Below are some of the restrictions placed on both our raw water and our finished water.

Water quality, according to the US EPA, refers to the chemical, physical, and biological characteristics of water. The quality of both source and treated water must adhere to the standards and mandates of the Clean Water Act (CWA). The CWA includes requirements related to effluent discharge limits, guidelines, testing and pretreatment guidelines. The primary purpose of the CWA is to minimize the pollutants discharged to public waters. The purpose of this limit is twofold. Limiting industrial discharge to bodies of water protects the plants and animals that live in and depend on that body of water. Also, many surface waters are processed for human consumption or other use; minimizing the pollution that goes into the water makes it easier and less expensive to further process the water. Overall, the CWA is in place to maintain the health of ecosystems and safety of all waters for human use and consumption.

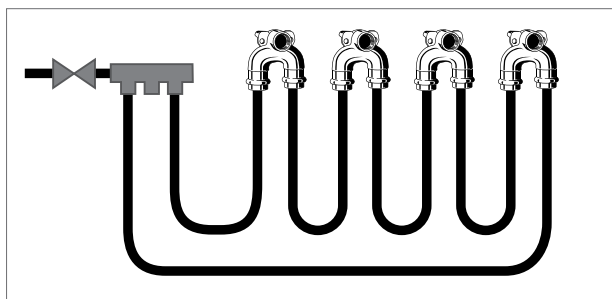
Stagnation in water distribution systems is a problem in most modern buildings, but it is a larger problem in hospitals where immunocompromised patients can be found coexisting with piping dead ends and inconsistent occupancies that lead to periods of stagnation. Stagnation can lead to a buildup of biofilms and pathogens that can ultimately damage the system, causing health problems for those exposed. Other areas where stagnation and the consequences associated with it may cause health concerns are hotels and schools, where water use follows the inconsistent use of the building.

6.7.1 Piping Details

There are a few methods for piping hot water supply lines to help eliminate dead legs and keep water moving. Below are a few piping diagrams showing series and loop methods.



Series Diagram



Loop diagram

The following design methods have been proven in Europe and will soon be available in North America thanks to Viega's line of flow-through fittings. Stagnation can now be minimized to extents not previously possible by designing and installing plumbing in a completely new way. Just as the Viega ManaBloc provided an innovative alternative to branch-and-tee systems, Viega's flow-through fittings make "series" and "loop" installation a possibility.

A series installation utilizes a strategy that generates flow through the supply piping of all fixtures connected in series prior to the one in use. The Series Diagram above shows a series installation where each circle represents a fixture connection. A loop installation, shown in the Loop Diagram, incorporates supply piping that lets flow in either direction. This allows water to be supplied to a single fixture from both the left and right sides. The use of any fixture in a loop will induce flow up to the point of connection, significantly reducing or eliminating dead legs.

For more detailed design information, contact your local Viega sales representative.

6.7.2 Fittings



Double elbow

Viega offers a special zero lead double elbow fitting that simplifies piping these circuits. It allows you to flow the supply water through the fitting and on to the next fixture. The fixture supply connects to a standard 1/2" F NPT to transition out from the wall.

6.8 System Sizing and Calculations

6.8.1 Code References

6.8.1.1 US Code Approvals



Viega PureFlow and its related plumbing components are recognized by the International Plumbing Code (IPC), the Uniform Plumbing Code (UPC), and the National Plumbing Code (NPC).

Viega has attained the below evaluation reports attesting its compliance with their respective model plumbing codes. Refer to these reports and their respective codes when sizing PureFlow systems for residential and light commercial buildings.

- ICC-ES PMG 1038
- IAPMO 4030
- IAPMO 3700

6.8.1.2 Canadian Code Approvals



Viega PureFlow and its related plumbing components are recognized by the National Plumbing Code of Canada (NPCC). Refer to the respective sizing tables and/or any provincial code requirements for sizing Viega PureFlow systems for residential and light commercial buildings.

6.8.2 General

Systems are sized using the same methods as other traditional piping materials outlined in each respective model plumbing code. While all PEX tubing has a slightly smaller I.D. than equivalent metal piping systems, its flexibility (requiring fewer fittings) and smooth inner walls make up for this slight dimensional difference. For pipe sizing methods that require the friction loss and velocity characteristics of PEX tubing, see the following sections.

6.8.3 Sizing Methods

There are several methods for determining potable water distribution pipe sizing within each model plumbing code. While each method may differ, they all rely on similar basic information to be attained in order to accurately size a system.

The most common factors required for sizing a system are:

- Available water supply pressure. This includes pressure losses through inline devices like meters and water softeners.
- Total fixture demand for all fixtures being supplied within the building expressed as:
 - WSFU (water supply fixture units) or
 - GPM (gallons per minute)
- Vertical elevation changes from water supply to highest fixture. Account for pressure loss or gain of 0.433 psi per foot of elevation change due to gravity.
- Total pipe length from water supply to most remote highest-demand fixture.
- Total tube length includes equivalent length of fittings and/or valves inline (depends on sizing method).

Once this information is compiled, it can be applied to the sizing method being used. The minimum meter size is also determined within these methods. In some cases, you must account for all fittings and/or valves as part of calculating the total pipe length (also known as the developed tube length). The fitting pressure loss is traditionally expressed as an equivalent length of PEX tubing and is added to the total pipe length to determine the developed tube length. The fitting equivalent lengths of PEX tubing are available from the fitting manufacturer; see section "6.8.5 Viega PureFlow Press Fittings Friction Loss" on page 35.



Always refer to the relevant code sizing tables being used to size your system.

6.8.4 Viega ManaBloc/MiniBloc Pressure Loss

ManaBloc/MiniBloc Pressure Loss			
Size	Rate flow	Pressure loss*	K-factor
3/8" port	2.5 GPM	2 psi	0.35
1/2" port	4.4 GPM	4.1 psi	0.21
1 1/4" manifold**	31 GPM	11.5 psi	0.012

* Pressure loss = $K \times \text{GPM}^2$

** 36-port manifold

6.8.5 Viega PureFlow Press Fittings Friction Loss

Friction loss equivalent feet of SDR9 PEX tubing:

PureFlow Press Zero Lead Bronze Fittings				
Size	Coupling	Elbow	Tee run	Tee branch
3/8"	2.9	9.2	2.9	9.4
1/2"	2.0	9.4	2.2	10.4
3/4"	1.0	8.0	1.0	9.0
1"	1.0	10.0	2.0	10.0
1 1/4"	2.0	11.0	2.0	11.0
1 1/2"	2.0	13.0	2.0	12.0
2"	1.0	19.0	2.0	18.0

PureFlow Press Polymer Fittings				
Size	Coupling	Elbow	Tee run	Tee branch
3/8"	4.5	14.3	6.5	14.7
1/2"	2.6	12.6	3.9	14.0
3/4"	2.5	18.9	3.6	19.1
1"	3.1	17.7	3.8	18.4
1 1/4"	4.0	18.6	6.4	18.7
1 1/2"	5.2	29.4	7.9	28.3
2"	8.9	36.4	10.2	37.5

PureFlow Press Bronze by M NPT Adapter		
Size	Flow direction	Equivalent feet
3/8" x 1/2"	PEX to M NPT	5.7
	M NPT to PEX	3.0
1/2" x 1/2"	PEX to M NPT	3.3
	M NPT to PEX	2.2
3/4" x 3/4"	PEX to M NPT	2.7
	M NPT to PEX	2.2
1" x 1"	PEX to M NPT	3.0
	M NPT to PEX	2.5
1 1/4" x 1 1/4"	PEX to M NPT	3.7
	M NPT to PEX	2.9
1 1/2" x 1 1/2"	PEX to M NPT	4.2
	M NPT to PEX	3.1
2" x 2"	PEX to M NPT	5.5
	M NPT to PEX	4.1

PureFlow Press Bronze by F NPT Adapter		
Size	Flow direction	Equivalent feet
1/2" x 1/2"	PEX to F NPT	3.1
	PEX to F NPT	2.5
3/4" x 3/4"	PEX to F NPT	2.7
	PEX to F NPT	3.6
1" x 1"	PEX to F NPT	4.1
	PEX to F NPT	4.6
1 1/4" x 1 1/4"	PEX to F NPT	3.1
	PEX to F NPT	2.5
1 1/2" x 1 1/2"	PEX to F NPT	2.7
	PEX to F NPT	3.6
2" x 2"	PEX to F NPT	4.1
	PEX to F NPT	4.6

PureFlow Press Bronze by Tubing Adapter		
Size	Flow direction	Equivalent feet
3/8" x 1/2"	PEX to Tubing	5.1
1/2" x 1/2"	PEX to Tubing	3.5
3/4" x 3/4"	PEX to Tubing	3.3
1" x 1"	PEX to Tubing	3.8
1 1/4" x 1 1/4"	PEX to Tubing	4.3
1 1/2" x 1 1/2"	PEX to Tubing	4.7
2" x 2"	PEX to Tubing	6.2

PEX Press Bronze by M NPT Elbow		
Size	Flow direction	Equivalent feet
1/2" x 1/2"	PEX to M NPT	4.8
	M NPT to PEX	4.5
3/4" x 3/4"	PEX to M NPT	5.3
	M NPT to PEX	5.4
1" x 1"	PEX to M NPT	8.4
	M NPT to PEX	6.1
1 1/4" x 1 1/4"	PEX to M NPT	8.2
	M NPT to PEX	7.6
1 1/2" x 1 1/2"	PEX to M NPT	8.6
	M NPT to PEX	8.1
2" x 2"	PEX to M NPT	11.7
	M NPT to PEX	12.3

PureFlow Press Bronze by F NPT Drop Ear		
Size	Flow direction	Equivalent feet
3/8" x 1/2"	PEX to F NPT	7.1
1/2" x 1/2"	PEX to F NPT	4.8
3/4" x 1/2"	PEX to F NPT	4.0
3/4" x 3/4"	PEX to F NPT	7.8

PureFlow Press Bronze by F NPT Drop Ear		
Size	Flow direction	Equivalent feet
3/4" x 3/4"	PEX to flare	3.3
1" x 3/4"	PEX to flare	2.8
1" x 1"	PEX to flare	3.7

PureFlow Press Bronze by Street Elbow		
Size	Flow direction	Equivalent feet
1/2" x 1/2"	PEX to street	7.9
	Street to PEX	7.9
1/2" x 3/4"	PEX to street	5.8
	Street to PEX	4.7
3/4" x 3/4"	PEX to street	10.3
	Street to PEX	8.7

PureFlow Press Bronze by Street		
Size	Flow direction	Equivalent feet
1/2" x 1/2"	PEX to street	2.8
3/4" x 3/4"	PEX to street	2.8
1" x 1"	PEX to street	3.2
1 1/4" x 1 1/4"	PEX to street	3.7
1 1/2" x 1 1/2"	PEX to street	4.0
2" x 2"	PEX to Street	5.3

PureFlow Press Bronze by ProPress		
Size	Flow direction	Equivalent feet
1/2" x 1/2"	PEX to ProPress	3.0
3/4" x 3/4"	PEX to ProPress	2.9
1" x 1"	PEX to ProPress	3.3
1 1/4" x 1 1/4"	PEX to ProPress	3.8
1 1/2" x 1 1/2"	PEX to ProPress	4.2
2" x 2"	PEX to ProPress	5.3

PureFlow Press Bronze by Tubing Elbow		
Size	Flow direction	Equivalent feet
3/8" x 1/2"	PEX to tubing	5.6
1/2" x 1/2"	PEX to tubing	8.0

PureFlow Press Polymer Manifolds – Flow Through			
Size	Ports	Flow direction	Equivalent feet
3/4" x 3/4" x 1/2"	2	Inlet to inlet	9.5
		Inlet to branch	8.2
3/4" x 3/4" x 1/2"	3	Inlet to inlet	8.7
		Inlet to branch	8.2
3/4" x 3/4" x 1/2"	4	Inlet to inlet	8.7
		Inlet to branch	8.2
1" x 3/4" x 1/2"	4	Inlet to inlet	4.7
		Inlet to branch	7.2
1" x 1" x 1/2"	6	Inlet to inlet	7.4
		Inlet to branch	7.2
1" x 1" x 1/2"	8	Inlet to inlet	7.5
		Inlet to branch	7.2

PureFlow Press Polymer Manifolds – Closed			
Size	Ports	Flow direction	Equivalent feet
3/4" x 1/2"	4	Inlet to branch	7.6
1" x 1/2"	6	Inlet to branch	6.6

6.8.6 Viega PureFlow PEX Tubing

6.8.6.1 Flow Velocity

Flow rate GPM	Flow Velocity, ft/sec						
	3/8	1/2	3/4	1	1 1/4	1 1/2	2
0.5	1.7	0.9			Velocity < 0.5 ft/sec		
0.75	2.5	1.4	0.7				
1.0	3.3	1.8	0.9	0.5			
1.5	5.0	2.7	1.4	0.8	0.6		
2.0	6.7	3.6	1.8	1.1	0.7	0.5	
2.5	8.3	4.5	2.3	1.4	0.9	0.7	
3.0	10.0	5.4	2.7	1.6	1.1	0.8	
3.5		6.3	3.2	1.9	1.3	0.9	0.5
4.0		7.2	3.6	2.2	1.5	1.1	0.6
4.5		8.1	4.1	2.5	1.7	1.2	0.7
5.0		9.1	4.5	2.7	1.8	1.3	0.8
6.0		10.9	5.4	3.3	2.2	1.6	0.9
7.0			6.4	3.8	2.6	1.8	1.1
8.0			7.3	4.4	2.9	2.1	1.2
9.0			8.2	4.9	3.3	2.4	1.4
10.0			9.1	5.5	3.7	2.6	1.5
11.0			10.0	6.0	4.0	2.9	1.7
12.0			10.9	6.6	4.4	3.2	1.8
13.0			11.8	7.1	4.8	3.4	2.0
14.0				7.7	5.1	3.7	2.2
15.0				8.2	5.5	4.0	2.3
16.0				8.8	5.9	4.2	2.5
17.0				9.3	6.3	4.5	2.6
18.0				9.9	6.6	4.8	2.8
19.0				10.4	7.0	5.0	2.9
20.0				11.0	7.4	5.3	3.1
25.0					9.2	6.6	3.8
30.0					11.0	7.9	4.6
35.0		Velocity > 12 ft/sec				9.2	5.4
40.0						10.6	6.2
45.0						11.9	6.9
50.0							7.7
55.0							8.5
60.0							9.2
65.0							10.0
70.0							10.8
75.0							11.5

6.8.6.2 Pressure Loss

Viega recommends the following velocities for hot and cold PEX water distribution systems:

- Domestic cold water – 10 fps
- Domestic hot water – 8 fps

The flow velocity through Viega's PEX fittings does not fall under these limitations. The equivalent length of PEX tube for Viega PureFlow fittings is available from Viega to assist in system sizing where applicable (refer to "6.8.5 Viega PureFlow Press Fittings Friction Loss" on page 35).

Flow rate GPM	60°F (16°C) Water						
	Pressure loss PSI/100 ft of pipe						
	3/8	1/2	3/4	1	1 1/4	1 1/2	2
0.5	2.0						
0.75	4.1						
1.0	7.0	1.6					
1.5	14.9	3.4					
2.0	25.4	5.8	1.1				
2.5	38.5	8.7	1.6				
3.0	53.9	12.2	2.3				
3.5		16.2	3.0				
4.0		20.8	3.9	1.1			
4.5		25.8	4.8	1.4			
5.0		31.4	5.9	1.7			
6.0		44.0	8.2	2.4			
7.0			10.9	3.2	1.2		
8.0			14.0	4.1	1.6		
9.0			17.4	5.1	1.9		
10.0			21.1	6.2	2.3	1.0	
11.0			25.2	7.4	2.8	1.2	
12.0			29.6	8.8	3.3	1.5	
13.0			34.3	10.1	3.8	1.7	
14.0				11.6	4.4	2.0	
15.0				13.2	5.0	2.2	
16.0				14.9	5.6	2.5	
17.0				16.7	6.3	2.8	
18.0				18.5	7.0	3.1	
19.0				20.5	7.7	3.4	
20.0				22.5	8.5	3.8	1.0
25.0					12.8	5.7	1.5
30.0					18.0	8.0	2.2
35.0		Pressure loss excessive as flow velocity is > 12 ft/sec				10.7	2.9
40.0						13.7	3.7
45.0						17.0	4.6
50.0							5.6
55.0							6.6
60.0							7.8
65.0							9.0
70.0							10.4
75.0							11.8

Pressure loss based on Hazen-Williams formula (C=150)

Pressure loss for actual length can be calculated by following formula:

Actual length / 100 ft x value from chart above

6.8.7 Calculating Pressure Drop through Fittings

To account for pressure drop through a PEX fitting, simply take the equivalent feet factor noted in section "6.8.5 Viega PureFlow Press Fittings Friction Loss" on page 35 for the size and type of fitting and multiply it by the PEX tubing pressure loss per foot factor (see "6.8.6.2 Pressure Loss" on page 38) for that same PEX tube size per the flow rate being applied.

Example:

- ½" PureFlow Press Polymer Elbow has an equivalent PureFlow PEX tubing factor of 12.6 ft.
- ½" PureFlow PEX tubing has a 20.8 psi drop per 100 feet at 4 gpm.
 $20.8 / 100 \text{ ft.} = 0.208 \text{ psi per foot}$
 $12.6 \times 0.208 = 2.6 \text{ psi drop}$

6.8.8 Reducing Fittings

When using a reducing fitting (e.g., a tee), simply use the coinciding value for the branch leg size. If the run legs are different sizes, use half (0.5)* of each of their respective equivalent value for each size. Once these values are determined, apply them to their respective tubing pressure drop factors per the flow rate being applied.

Example:

¾" x ½" x ¾" PureFlow Press polymer tee at 4 GPM through the ½" branch size would have the following pressure drop:

Calculating ¾" run leg:

- ¾" run leg of tee = 3.6 equiv ft of PEX
 $3.6 \times 0.5 = 1.8 \text{ equiv ft of PEX}$
- ¾" PEX at 4 GPM = 3.9 PSI / 100ft loss
 $3.9 \text{ PSI} / 100\text{ft} = 0.039 \text{ PSI} / \text{ft loss}$
 $0.039 \text{ PSI} \times 1.8 \text{ equiv ft} = 0.07 \text{ PSI loss}$

Calculating ½" run leg:

- ½" run leg of tee = 3.9 equiv ft of PEX
 $3.9 \times 0.5 = 1.95 \text{ equiv. ft of PEX}$
- ½" PEX at 4 GPM = 20.8 PSI / 100ft loss
 $20.8 / 100\text{ft} = 0.208 \text{ PSI} / \text{ft loss}$
 $0.208 \times 1.95 = 0.41 \text{ PSI loss}$

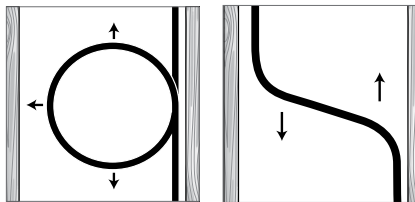
Combined run leg:

- $0.07 \text{ PSI} + 0.41 \text{ PSI} = 0.48 \text{ PSI loss through run leg of reducing tee}$

** Multiply by 0.5 to get half of the full run length value for the reducing tee.*

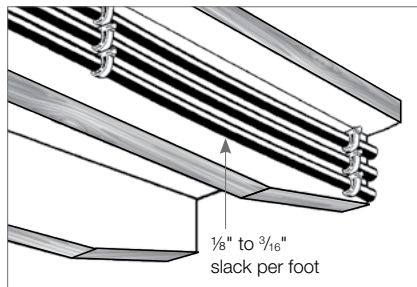
6.9 Tubing Expansion

Viega PureFlow PEX tubing, as with any PEX tubing, expands and contracts with temperature changes in the environment or the fluid inside the tubing. The longer the tubing run and the higher the temperature change, the more linear expansion the system will experience. This expansion and contraction can affect the appearance and integrity of the system by putting stress on the tubing, fittings, valves, and fasteners. The system should be designed to accommodate tubing expansion.



Using a loop to accommodate tubing expansion

Offsets also provide room for tubing expansion.



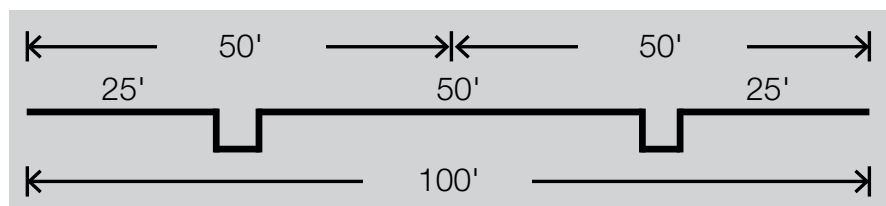
Allow some slack in all runs to prevent damage from tubing contraction.

Tubing fasteners perform two functions: providing support for the tubing and guiding the tubing during expansion and contraction. It is important to keep this in mind when installing fasteners. An expansion compensator will not be effective if the fasteners prevent linear movement of the piping system.

Tubing sizes smaller than $\frac{3}{4}$ " generally do not require expansion compensators with fittings and can easily be bent into loops and offsets to absorb linear expansion. For tubing sizes 1" and larger, refer to "6.10 Calculating Expansion Loops and Offsets" on page 41 for compensation options.

For unconstrained tubing runs (not within the floor), Viega recommends the use of expansion offsets. This can be accomplished at a corner or by using offsets or loops on straight tubing runs. Expansion compensators should be installed at the midway point of tubing runs and should be spaced no more than 50 feet apart.

Below is an example of required offsets for a 100-foot tubing run. Note that the expansion compensators are no more than 50 feet apart.



6.10 Calculating Expansion Loops and Offsets

There are three types of expansion offsets recommended for use with large-diameter tubing:

- Corner expansion offset
- Z-type expansion offset
- U-type expansion loop

A description, illustration, and dimensions chart for each type of offset are on the next few pages.

6.10.1 Linear Expansion

To calculate linear expansion for PEX tubing, use the following formula:

$$\Delta L = \frac{\text{PEX expansion rate}}{100' \times 10^{\circ}\text{F}} \times \Delta T \times \text{LT}$$

where:

Viega PureFlow PEX expansion rate = 1.1" per 100' per 10°F

ΔT = Change in temperature (in °F)

LT = Length of tube between fixed points (in ft.)

For example:

40' of 1" Viega PureFlow PEX tubing going from 70°F to 130°F

$$\Delta L = \frac{1.1''}{1000} \times 60^{\circ} \times 40' = 2.64''$$

$$\Delta L = 2.64''$$

6.10.2 Compensation Distance

To calculate the dimensions of the expansion compensation offset needed, use the following formula:

$$L = C\sqrt{\text{OD} \times \Delta L}$$

where:

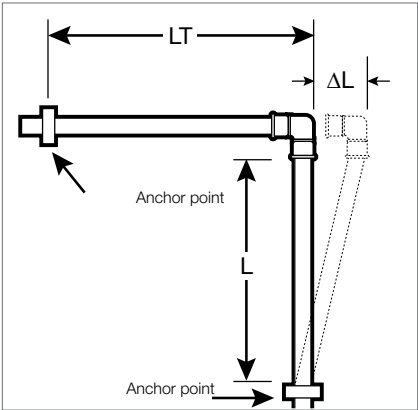
L = length of compensation distance

C = 12 (PEX material specific constant)

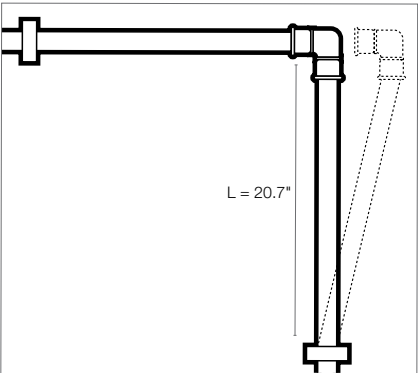
OD = outer tubing diameter ($\frac{1}{8}$ " + nominal tube size)

ΔL = change in length from temperature change

6.10.3 Corner Expansion Offset



Corner Offset



Corner Expansion Example

Where piping takes a corner after a long straight run, a simple 90° elbow in the piping will allow for the absorption of expansion.

Calculate the necessary “L” dimension between the elbow and the nearest fastener, or use the chart below, which was figured using the maximum run for a single expansion compensator (50 feet).

Following the previous example:

$$L = C\sqrt{OD \times \Delta L}$$

where:

$$C = 12$$

$$OD = 1.125 \text{ (1" PEX)}$$

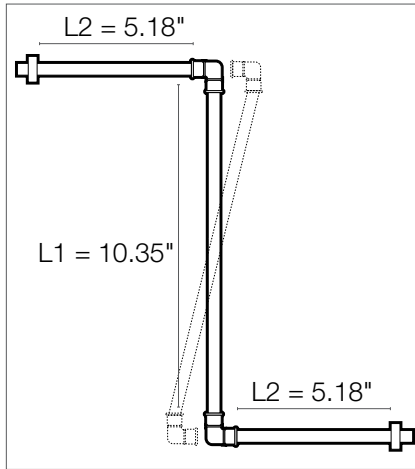
$$\Delta L = 2.64"$$

$$L = 12\sqrt{1.125 \times 2.64} = 20.7"$$

$$L = 20.7"$$

		Corner Expansion Offset (L, inches) per 50 linear feet of run							
Tubing	ΔT(°F)	60	80	100	120	140	160	180	200
	Tube nom.								
Viega PureFlow PEX	¾"	20.4	23.6	26.4	28.9	31.2	33.4	35.4	37.3
	1"	23.2	26.7	29.9	32.8	35.4	37.8	40.1	42.3
	1¼"	25.6	29.6	33.1	36.2	39.1	41.8	44.4	46.8
	1½"	27.8	32.1	35.9	39.4	42.5	45.5	48.2	50.8
	2"	31.8	36.8	41.1	45.0	48.6	52.0	55.1	58.1

6.10.4 Z-type Expansion Offset



Z-type expansion example

The Z-type expansion offset integrates two 90° elbows that form a “Z” pattern.

With this type of configuration ½ of the “L” dimension is applied to the center area of the “Z” (represented as L1 in the table and illustration) while ¼ of the “L” dimension would be applied to each of the top and bottom areas (represented as L2).

Calculate the necessary L1 and L2 dimensions or use the chart below, which was figured using the maximum run for a single expansion compensator (50 feet).

$$L = 20.7''$$

$$L1 = \frac{1}{2} (L)$$

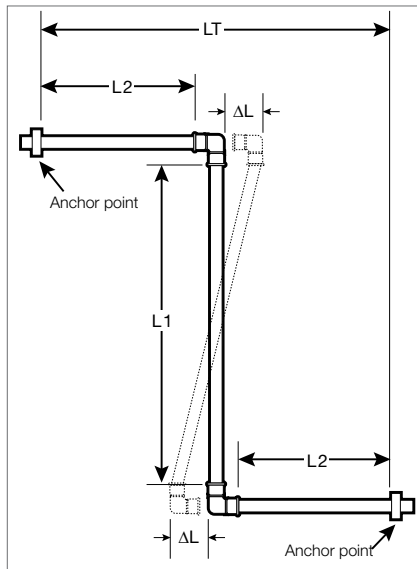
$$L1 = 20.7''/2 = 10.35''$$

$$L1 = 10.35''$$

$$L2 = \frac{1}{4} (L)$$

$$L2 = 20.7''/4 = 5.18''$$

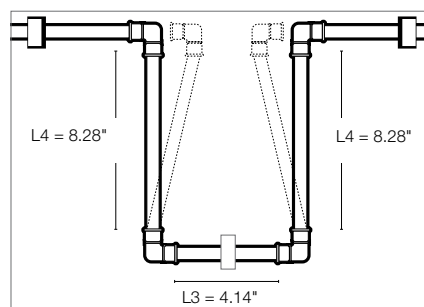
$$L2 = 5.18''$$



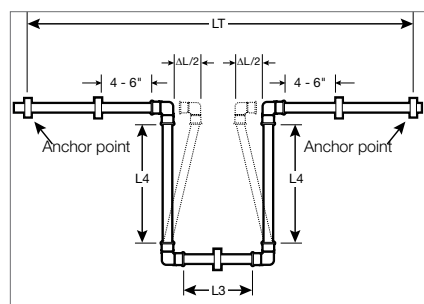
Z-type offset

		Z-type Expansion Offset (Inch) per 50 Linear Feet of Run															
Tubing	ΔT(°F)	60		80		100		120		140		160		180		200	
	Tube nom.	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2
Viega PureFlow PEX	¾"	10.2	5.1	11.8	5.9	13.2	6.6	14.4	7.2	15.6	7.8	16.7	8.3	17.7	8.8	18.6	9.3
	1"	11.6	5.8	13.4	6.7	15.0	7.5	16.4	8.2	17.7	8.8	18.9	9.5	20.1	10.0	21.1	10.6
	1¼"	12.8	6.4	14.8	7.4	16.5	8.3	18.1	9.1	19.6	9.8	20.9	10.5	22.2	11.1	23.4	11.7
	1½"	13.9	7.0	16.1	8.0	18.0	9.0	19.7	9.8	21.3	10.6	22.7	11.4	24.1	12.1	25.4	12.7
	2"	15.9	8.0	18.4	9.2	20.5	10.3	22.5	11.3	24.3	12.2	26.0	13.0	27.6	13.8	29.1	14.5

6.10.5 U-type Expansion Offset



U-type expansion



U-type looped offset

The U-type expansion loop integrates four 90° elbows that form a “U” pattern.

With this arrangement $\frac{1}{5}$ of the “L” dimension is applied as the width (represented as L3) while $\frac{2}{5}$ of “L” is applied as each leg in the other dimension (represented as L4).

Calculate the necessary L3 and L4 dimensions or use the chart below, which was figured using the maximum run for a single expansion compensator (50 feet).

$$L = 20.7''$$

$$L3 = \frac{1}{5} (L)$$

$$L3 = 20.7''/5 = 4.14''$$

$$L3 = 4.14''$$

$$L4 = \frac{2}{5} (L)$$

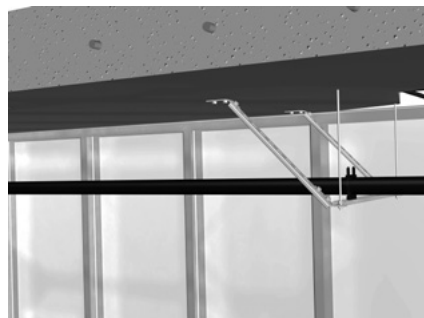
$$L4 = 2(20.7'')/5 = 8.28''$$

$$L4 = 8.28''$$

		U-type Expansion Offset (Inch) per 50 Linear Feet of Run															
Tubing	$\Delta T(^{\circ}F)$	60		80		100		120		140		160		180		200	
	Tube nom.	L3	L4	L3	L4	L3	L4	L3	L4	L3	L4	L3	L4	L3	L4	L3	L4
Viega PureFlow PEX	$\frac{3}{4}''$	4.1	8.2	4.7	9.4	5.3	10.5	5.8	11.6	6.2	12.5	6.7	13.3	7.0	14.2	7.5	14.9
	1"	4.6	9.3	5.3	10.7	6.0	12.0	6.6	13.1	7.1	14.2	7.6	15.1	8.0	16.0	8.5	16.9
	1 $\frac{1}{4}''$	5.1	10.2	5.9	11.8	6.6	13.2	7.2	14.5	7.8	15.6	8.4	16.7	8.9	17.7	9.4	18.7
	1 $\frac{1}{2}''$	5.6	11.1	6.4	12.9	7.2	14.4	7.9	15.7	8.5	17.0	9.1	18.2	9.6	19.3	10.2	20.3
	2"	6.4	12.7	7.4	14.7	8.2	16.4	9.0	18.0	9.7	19.5	10.4	20.8	11.0	22.1	11.6	23.2

The fastener shown on the L3 leg may be required to provide additional support depending on how the expansion loop is installed (horizontal/vertical).

6.11 Structural Considerations



Pipe braced with brackets

Support of piping materials varies geographically. Refer to local code for support specifications per your location. Any bracing or clamping should be done with supports that are designed for use with plastic tubing that do not crush or damage the pipe surface. The best practice is to use clamps with integral insulators or line the clamp or hanger with thin foam.

7 Installing the Viega PureFlow PEX Tubing System

7.1 Handling PureFlow PEX Tubing

The properties of Viega PureFlow PEX tubing make it easy to work with and install in most types of construction. Some care must be taken to prevent damage to the tubing before and during installation:

- Use care to protect Viega PureFlow PEX tubing from physical damage during storage and installation. Keep the tubing away from sharp objects, open flames, etc., and do not place heavy objects on the tubing.
- Damaged sections of tubing should be cut out and discarded.
- Do not expose Viega PureFlow PEX tubing to sunlight or any UV source for extended periods of time exceeding six months.
- Do not store Viega PureFlow PEX tubing outdoors where it may be exposed to UV light.



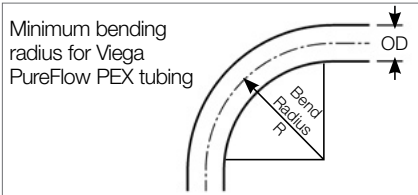
7.2 Decoiling PureFlow PEX Tubing



A decoiler should be used to prevent twisting when removing tubing from $\frac{3}{4}$ " to 1" coils. Roll coils out and use care to avoid twisting $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", and 2" coils or when a decoiler is unavailable. If larger diameter tubing is used for short run sections, straight lengths are also available which can assist in this type of installation.

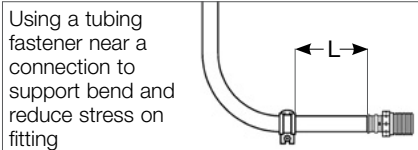
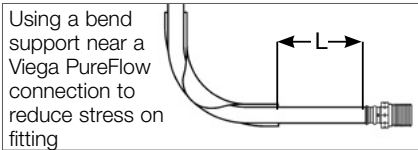
7.3 Bending PureFlow PEX Tubing

Viega PureFlow PEX tubing can be free bent (unsupported bend) to a minimum radius of eight times the tubing O.D. and five times the tubing O.D. with the use of a Viega-approved bend support. with the use of a Viega tubing bender. For situations requiring tighter bends, use elbow fittings. If bending against a PEX coil bend direction, the bending radius is 24 times the tubing O.D. Viega does not allow the practice of “hot bending” Viega PureFlow PEX tubing to make a tighter bend radius.



Viega PureFlow PEX Nominal size*	Minimum radius	
	Free bend (8 x O.D.)	Supported (5 x O.D.)
3/8"	4"	2.5"
1/2"	5"	3.1"
3/4"	7"	4.4"
1"	9"	5.6"
1 1/4"	11"	6.75"
1 1/2"	13"	8.1"
2"	17"	10.6"

**Viega PureFlow PEX bend radius values were calculated using standard CTS O.D. dimensions, which are 1/8" larger than the nominal tube size listed.*



To reduce damaging stress on Viega PureFlow fittings, bend supports or tubing fasteners must be used to anchor all bends made close to fittings. Support must be provided for tubing bends located closer to fittings than distance “L” in table below (see the diagrams to the left for typical installation examples).

Tubing size	Maximum distance from fitting to bend
3/8" PEX	L = 6 inches
1/2" PEX	L = 8 inches
3/4" PEX	L = 10 inches
1" PEX	L = 12 inches
1 1/4" PEX	L = 14 inches
1 1/2" PEX	L = 16 inches
2" PEX	L = 18 inches

7.4 Removing PureFlow Connections

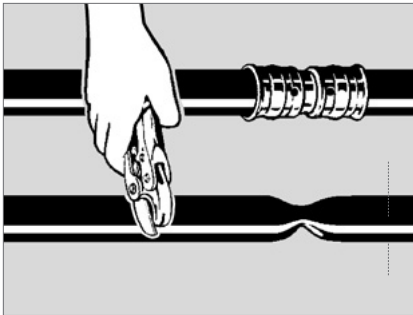
Should a mistake be made, simply cut out the PureFlow fitting and replace with a new one.



CAUTION!

Do not reuse Viega PureFlow fittings.

7.5 Repairs



Sections of kinked tubing should be repaired by cutting out the damaged section and installing a repair coupling.

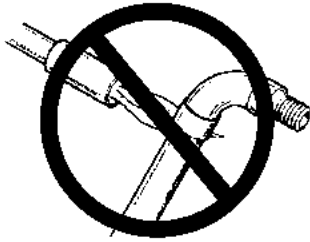
7.6 Freezing

While plastic tubing has some insulation properties (R-value) it generally is not enough to meet most thermal performance requirements as outlined in code. As a general practice, anywhere metal piping requires insulation, plastic piping will too. Always check code for necessary insulation requirements.

The flexibility of Viega PureFlow PEX tubing makes it resistant to damage from freezing, but precautions to prevent freezing should be taken when low temperatures might be encountered.

Insulating each PEX tube individually or as a group is not generally necessary if the PEX tubing is installed within the insulation envelope of the structure, i.e., the heated area. For example, the tubing may be installed under the insulation in the attic or within an interior wall of a heated space.

PureFlow PEX tubing should not be intentionally installed in areas subjected to freezing.



Do not use an open torch or excessive heat to thaw PureFlow PEX tubing. Tubing failure or damage can result.

Heat (**do NOT use a torch**) must be applied directly to the frozen tubing section. Temperature on tubing must not exceed 180°F.

If freezing occurs, several suitable methods exist to thaw PureFlow PEX tubing:

- Hot water
- Wet, hot towels
- Hand-held hair dryer
- Low-wattage electrical heating tape (self limiting)
- A commercial system that pumps heated water through a tube to the ice blockage and returns the cooled water for reheating

7.6.1 Heat Tape

It is an acceptable practice to use heat tape on PEX tubing as long as it is a self-limiting type not controlled by an external thermostat. Below is a list of manufacturers that offer heat tapes meeting these requirements:

- EasyHeat®/10800 series
- Heaterzone.com
- WRAP-ON/PIPE-GUARD™
- BriskHeat®

7.7 Condensation Control

As a general practice, anywhere metal piping requires insulation for condensation control, plastic piping will too. Always check code for necessary insulation requirements.

7.8 Noise and Water Hammer in PureFlow Systems

As with all plumbing materials, under some operating conditions, water hammer can occur in PEX plumbing systems. The inherent flexibility of Viega PureFlow PEX drastically reduces the magnitude of pressure surges compared with metallic plumbing materials. Damage to plumbing components in a PEX system due to these pressure surges is highly unlikely, although noise can sometimes result. Fortunately, there are solutions to minimize or eliminate water hammer noise.

- Install fixtures that are not water hammer prone.

As a general rule, two-handle fixtures are less likely to cause hammer than single-handle fixtures. Single-handle shower valves, which rotate to close and therefore are difficult to close quickly, might be good choices.

- Clamping or strapping more frequently may help prevent tubing noise. It is important that the tubing not be in contact with wallboard, forced air ducts or other high-resonance articles. Insufficiently or improperly clamped or strapped tubing may move during fixture operation and hit against these surfaces.

- Install a water hammer arrester at fixtures where noise is a problem. A water hammer arrester (AA sized) installed as closely as possible to the fixture on the cold-water side only will eliminate the source of the noise (the pressure wave). It should be noted that even with an arrester, tubing that is clamped or strapped insufficiently may still hit against something as it moves slightly when the water flow is stopped.

- Avoid operating fixtures in such a way that causes near instantaneous shutoff. Simply closing fixtures in a less abrupt manner can eliminate hammer noise.

7.9 Electrical Grounding

Viega PureFlow PEX tubing may not be used as an electrical ground. Consult the NEC (National Electrical Code) for recommended grounding method when plastic pipe is used.



WARNING!

Do not ground plastic piping.

7.10 Expanding Foams

When penetrations must be sealed for air infiltration purposes, there are several options available. Use a good grade of silicone, acrylic, or siliconized acrylic caulking. **DO NOT use oil-based caulks.** Most canned expanding foams and open- or closed-cell pipe insulation are good sealing materials and may be used in direct contact with PEX tubing. Other materials may be used provided they do not cause short- or long-term damage to the PEX tubing.



WARNING!

When using expanding spray foam to insulate walls in a structure, there are several options available. Viega suggests using water-based or urethane-based open-cell insulation only. **DO NOT use closed-cell spray foams.** Closed-cell spray foams have the potential to generate high temperatures during their expansion process, especially when not applied properly, which can damage PEX tubing. Always follow the spray foam manufacturer's installation instructions and warnings.



Do not expose Viega products to any foreign substance that includes but is not limited to VOC (Volatile Organic Chemical) compounds, paints, solvents, glues, cleaners, and disinfectants.



Viega products that are exposed to these types of substances are at risk of having failures (leaks).

7.11 Fire Stop Compounds

Most building codes require the use of a fire-stopping compound when tubing penetrates a fire-rated wall. There are a number of fire-stopping compounds identified as water based, acrylic or latex that have been listed for use with PEX tubing that include but are not limited to the following.

- 3M Fire Protection: CP 25WB+ Caulk
- Tremco, Inc.: TREMstop® IA
- Specified Technologies, Inc.: SpecSeal® SSS 100/SSS 102
- Passive Fire Protection Partners: Fire Stop™ 4800 DW/4100 DW/4100 NS/3600 EX

It is the responsibility of the user to determine the suitability of these or any products for the intended application and install the compounds in accordance with the product's installation instructions and listing.

7.12 Termiticides/Pesticides

Applications of different termiticides, pesticides, and insecticides that may come in contact with the outer surface of Viega PEX products, based on present knowledge, should not adversely affect the performance of Viega PureFlow PEX tubing and/or fitting products for use in potable water distribution systems.

Because of the wide array of insect and pest eradication products available to consumers today, it is impossible to make a general assessment of all available products' impact on plastic plumbing components. However, if utilized in accordance with the pesticide/termiticide/insecticide manufacturers' application guidelines, it is unlikely the products will negatively impact Viega's PureFlow PEX tubing.



WARNING!

As with any product, misapplication of any chemical could result in unwanted results or damage to other components, including the plumbing system, per the typical warnings accompanying the products.

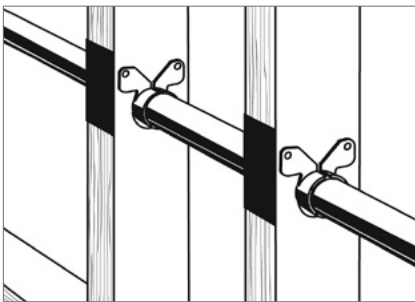
8 Fastening the Viega PureFlow System

8.1 Wood Frame Construction

Viega PureFlow PEX tubing is ideal for use in wood frame construction. The ability to bend the tubing around corners and obstacles greatly simplifies installation. This system eliminates the expensive and time-consuming use of fittings where tubing turns within a wall, and it eliminates the potential fire hazard of soldering close to exposed framing members.

A few rules should be followed when running Viega PureFlow PEX tubing in wood frame construction:

- Use nailing plates to protect the tubing from nails and screws where it passes through studs.
- Suspension clips are required for metal studs and optional for wooden studs.
- When turning tubing sharply to exit from a wall, a bend support must be provided. Either use a drop-ear bend support, drop-ear elbow, or a stub out. Neglecting to use a support will place excessive stress on the fitting, and the tubing will not exit perpendicular to the wall.



Nailing plates protect tubing passing through studs and joists from nails.

8.2 Steel Construction



Suspension clip fasteners used to protect tubing from abrasion when passing through steel studs

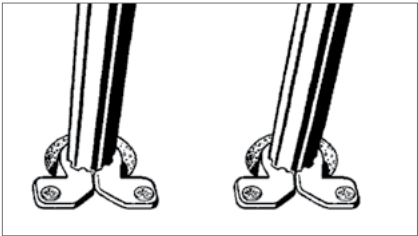
The Viega PureFlow system works as well in steel frame construction as it does in wood. Where tubing runs through metal studs, suspension clip fasteners must be used to protect tubing from sharp stud edges (see illustration to the left). Follow the same guidelines for fastening and supporting the tubing as for wood frame construction.

8.3 Supporting PureFlow PEX Tubing

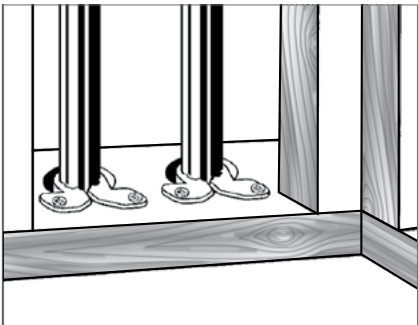


CAUTION!

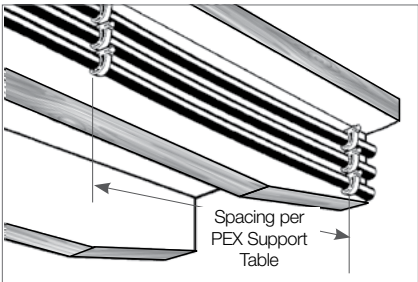
Use only plastic or plastic-coated tubing supports. Metal supports may damage tubing.



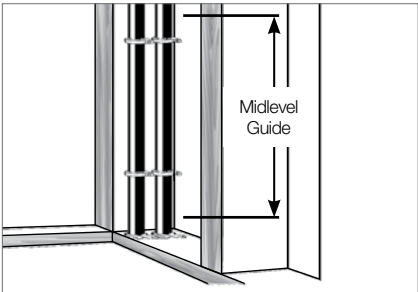
Suspension clips support tubing in joist penetrations or anywhere abrasion is a concern.



Suspension clip fasteners used at floor plate



Tubing supported with U-clip or lock clip fasteners on horizontal runs



J-clamp or lock clip fasteners used to support tubing in vertical runs between floors

When running tubing, leave a small amount of slack between fasteners to account for tubing contraction.

Note that Viega PureFlow PEX tubing will expand or contract 1.1" per 100' for every 10°F of temperature change. In long straight runs, allow adequate clearance for this (see "Tubing Expansion" on page 40).

Tubing should be allowed freedom to move slightly as it expands. Do not clip it tightly into place or locate it where it will be tightly constrained. Use suspension clips or an approved plastic insulator where tubing passes through studs or joists where abrasion and noise is a concern (see illustrations to left).

Viega PureFlow PEX tubing must be fastened at a minimum interval noted in the table below for vertical and horizontal support.

	PEX size	Horizontal	Vertical
Viega PureFlow PEX	½" - 1"	32" O.C.	Base of each floor with midlevel guide
	1¼" - 2"	48" O.C.	

PEX support

In risers or vertical runs, Viega PureFlow PEX tubing should be attached with suspension clips or an approved plastic insulator at each floor or ceiling penetration, and every four feet in between.



WARNING!

Suspension clips are required for metal studs and are optional for wood studs.



WARNING!

Use nailing plates to protect tubing from nails and screws where it passes through wood studs.



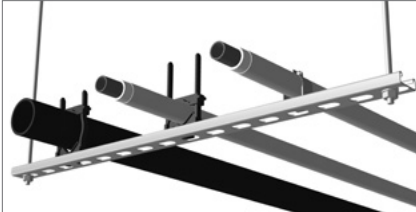
WARNING!

Some model codes may allow greater support spacing intervals for plastic tubing. Always refer to local code for approved spacing requirements that exceed the ones referenced in this manual.

8.4 PEX Hangers

There are several methods for hanging pipe from a ceiling surface that varies based on the construction type being used. Below are some examples of typical methods used with PEX tubing.

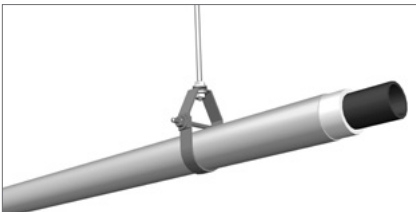
8.4.1 Trapeze Hangers



Typical PEX tubing support for trapeze hanger

Trapeze hangers are typically used for multiple runs of tubing going to a similar location. These are attached to the ceiling by threaded rods using female threaded anchors (in wood or cement) or beam clamps for I-Beam type construction. A variety of clamps are designed for use with PEX tubing that are compatible with Uni-strut supports.

8.4.2 Clevis/Tear Drop Hangers



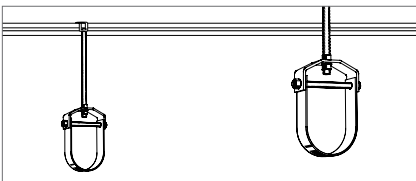
Typical PEX tubing support for clevis hanger

Clevis and/or tear drop hangers are commonly used to support individual runs of piping. These are attached to the ceiling or support beam by a threaded rod with female anchor or beam clamp, respectively. Hangers must have a rubber or foam lining when used with PEX tubing. No lining is necessary with PEX protected with jacketed insulation.

8.4.3 PEX Support Trays

PureFlow PEX support trays are for use with clevis hangers and/or coated ring clamps to help reduce the number of support hangers that are required for hanging PureFlow PEX tubing. These trays are available in 10 ft. lengths for 1" through 2" PureFlow PEX tubing sizes.

8.4.3.1 Installing PEX Support Trays

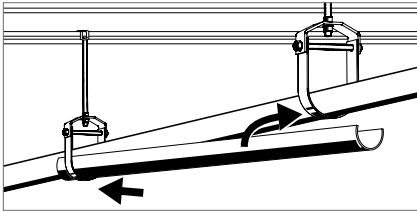


1. Install hangers at recommended spacing per table below.

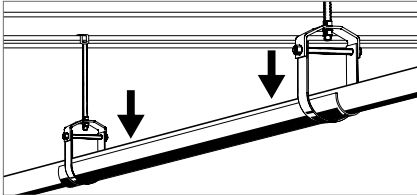
Tubing size	Spacing Intervals				
	Between hangers*	Hanger to end of tray	Between trays	Fitting to tray	Tray overlap**
1"	8' max.	Min. 1 x nominal tube size	32"	2" min.	4" min.
1¼" - 2"	8' max.	Min. 1 x nominal tube size	48"	2" min.	4" min.

*Where trays are installed continuously, it may be necessary to use closer hanger spacing to maintain a consistent hanger interval.

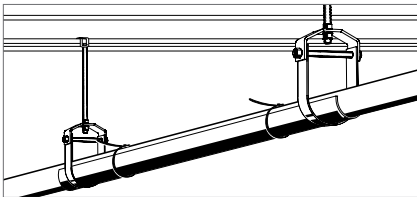
**A maximum of two continuous tray lengths must be used where thermal compensation and/or offsets are required, typically every 50 ft.



2. Install PureFlow PEX tubing. Slide the support trays under the tubing and into the hangers.



3. Snap the tubing into the support trays.



4. Trays must be strapped to the tubing using Viega zip ties (or equivalent) every 48" (two straps for trays less than 48" in length) for clevis and/or tear drop hangers and only once between clamp-type hangers.



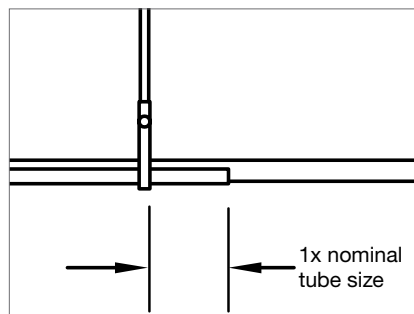
CAUTION!

When using tin snips or a reciprocating saw to trim support trays for shorter tubing runs, be sure to remove any sharp edges prior to installing trays onto the PureFlow PEX tubing.

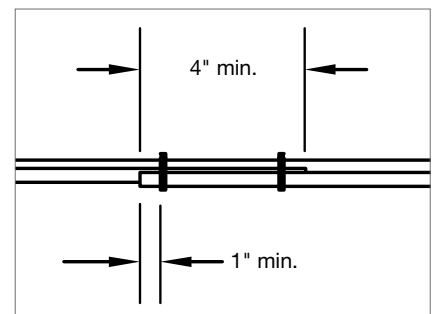


Where space is available, it may be easier to install the support trays on the PEX tubing while on the floor and then install the tubing with trays attached onto the hangers.

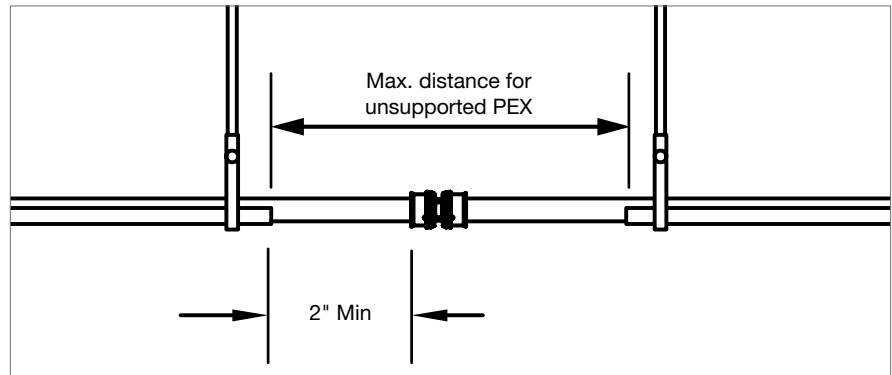
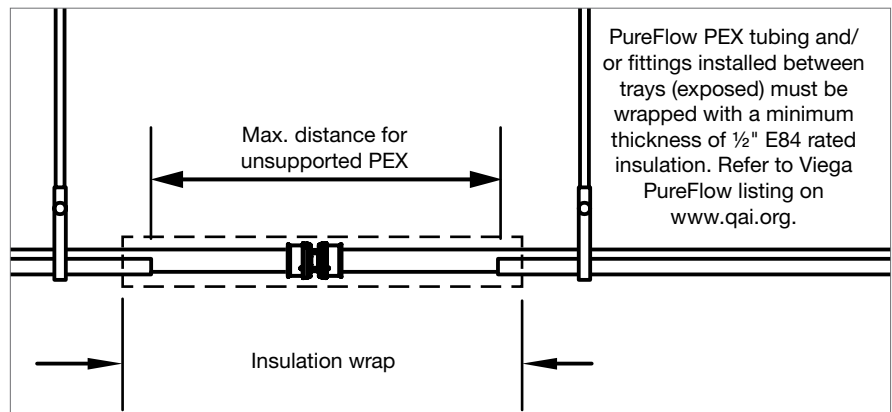
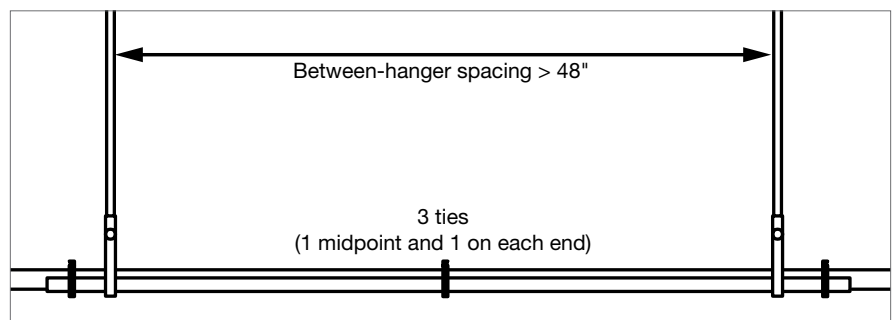
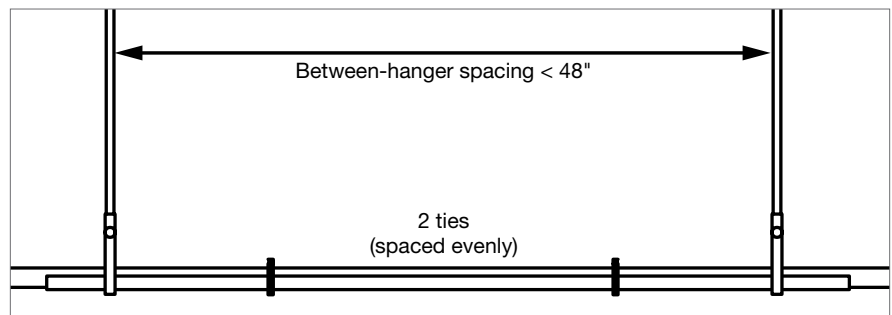
8.4.3.2 Installation Details



Hanger to end of tray



Overlap detail with straps

*Fitting to tray/between trays**Plenum installation**Tray strapping detail 3 ties**Tray strapping detail 2 ties*

8.4.4 Pipe Labels

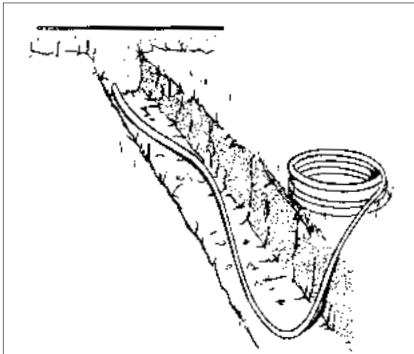
When pipe labels are required, it is acceptable to place flexible, pressure-sensitive stickers directly on Viega PureFlow tubing and/or on jacketed insulation that is installed over the tubing. If label adhesion is an issue, zip ties can be used to assure long-term placement. Refer to local code for required pipe labeling and placement.

9 Water Service Installation

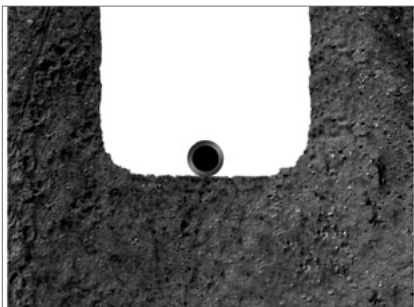
Viega PureFlow and its related fittings are listed to the requirements of AWWA C904 and approved for use in water service applications. Viega offers a variety of threaded, solder, and ProPress adapters to transition PEX to several types of piping materials.

9.1 Below Grade and Service Line

Viega PureFlow PEX tubing may be used underground and for water service piping. When running lines underground, it is important to provide a stable, continuous trench base to support the tubing.

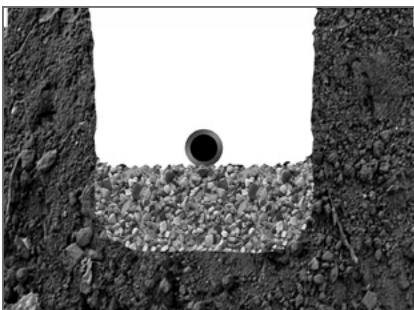


Always allow sufficient slack when tubing is laid in trenches. Snake the tubing slightly side-to-side to provide for contraction due to temperature change.



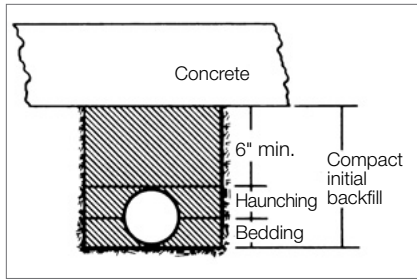
Trench in good soil

Do not use blocking to support tubing. PEX tubing can be damaged by contact with sharp objects. Ensure that trench bottom and fill do not contain sharp rocks or other items. In good soil conditions tubing may be placed directly on trench bottom.



Trench in bad soil

In poor soil conditions (rocky, loose, etc.) the trench should be excavated at least six inches below the tubing level and backfilled with appropriate material to provide a stable base (coarse sand, pea gravel or similar).



Backfill material must be free of large rocks, glass, or other sharp objects. Provide sufficient coverage over tubing so that expected traffic loads will not deform tubing (consult local codes). Compact this material to at least 6" above the tube.

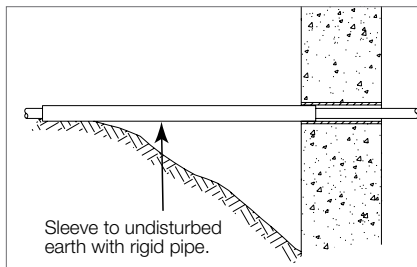
Do not install Viega PureFlow PEX tubing where soil is or may become contaminated with solvents, fuels, or similar chemicals. Do not install tubing above or below septic tanks, leach fields, pits, or cesspools.

Always follow local codes when installing Viega PureFlow PEX tubing. Consult standards such as ASTM D2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping for further information.

9.2 Trace Wire

It is an acceptable practice to use trace wire to assist with the detection of Viega underground piping systems. Refer to local code for minimum wire gauge and material requirements.

9.3 Foundation Penetration



Where service lines penetrate the foundation, to prevent shearing or pinching off of the tube when backfill below the tubing settles, plastic tubing must be properly sleeved.

If there is an area of over-excavation through which the tubing must pass, it must be sleeved with a larger rigid pipe (Schedule 40 PVC or equivalent) to undisturbed earth. The foundation end of the rigid pipe must also be supported by the foundation wall.

Slight over-excavations (12" or less) do not require rigid sleeving when the area below the tubing is back-filled and well compacted to the level of penetration. Always sleeve plastic tubing where it passes through concrete. Do not use oil-based caulks or sealants in contact with tubing.

9.4 Concrete

Viega PureFlow PEX tubing can be installed within concrete slabs. All penetration points must be sleeved to prevent tubing damage (entry/exit points, expansion joints, etc.). Penetrations in walls, etc., may be sealed with silicone caulk. Do not use oil-based caulk. Best practice dictates that only continuous lengths of tubing should be run within the slab. Viega does not recommend the installation of fittings within a slab as part of a design. Fittings should only be used in a slab if they are necessary to make a repair. If the use of fittings buried in concrete are necessary for repairs, all such fittings must be wrapped with insulation, noncorrosive tape (no adhesives), or sleeved to prevent corrosion. The wrap must be a self-fusing, formaldehyde-free, fully cured silicone tape with a minimum of 0.020" thickness. The wrap is available from Viega (part number 15320). Contact a Viega representative for additional information on approved wrapping materials.

When running tubing within a concrete slab, the tubing must be fastened to the reinforcing mesh or rebar every two to three feet to prevent it from floating up while concrete is curing.

9.4.1 Sleeving Requirements

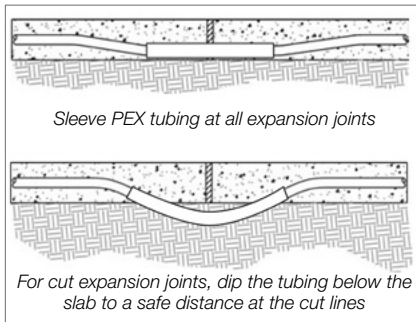
All penetration points of Viega PureFlow PEX tubing run within concrete slabs or walls must be sleeved to protect the tubing from expansion and contraction. Sleeving may consist of a larger piece of plastic tubing or open- or closed-cell insulation with a wall thickness no less than 0.022" thick.

9.4.2 Sealants

Use of a silicone, acrylic or siliconized acrylic caulk may be necessary to seal any voids between PEX tubing and the sleeving material. Most canned expanding foams and open- or closed-cell pipe insulation are also good sealing materials and may be used in direct contact with PEX tubing. **DO NOT use oil-based caulks or closed-cell spray foams.**

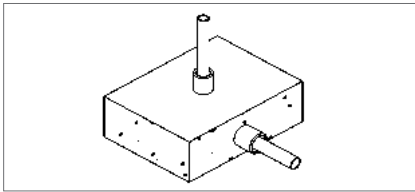
9.5 Installing Under the Slab

When installing Viega PureFlow PEX tubing in the ground under a slab, the tubing should be snaked from side to side in the prepared trench to provide for contraction due to temperature change. The trench bottom should be smooth and free of rocks and debris. Lay the tubing directly on the trench bottom. Tubing must be continuously supported by the trench bottom. Best practice dictates that only continuous runs of tubing should be placed under slabs. Viega does not recommend the installation of fittings under a slab as part of a design. Any connections must be outside the slab or in an access box.

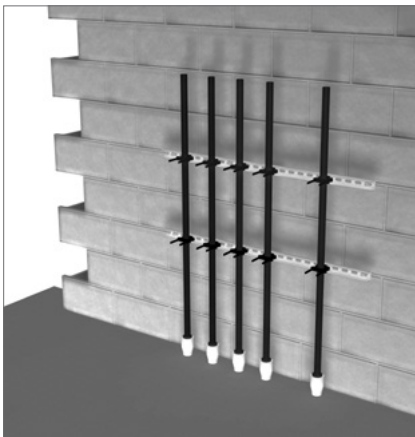
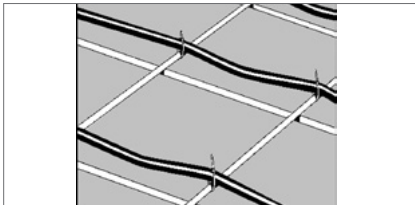


PEX tubing must be sleeved at all expansion joints and every point where it enters, exits, or penetrates the slab. For expansion joints that are to be cut, the tubing must be dipped below the slab to prevent damage.

Elbow sleeves protect tubing at concrete slab penetrations.

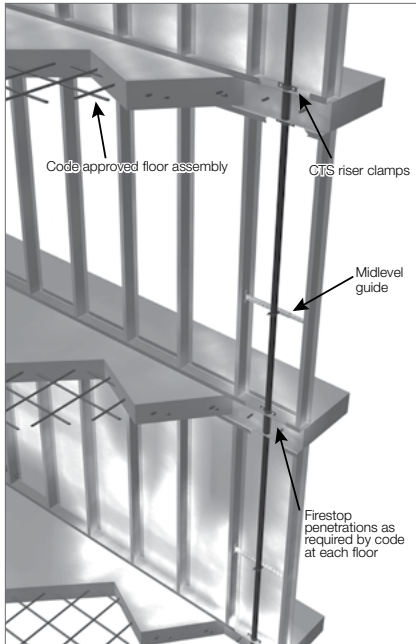


Tubing must be fastened to the reinforcing mesh on rebar with the use of plastic zip ties.



Water service tubing through slab

9.6 PEX Risers



Viega PureFlow tubing can be used as a riser to supply multiple floors with hot and cold water. To help control thermal expansion between multiple floors you should use a mid-level guide at every floor and riser clamps at the following intervals:

Hot lines

Use clamps above and below floor every other floor with a single clamp above the floor in between.

Cold lines

Use clamps above and below floor every fourth floor with a single clamp above floor each floor between.

9.6.1 Support

There are a variety of clamps and hangers to support PEX tubing risers to support members or wall surfaces. Always use products designed for use with plastic tubing that have no sharp edges or can potentially flatten or crush PEX tubing.

9.6.2 Clamps



Viega offers two types of multi clips that will fit up to 2" PEX tubing. One is designed to mount to a wall surface and comes with a mounting screw. The other type is designed to insert into a Uni-strut support bar. Lock clips, tubing insulators, and suspension clips are also available for use with PEX tubing. Ring clamps, clevis, or tear drop hangers must have a rubber or protective lining when used with PEX tubing.

9.7 Fire-resistant Construction

9.7.1 US Listings

9.7.1.1 Plenum Rating

Viega PureFlow PEX tubing has been tested and listed to the ASTM E84 with the following ratings:

ASTM E84 Plenum Ratings/Listing				
Manufacturer	Products listed	Flame spread	Smoke development	Limitations
Viega	¾" to 2" PEX	25 or less	50 or less	½" minimum insulation thickness, no spacing limitations

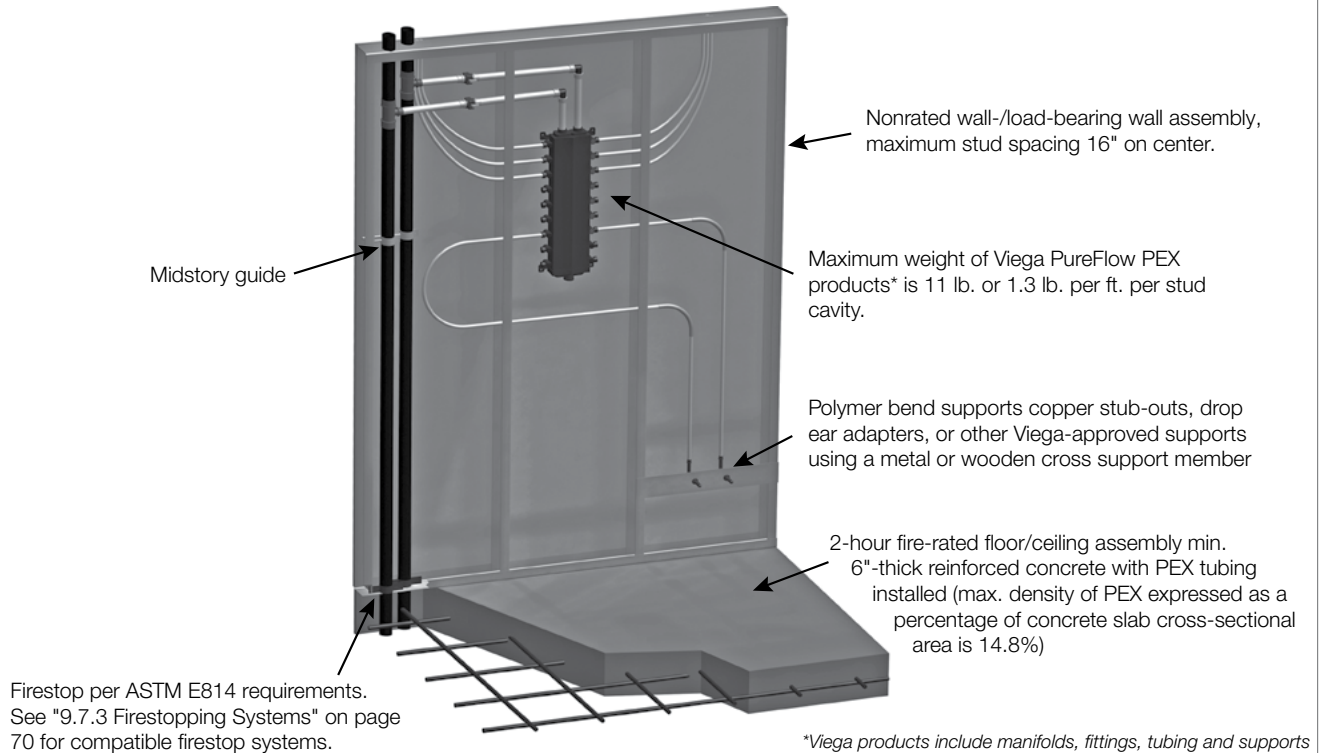
Listings include fitting connections in line when covered by insulation.

9.7.1.2 Fire-resistant Construction

ANSI/UL 263 and ASTM E119		
Construction type	Assembly type	Design number
Wood frame construction	Floor/ceiling	M517
	Walls	VL/FWDP 60-01
Noncombustible concrete/steel construction	Floor/ceiling	VL/FWDP 120-01
	Walls	VL/FWDP 120-02
		VL/FWDP 60-02

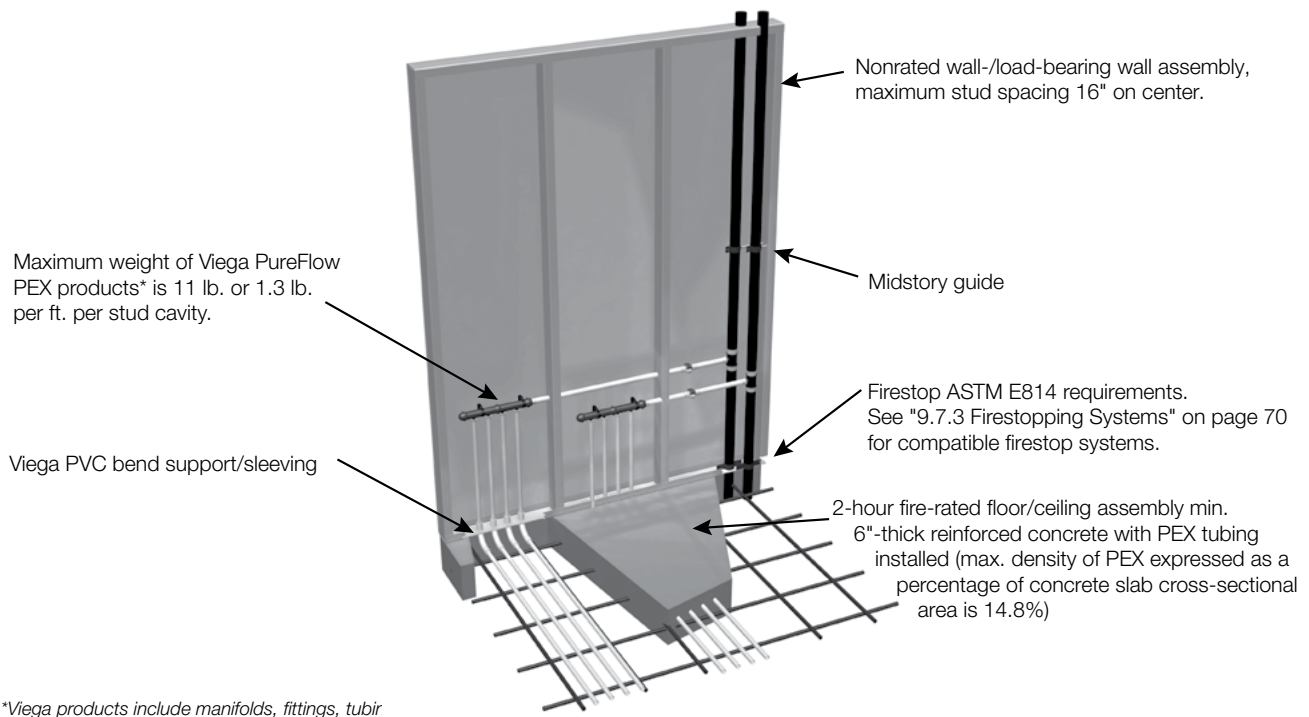
US: Wood-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – ANSI/UL 263

ITS Design No. VL/FWDP 60-01; ITS Design No. VL/FWDP 120-01

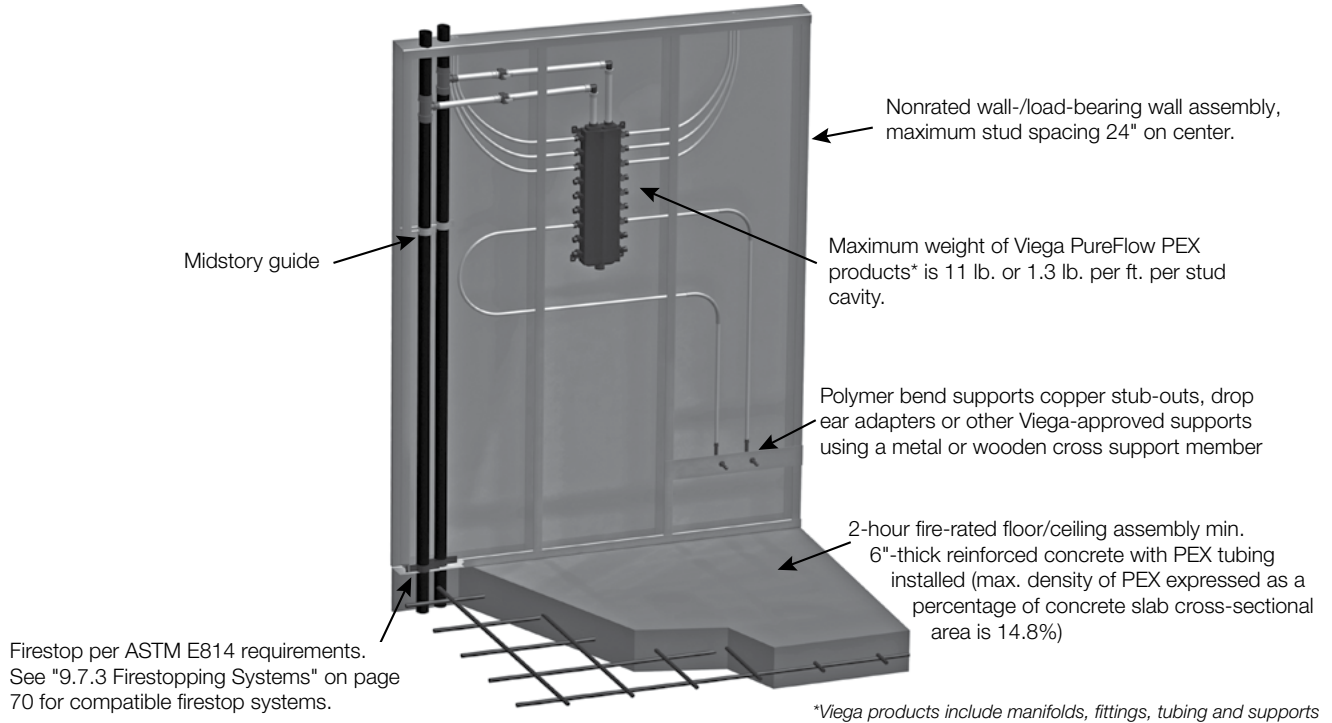


US: Wood-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – ANSI/UL 263

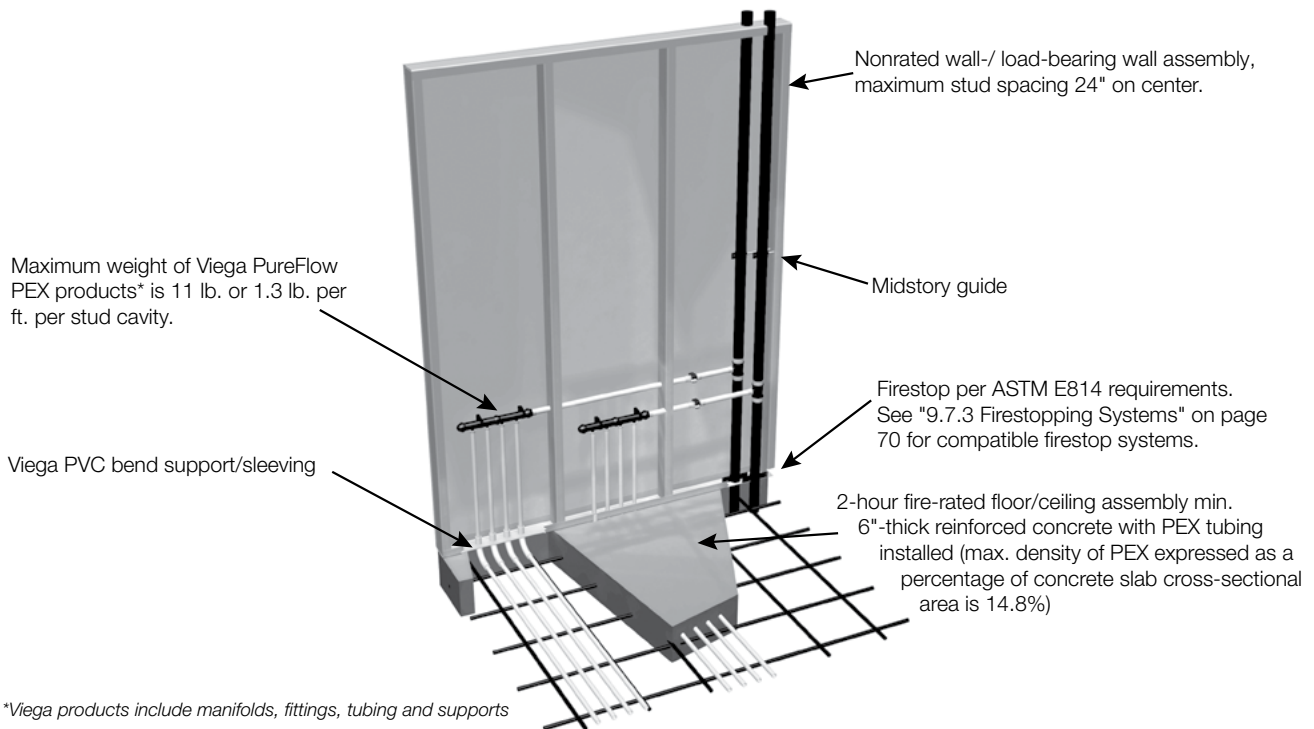
ITS Design No. VL/FWDP 60-01; ITS Design No. VL/FWDP 120-01



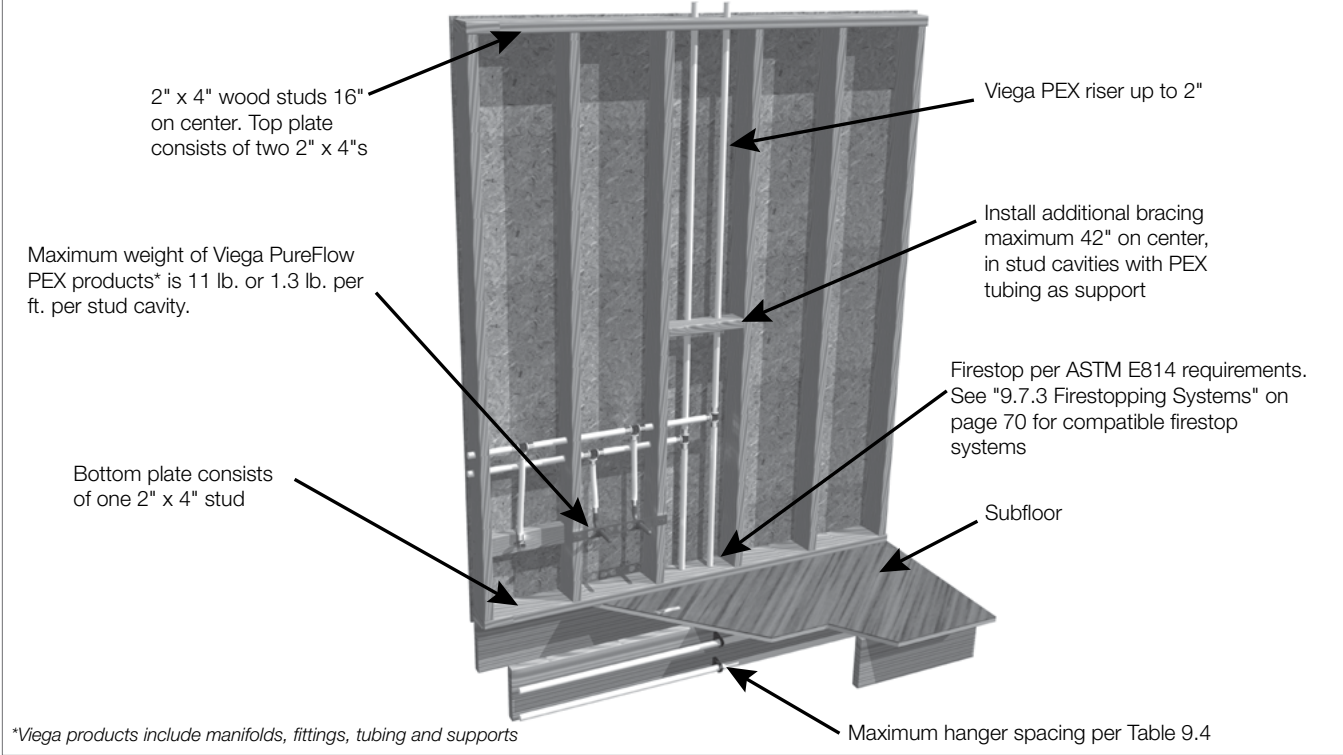
US: Steel-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – ANSI/UL 263
ITS Design No. VL/FWDP 60-02; ITS Design No. VL/FWDP 120-01



US: Steel-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – ANSI/UL 263
ITS Design No. VL/FWDP 60-02; ITS Design No. VL/FWDP 120-01



US: Wood-Stud Wall Assembly and Wood Floor/Ceiling Assembly – ANSI/UL 263
ITS Design No. VL/FWDP 60-01; UL Design No. M517



9.7.2 Canadian Listings

9.7.2.1 Plenum Rating

Viega PureFlow PEX has the following listings for each respective construction type:

CAN/ULC S102.2 Plenum Ratings/Listings				
Manufacturer	Products listed	Flame spread	Smoke development	Limitations
Viega	3/8" to 2" PEX	25 or less	50 or less	1/2" minimum insulation thickness, no spacing limitations
Viega	3/8" to 2" PEX	25 or less	50 or less	No spacing limitations

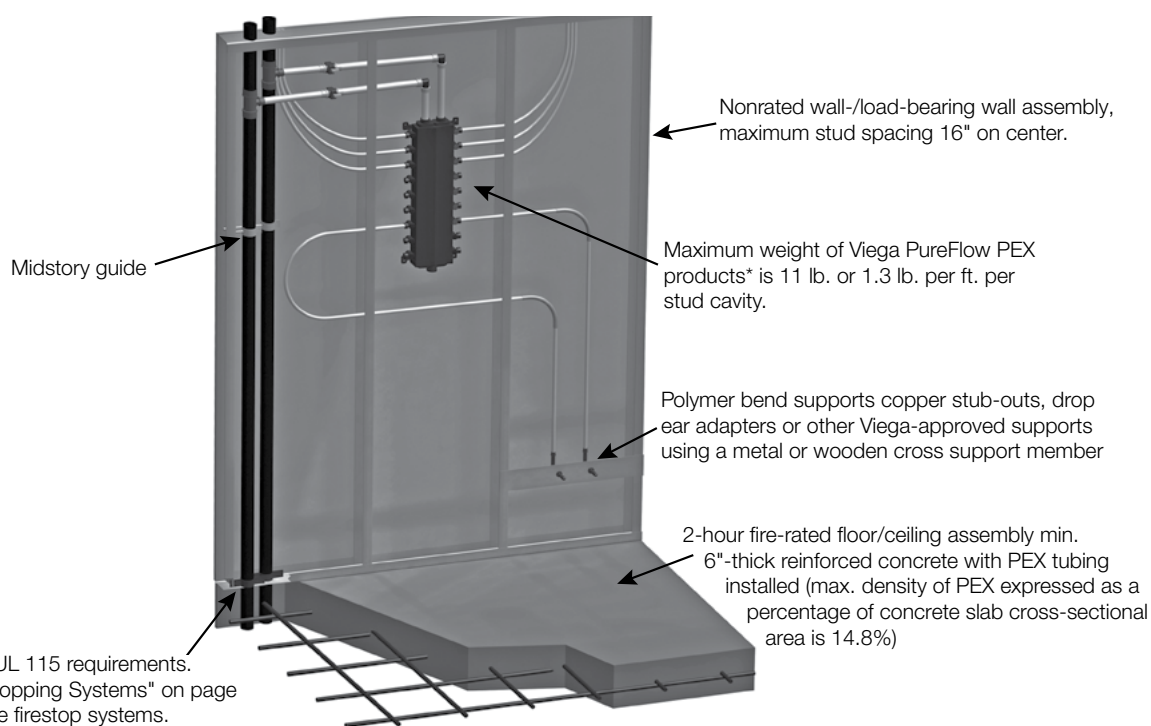
Listings include fitting connections in line when covered by insulation.

9.7.2.2 Fire Resistant Construction

Viega PureFlow PEX tubing has been tested and listed to the CAN/ULC S102.2 with the following ratings:

CAN/ULC - S101		
Construction type	Assembly type	Design number
Wood frame construction	Floor/ceiling	M522
	Walls	VL/FWDP 60-01
Noncombustible concrete/steel construction	Floor/ceiling	VL/FWDP 120-01
		VL/FWDP 120-02
	Walls	VL/FWDP 60-02

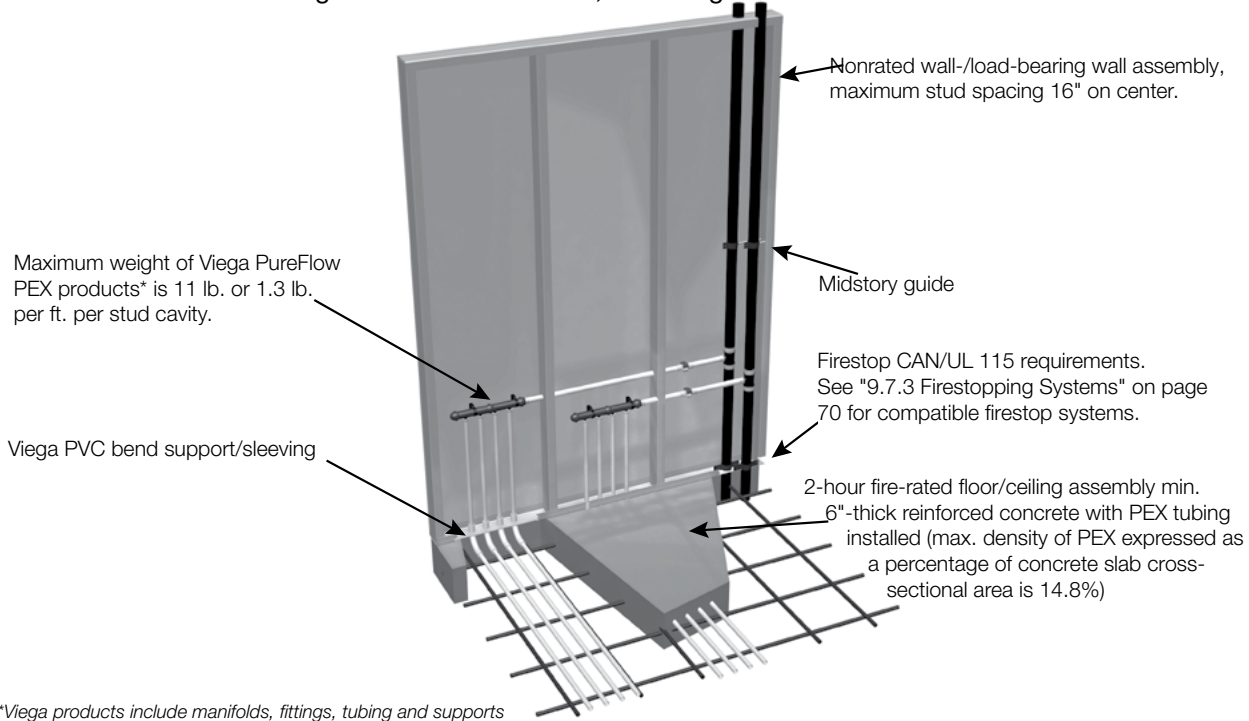
Canada: Wood-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – CAN/ULC S101 ITS Design No. VL/FWDP 60-01; ITS Design No. VL/FWDP 120-01



*Viega products include manifolds, fittings, tubing and supports

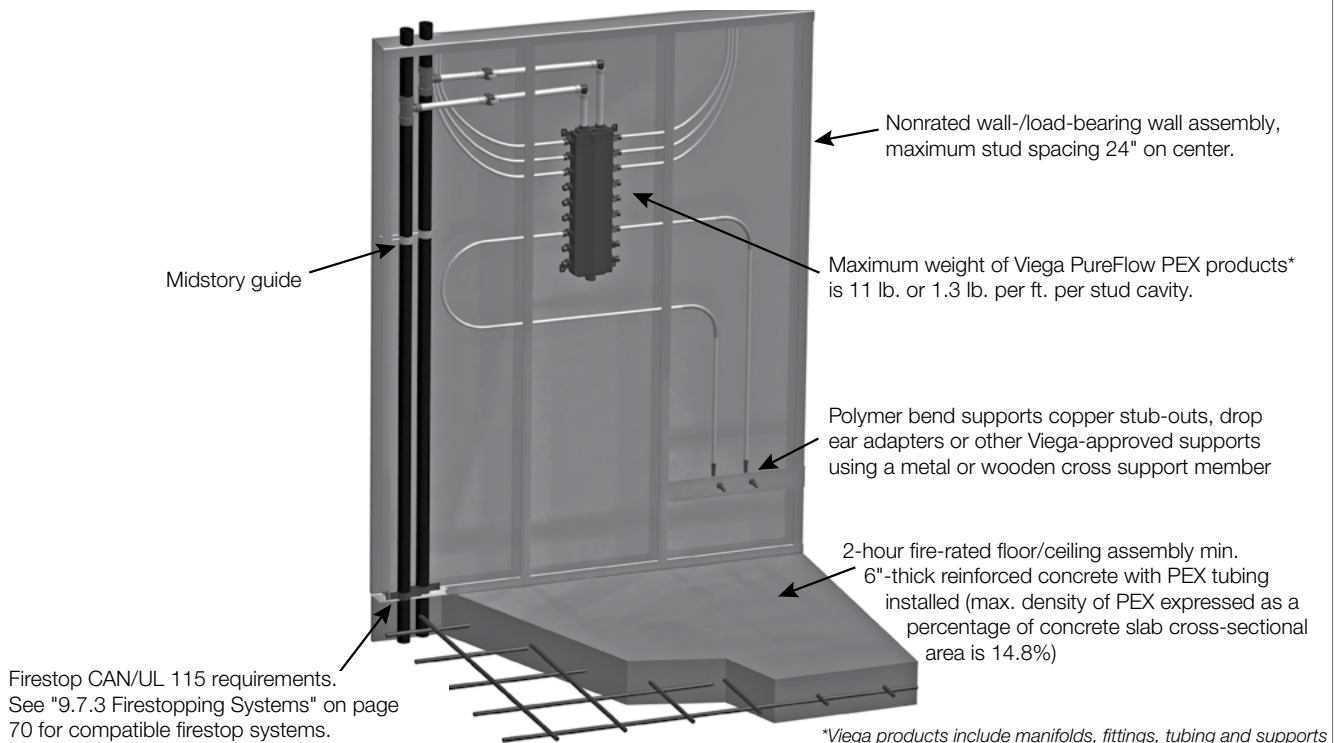
Canada: Wood-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – CAN/ULC S101

ITS Design No. VL/FWDP 60-01; ITS Design No. VL/FWDP 120-01



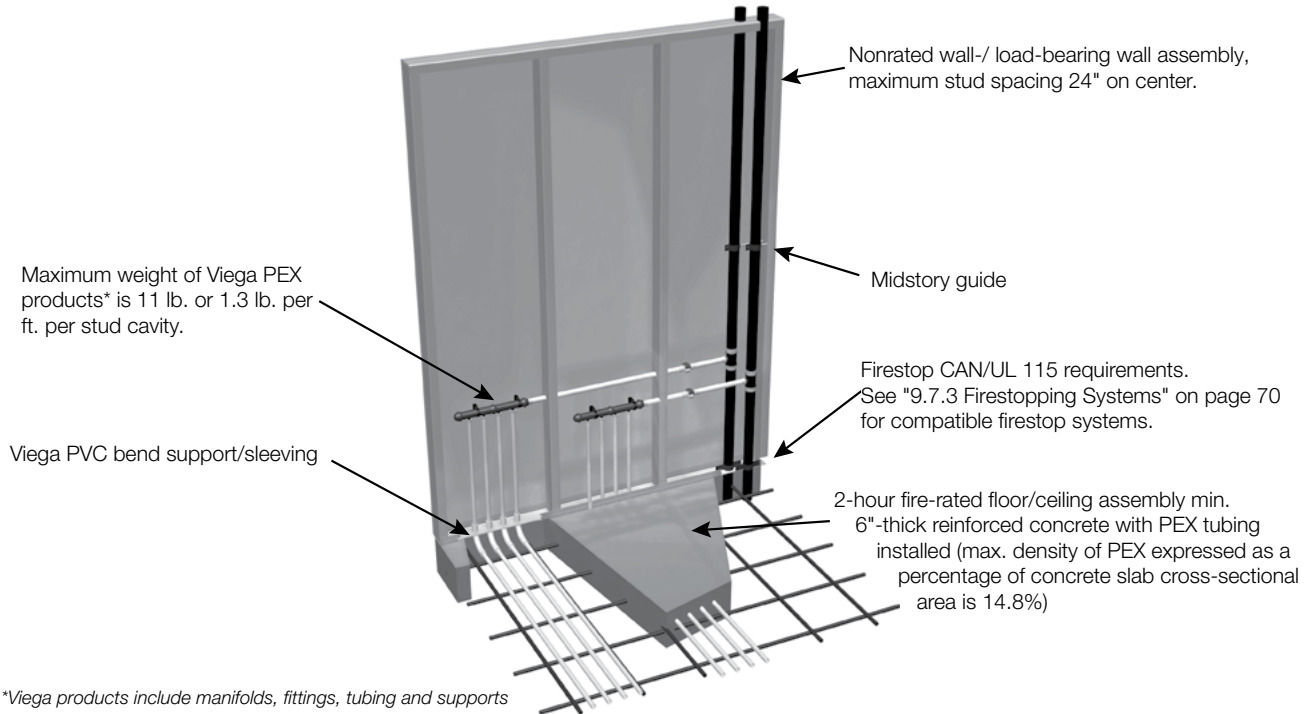
Canada: Steel-Stud Wall Assembly and Concrete Floor/Ceiling Assembly – CAN/ULC S101

ITS Design No. VL/FWDP 60-02; ITS Design No. VL/FWDP 120-01



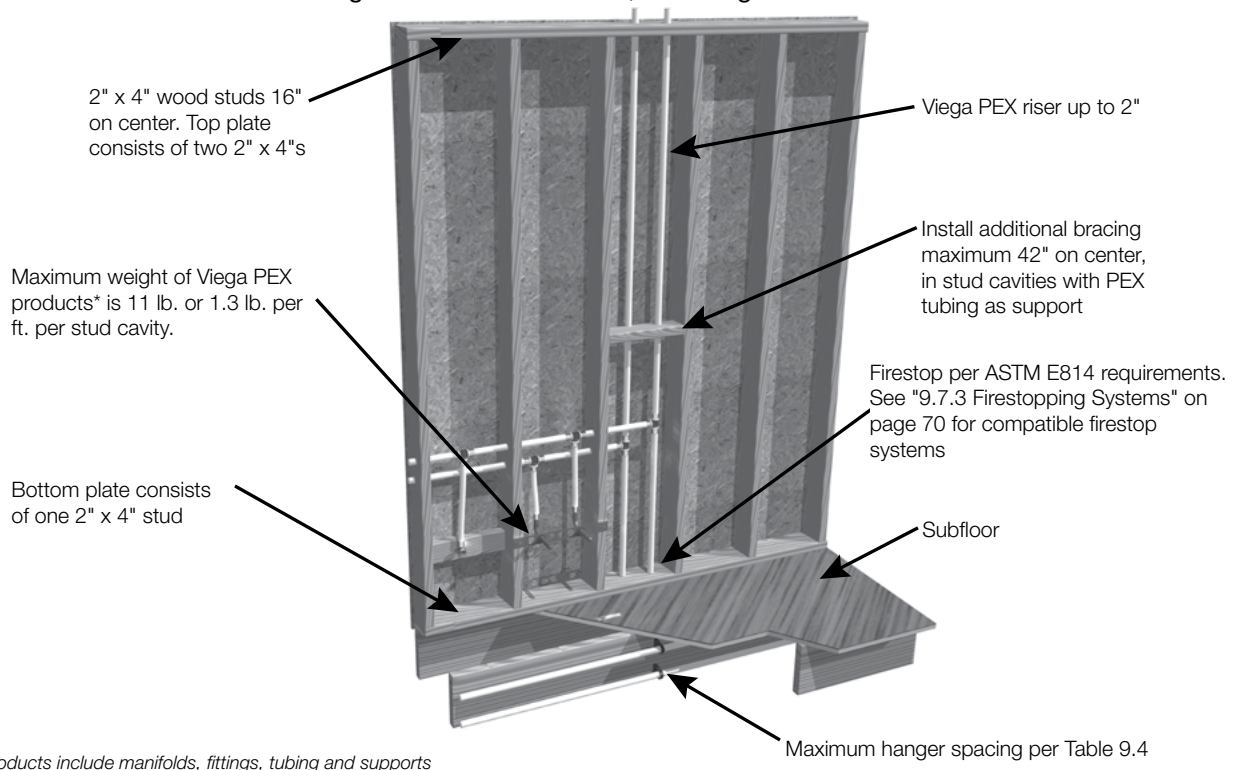
Canada: Steel-Stud Wall Assembly and Concrete Floor/Ceiling Assembly - CAN/ULC S101

ITS Design No. VL/FWDP 60-02; ITS Design No. VL/FWDP 120-01



Canada: Wood-Stud Wall Assembly and Wood Floor/Ceiling Assembly - CAN/ULC S101

ITS Design No. VL/FWDP 60-01; UL Design No. M522



9.7.3 Firestopping Systems

9.7.3.1 Caulking

Most building codes require the use of a firestopping compound when tubing penetrates a fire-rated wall. There are a number of firestopping compounds identified as water based, acrylic, or latex that have been listed for use with PureFlow PEX tubing. The information provided on firestopping is to assist users in selecting a firestop compound for use with Viega PureFlow PEX tubing and is not intended as a warranty of these compounds or an endorsement of their use. The firestop materials listed below are known to have been third-party tested with PEX tubing. It is the responsibility of the user to determine the suitability of these or any products for the intended application and to install the compounds in accordance with the product's installation instructions.

Assembly types		RectorSeal® Caulking					
		Wall	Caulk	Tube size	Floor/ceiling	Caulk	Tube size
Wood-stud/steel-stud assemblies	1-hour	W-L-2121	MC Wrap	1"	F-C-2192	MC 1000	1"
		W-L-2209	MC 1000	1"	F-C-2212	MC 150+	1"
		W-L-2262	MC 150+	1"	F-C-2329	MC 150+	1"
		W-L-2342	MC 1000	2"	F-C-2298	MC 1000	1"
		W-L-2373	MC 150+	1"	F-C-8015	MC pipe collar	1"
		W-L-2402	MC 1000	1"	F-C-8039	MC 350i	1"
		W-L-2430	MC 1000	2"			
		W-L-2457	MC 350i	2"			
	2-hour	W-L-2121	MC Wrap	1"			
		W-L-2209	MC 1000	1"			
		W-L-2262	MC 150+	1"			
		W-L-2342	MC 1000	2"			
		W-L-2373	MC 150+	1"			
		W-L-2402	MC 1000	1"			
		W-L-2430	MC 1000	2"			
		W-L-2457	MC 350i	2"			
Concrete assemblies	2-hour	W-J-2025	MC 1000	1"	F-A-2171	MC 1000	1½"
		W-J-2122	MC 1000	1"			
		W-J-2142	MC 150+	1"			
		W-J-2162	MC 1000	1½"			
		W-J-2180	MC 1000	2"			
		W-J-2197	MC 350i	1"			
		C-AJ-2176	MC pipe collar	1"	C-AJ-2176	MC pipe collar	1"
		C-AJ-2628	Sleeve	2"	C-AJ-2628	Sleeve	2"
	3-hour	C-AJ-2119	MC 1000	1"	C-AJ-2119	MC 1000	1"

Assembly types		3M™ Caulking					
		Wall	Caulk	Tube size	Floor/ceiling	Caulk	Tube size
Wood-stud/steel-stud assemblies	1-hour	PHV-120-04	CP 25WB+	1" (x3)	F-C-2039	CP 25WB+	1"
		PHV-120-11	CP 25WB+	1"	F-C-2240	CP 25WB+	1"
		W-L-2091	CP 25WB+	1"	F-C-2343	CP 25WB+	1/2"
		W-L-2146	CP 25WB+	1" multiple	F-C-2344	CP 25WB+	1/2" (x2)
		W-L-2173	FB1000NS	3/4"	F-C-2391	CP 25WB+	2"
		W-L-2448	CP 25WB+	2"	F-E-2002	CP 25WB+	1"
		W-L-2483	CP 25WB+	1"	F-E-2012	CP 25WB+	1"
		W-L-2543	FB-3000 WT	2"	F-E-2040	CP 25WB+	2"
		W-L-2547	CP 25WB+	2"	PHV-120-04	CP 25WB+	1" (x3)
	2-hour	PHV-120-04	CP 25WB+	3"	PHV-120-04	CP 25WB+	3"
		PHV-120-11		1"			
		W-L-2090	FB-3000 WT	1"			
		W-L-2091	CP 25WB+	1"			
		W-L-2146	CP 25WB+	1" multiple			
		W-L-2448	CP 25WB+	2"			
		W-L-2483	CP 25WB+	1"			
		W-L-2543	FB-3000 WT	2"			
		W-L-2547	CP 25WB+	2"			
Concrete assemblies	2-hour	C-AJ-2510	FB-3000 WT	2"	C-AJ-2510	FB-3000 WT	2"
		C-AJ-2536	CP 25WB+	2"	C-AJ-2536	CP 25WB+	2"
		PHV-120-04	CP 25WB+	1" (x3)	F-A-2115	FB-3000 WT	1" (x3)
		PHV-120-11	CP 25WB+	1"	PH-120-10	CP 25WB+	1"
		C-AJ-2213	CP 25WB+	1"	PHV-120-04	CP 25WB+	1" (x3)
		C-AJ-2378	CP 25WB+	1"	PHV-120-11	CP 25WB+	1"
		W-J-2110	CP 25WB+	1"			
		W-J-2232	CP 25WB+	2"			

Assembly types		Hilti® Caulking					
		Wall	Caulk	Tube size	Floor/ceiling	Caulk	Tube size
Wood-stud/steel-stud assemblies	1-hour	W-L-2186	FS-ONE	1"	F-C-2081	FS-ONE	1"
		W-L-2235	CP 648 wrap	1"	F-C-2230	FS-ONE/CP 648-E	1"
		W-L-2466	FS-ONE	1"	F-C-2310	FS-ONE	1"
		W-L-2467	FS-ONE	1"	F-C-2334	FS-ONE	1"
		W-L-2474	CP 648 wrap	2"	F-C-8038	FS-ONE/CP 606	multiple
	2-hour				F-C-8044	CP CFS-S SIL SL	multiple
		W-L-2186	FS-ONE	1"	F-C-2081	FS-ONE	1"
		W-L-2235	CP 648 wrap	1"	F-C-2310	FS-ONE	1"
		W-L-2466	FS-ONE	1"			
		W-L-2467	FS-ONE	1"			
Concrete Assemblies	2-hour	W-L-2474	CP 648 wrap	2"			
		C-AJ-2170	FS-ONE	1"	C-AJ-2170	FS-ONE	1"
		C-AJ-2407	FS-ONE	1"	C-AJ-2407	FS-ONE	1"
		C-AJ-2647	FS-ONE	1"	C-AJ-2647	FS-ONE	1"
		W-J-2071	FS-ONE	1"	F-B-2040	CP 680-P/CP	2"
	3-hour				F-B-2041	CP 680-P/CP	2"
					F-A-2142	CP 680-P/CP	½" multiple
		C-BJ-2028	FS-ONE	1"			
		C-BJ-2040	FS-ONE	2"			
		C-BJ-2041	FS-ONE	1"			

9.7.3.2 Support Collar Systems

There are a variety of cast-in place sleeves available when penetrating PEX tubing through floor/ceiling concrete slabs. It is best to contact the manufacturer of these support collar systems for detailed installation information.

For additional installation support and/or assistance with selecting the appropriate firestop system for your application, contact one of the firestop manufacturers listed below:

- Rector Seal®
800-231-3345
<http://www.metacaulk.com/>
- Hilti
800-879-8000
<https://www.us.hilti.com/firestop>
- 3M Fire Protection Products
800-328-1687
http://solutions.3m.com/wps/portal/3M/en_US/fire-protection-systems-NA/firestop/

10 Pressure Testing Viega PureFlow Systems

10.1 General

Upon the completion of installing a Viega PureFlow plumbing system, a hydrostatic (potable water) pressure test must be conducted. If potable water is not available, or the potential for a freezing condition exists, pneumatic* (air or nitrogen) testing and/or the use of an RV antifreeze** solution are also acceptable methods for pressure testing.

* Use air testing only if approved by local code or the Authority Having Jurisdiction (AHJ)!

** RV antifreeze must be drained and flushed from all portions of the plumbing system prior to consumer use.

Always refer to local plumbing code for pressure testing requirements and approved methods specific to plastic plumbing systems. If none is specified, refer to the "Testing PureFlow Systems (Branch and Main/ ManaBloc)" on page 74 for acceptable methods, test pressures and durations.



ManaBloc Valve Information

Opening a port valve to an empty or unpressurized distribution line may cause valve damage.

To prevent potential valve damage or failure, open the port valves before filling and pressurizing the lines. The force of water rushing to fill an empty line can cause the valve's seal to "clip off," resulting in incomplete sealing or complete valve failure.

CARE must be exercised when opening a port valve to an empty or unpressurized line. The fixture to which the line is connected should be in the OFF position and the valve must be opened slowly until water starts to flow into the line.

DO NOT CONTINUE to open the valve until the line is full and pressurized. Open the valve fully only after the line is up to system pressure. The fixture can then be opened to purge the line of air.

Valve stems are replaceable. Order part number 51602.

**WARNING!**

Water testing must be avoided during freezing conditions. Under no circumstances should the system be tested at temperatures lower than 10°F (-12°C).

**WARNING!**

Follow antifreeze manufacturer's instructions for concentrations. Use only nontoxic antifreeze approved for drinking water systems.



If such a solution is used, the antifreeze solution must be sufficiently concentrated to withstand the lowest temperature encountered while the testing fluid is in the system. Antifreeze solutions should be purged and the system flushed with potable water prior to consumer use.

**WARNING!**

Pressures used in testing can blow unmade or incomplete connections apart with tremendous force.

This force is many times greater when air is used as a test medium. To reduce the risk of personal injury, ensure that all connections are completed before testing. Use only the pressure and time required to determine that the system is leak free.

Testing PureFlow Systems (Branch and Main/ManaBloc)

Test method	Min./max. duration	Max. pressure (psi)	Min. pressure (psi)	Allowable variance (psi)
Water	15 min/1 hr	100	½	NA
Air	15 min/1 hr	100	½	8*

* If the pressure in the system declines more than 8 psi during the 15-minute to one-hour period, re-pressurize the system to the original test pressure and retest. If the system pressure declines more than 8 psi again during the test period, test the distribution line test caps or any other fittings in the system with the approved leak-detect solution.

Note: Some plumbing fixtures may not withstand test pressures greater than 80 psi. Consult fixture manufacturer's instructions for pressure limitations or plug all distribution lines at the fixture end. The system must, at a minimum, withstand the test pressure, without leaking, for a period of 15 minutes.

10.2 Air Testing

Air testing of a Viega PureFlow plumbing system must use the checklist provided to ensure safety.



WARNING!

It is the responsibility of the installer to read and understand the below pressure testing criteria and all safety precautions. Compressed air can store extremely high energy as compared to compressed water systems. Failure to follow these steps could result in personal injury, death and/or property damage.

10.2.1 Preparing for Air Pressure Test

- Notify other trades that air pressure test will be conducted on the plumbing system. Only qualified personnel should be present during the system testing.
- Use only compressed air or nitrogen that is free of any kind of lubricating oils.
- Do not conduct pressure testing overnight or if a large temperature change is anticipated.
- Before pressurizing the system, conduct a visual inspection to ensure proper connections have been made throughout the plumbing system.
- All personnel involved in the pressure testing must wear, at a minimum, eye and hearing protection. It is recommended the person applying the pressure to the system wear a full face shield.
- Only Viega PureFlow plumbing system components (tubing/fittings/manifolds) must be pressure tested. All other system components (water heaters and fixtures) must be isolated from the pressure test.
- Contact the inspector and schedule the pressure test.

10.2.2 Pressurizing the System

- Verify no other trades are present prior to starting the pressure test. Only qualified testing personnel should be present during pressure test.
- Introduce pressure into the system as outlined in the stages below.

Stage 1:

Gradually increase system pressure to 10 psi (approx. 30-second duration).

- Wait for 10 minutes before inspecting pressure gauge.
- If pressure holds steady, continue to Stage 2.
- If pressure falls over the test period, look for potential leaks with an approved leak-detect solution. Once system pressure is completely relieved and the leak is fixed, restart test procedure.

Stage 2:

Gradually increase system pressure to 50 psi (approx. 1-minute duration).

- Wait for 10 minutes before inspecting pressure gauge.
- If pressure holds stable, continue to Stage 3.
- If pressure falls over the test period, look for potential leaks with an approved leak-detect solution. Once system pressure is completely relieved and the leak is fixed, restart testing procedure from beginning.

Stage 3:

Gradually increase system pressure to 100 psi (approx. 1-minute duration).

- Inspect gauge pressure over next 10-minute period to verify pressure has not decreased more than the allowable variance noted in "Testing PureFlow Systems (Branch and Main/ManaBloc)" on page 74.
- If pressure variance allowed is not exceeded, the system test has passed.
- If pressure decreases more than the allowable variance, the test has failed. Apply approved leak-detect solution (see "Leak Detection") on fitting and/or manifold connections to isolate the location of the leak. Once system pressure is completely relieved and the leak is fixed, start testing procedure from beginning.

10.2.3 Completing the Air Test

- Depressurize system.
 - Use of the same safety equipment applies to these steps.
 - Slowly bleed off any remaining air pressure from system (approx. 1-minute duration).
 - Notify other trades the test is complete and work area is safe to occupy.
 - Document the time and date test was completed and the pressure and duration of the test.

10.3 Leak Detection

Viega has identified the leak detect solutions listed below as being compatible for use with Viega PureFlow Press system components. Consult leak detect manufacturer for proper application and product instructions. To determine the compatibility of other leak detect solutions not listed below, contact Viega Technical Services prior to their use.

- megabubble® Leak Detector
- Oatey® All Purpose Leak Detector
- Snoop Liquid Leak Detector

As an alternative leak detect, a mixture of original Palmolive Green™ dishwashing soap (#46100-46200) or Palmolive Ultra™ (#356140 or 46128) mixed with potable water at a ratio of two ounces of soap to one gallon of water (mix Ultra at a ratio of 1.5 ounces per gallon) may be used.



If the solution does not show a leak on any of the caps or fittings, isolate the ManaBloc by turning the valves to the OFF position, repressurize if needed, and apply the same solution to the ManaBloc manifold components.

11 System Disinfection

11.1 General

Public potable water distribution systems today generally require some form of residual disinfection to greatly eliminate or render harmless waterborne pathogens such as E. coli and Legionella. Some commonly used disinfection methods include the use of chlorine, chloramines, and chlorine dioxide at levels not to exceed EPA established levels. These can be used at the water supply/municipality as a primary treatment and within a building as a secondary treatment.

Viega LLC does not recommend use of Viega PureFlow PEX tubing as part of any potable water distribution system in buildings where chlorine dioxide is used as a secondary disinfection or where injection systems using chlorine dioxide are present. This is based on the limited industry data available for the long-term effects of chlorine dioxide on PEX tubing at allowable controlled levels. This does not include the disinfection/commissioning of a new or repaired system.

Local codes may require system disinfection. When no other method is available, follow the time limitations and exposure levels shown below.

1. Use a chlorine solution and one of the exposure durations listed below:

Concentration	Period	Authority
200 ppm	3 hours	IPC/UPC®
50 ppm	24 hours	IPC/UPC®

2. Mix the disinfection solution thoroughly before adding it to the system.
3. The chlorine solution must reach all parts of the system. Open all fixtures (both sides) and flow water until a chlorine smell is present. As an alternative, chlorine test tablets can be used to detect chlorine at each fixture.
4. The chlorine source for the solution can be, but is not limited to, the following:

Chlorine source	% Active chlorine	Form	Amount per 100 gallons of water for 200 ppm solution
Laundry bleach	5.25	Liquid	3 pints (48 oz.)

5. After the solution has been in the system for the time required by the Authority Having Jurisdiction (AHJ) or the exposure durations listed in Step 1, the system must be flushed completely with potable water.
6. The system must be purged or drained of all water or protected from freezing.



Failure to flush the system

To prevent reduced service life of system components, disinfection solutions must not be allowed to stand in the system longer than 24 hours. Thoroughly flush the system with potable water after disinfection.

11.2 California Flushing Requirements

The State of California requires all installations of PEX piping, where it is the initial plumbing system installed in new construction, must be flushed twice over a period of at least one week. The piping system must be first flushed for at least 10 minutes and then filled and allowed to stand for no less than one week, after which all the branches of the piping system must be flushed long enough to fully empty the contained volume. This does not apply to installations of PEX pipe where it replaces an existing tubing system of any material.

At the time of fill, each fixture must have a removable tag, shown below.

This new plumbing system was first filled and flushed on _____ (date)
by _____ (name)

The State of California requires that the system be flushed after standing at least one week after the fill date specified above. If this system is used earlier than one week after the fill date, the water must be allowed to run for at least two minutes prior to use for human consumption.

This tag may not be removed prior to the completion of the required second flushing, except by the building owner or occupant.

12 Installer Checklist

In the event there is a conflict between the contents of this list or any applicable code, the code or the instructions, whichever is more restrictive, shall govern.

Tubing Markings

- ASTM F876 Crosslinked polyethylene (PEX) tubing.
- ASTM F877 Crosslinked polyethylene distribution systems (connection listed with manufacturer-supplied fitting and PEX tubing).

Fitting Markings

- ASTM F877 Crosslinked polyethylene distribution systems (connection listed with manufacturer-supplied fitting and PEX tubing).

Joints and Connections

- Tube end cuts must be cut square and free of burrs.
- Connection must be assembled per manufacturer's product instructions.
- Incorrectly assembled fittings must be cut out and replaced.

General Installation Recommendations

- Contraction: allow $\frac{1}{8}$ " slack per foot of PEX tubing.
- PEX may be loosely bundled (NOT TAPED).
- Do not bend PEX tubing tighter than the manufacturer's recommended minimum bending radius.
- Install minimum 18" of metallic or other approved material piping between gas water heater and PEX tubing connections.
- PEX must be free of gouges, cuts, deep scratches, tar, kinks, grease, flux, and fading or discoloration.
- Protective sleeves or bushings must be used with metal studs.
- Use clamps or straps at the required minimum "L" spacing between a tubing bend and PEX connections.
- Minimum horizontal support must be per the table under "8.3 Supporting PureFlow PEX Tubing" on page 53.
- Vertical tubing must be supported at every floor and at the midpoint between floors.
- Supports/clamps must not restrict the movement of PEX tubing.
- Supports/clamps must not pinch, cut, kink, or damage tubing.
- Use only hangers and straps recommended for plastic tubing.
- Tubing passing through slabs or foundations must have a protective sleeve.
- Tubing must be protected from nail damage.
- Transition connections must be made with fittings approved for that purpose.
- PEX must be located at least 6" horizontally and 12" vertically from sources of high heat.

Testing

- Test pressure must be at least equal to normal system working pressure, but not less than $\frac{1}{2}$ psi and not greater than 100 psi.
- Test duration must not be less than 15 minutes.
- A slight drop in pressure after two hours is normal.

13 Limited Warranty

13.1 Limited Warranty for Viega PureFlow Water System

Subject to the conditions and limitations in this Limited Warranty, VIEGA LLC (Viega) warrants to the owner of applicable real property in the United States (including its territories) and Canada that the components in its PureFlow Plumbing System (as described below) when properly installed by licensed plumbers in potable water systems, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of twenty-five (25) years from date of installation.

The Viega PureFlow Plumbing System and components covered by this twenty-five (25) year warranty are:

Viega PureFlow crosslinked polyethylene (PEX) tubing installed with PureFlow Press fittings in metal or polymer and PureFlow Press sleeves sold by Viega installed as a system.

Viega PureFlow crosslinked polyethylene (PEX) tubing and ASTM F1807 metal crimp insert fittings sold by Viega and ASTM F2159 Poly alloy crimp fittings sold by Viega installed with copper crimp rings as a system.

Viega warrants that ManaBloc®, MiniBloc, or polymer or metallic manifolds, and their approved connections, sold by Viega and installed as a manifold plumbing system under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of ten (10) years from date of installation.

Power tools and jaws used with PureFlow Press fittings are warranted by the manufacturer and Viega extends no separate warranty on those tools or jaws. Viega warrants that PureFlow Press hand tools sold by Viega, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of two (2) years from date of sale. Viega warrants that PureFlow Crimp hand tools and tubing cutters sold by Viega, under normal conditions of use, shall be free from failure caused by manufacturing defects for a period of twelve (12) months from date of sale.

Viega warrants that properly installed PureFlow lav, closet risers, and riser accessories manufactured and/or sold by Viega shall be free from failure caused by manufacturing defects for a period of two (2) years from date of installation. Viega warrants that properly installed PureFlow valves manufactured and/or sold by Viega shall be free from failure caused by manufacturing defects for a period of five (5) years from date of installation.

Viega does not extend any warranty on its components used in systems with tubing, fittings, manifolds, or press sleeves not sold by Viega or installed by other than a licensed plumber. In addition, the warranty does not apply if distribution lines and their connections to manifold plumbing systems sold by Viega are not Viega Pureflow PEX tubing or approved connections sold by Viega.

Connection to non-Viega plumbing products intended for riser and/or water service applications does not void the system warranty provided all pipe, fittings, valves, and manifolds are sold by Viega after the transition location.

Termination connections to non-Viega end-use devices or equipment such as filtration, water softeners, shower valves, faucets, stops, and other such devices, when utilizing Viega PureFlow PEX does not void the system warranty as described.

Under this limited warranty, you only have a right to reimbursement if the failure or leak or resulting damage resulted from a manufacturing defect in the products covered by this warranty and the failure or leak or resulting damage occurred during the warranty period. You do not have a remedy or right of reimbursement under this warranty and the warranty does not apply if the failure or leak or resulting damage is caused by (1) components in the plumbing system other than those manufactured or sold by Viega; (2) not designing, installing, inspecting, testing, or operating the system in accordance with Viega's installation instructions at the time of the installation, applicable code requirements, and good plumbing practices; (3) improper handling and protection of the product prior to and during installation, exposure to ultra violet light, inadequate freeze protection, exposure to water pressures or temperatures in excess of the limitations on the tubing, or application of unauthorized or harmful solvents or chemicals; (4) chemically corrosive or aggressive water conditions; or (5) acts of nature such as earthquakes, fire, flood, or lightning.

In the event of a failure or leak in the system, it is the responsibility of the property owner to obtain and pay for repairs. Only if the warranty applies will Viega be responsible for reimbursement under this warranty. The part or parts which you claim failed should be kept and Viega contacted at the address below or by telephoning 800-976-9819 within thirty (30) days after the failure or leak and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of any claimed bills for which you seek reimbursement. Within a reasonable time after receiving the product, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega and reasonable access to the site of damage in order to determine whether the warranty applies. Viega will notify you of the results of this review.

In the event that Viega determines that the failure or leak and any resulting damages were the result of a manufacturing defect in the products covered by the 10-year or 25-year limited warranties and occurred during the first ten (10) years covered by this warranty, Viega will reimburse the property owner for reasonable repair or replacement charges to include drywall, flooring, and painting costs, as well as damages to personal property, resulting from the failure or leak. The remaining 15-year limited warranty for products covered by the 25-year limited warranty will cover material costs for pipe and fittings only, sold by Viega, not inclusive of any labor or installation costs. Any change in property ownership after the first ten years will nullify any remaining warranty coverage.

VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL ECONOMIC LOSS DAMAGES UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

THE ABOVE LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IF FOUND APPLICABLE, ANY IMPLIED WARRANTIES ARE LIMITED TO THE DURATION OF THE TIME LIMITS SET OUT IN THIS WRITTEN WARRANTY. Other than this limited warranty, Viega does not authorize any person or firm to create for it any other obligation or liability in connection with its products. This written warranty applies for the first 10 years of the applicable warranty regardless of any change of ownership in the property.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on the duration of implied warranties in certain types of transactions, so the above exclusion or limitations may not apply to you. This limited warranty gives you specific legal rights and you also may have other rights which vary from state to state. This warranty shall be interpreted and applied under the law of the state in which the product is installed.

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IM-PF 573225 0425 PureFlow Commercial Water System

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