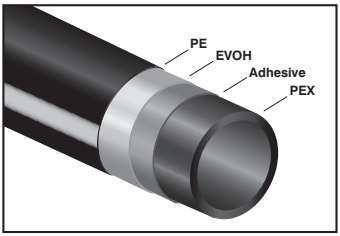
Tubing

Viega offers two types of Oxygen Barrier tubing for use in heating and cooling applications: Viega Barrier PEX tubing and FostaPEX®.

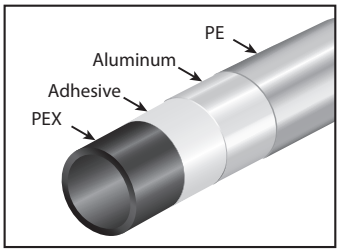
Viega Barrier PEX Tubing

- Is available coiled in sizes 5/16" to 2".
- Is available in straight lengths in sizes ¾" to 2".
- Can be easily identified by its black color and red stripe.
- Has a bend radius of 8x O.D.
- Has a UV exposure rate of six months.
- An uncoiler is typically used with Viega Barrier PEX tubing to keep the PEX tubing manageable and easy to use.
- A PEX tubing cutter must be used to cut Viega Barrier PEX tubing as it makes a straight, clean, burr-free cut.
- For use with heating and cooling applications at ratings of 73.4°F @ 160 psi, 180°F @ 100 psi and 200°F @ 80 psi.
- Has four layers: a layer of PEX, a layer of adhesive, a layer of ethylene vinyl alcohol (EVOH [which limits oxygen permeation]) and an outer layer of polyethylene.
- Viega Barrier PEX tubing is recommended for use with PEX Press fittings. For instructions on making a PEX press connection, please see Page 6.



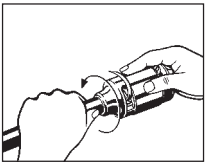
FostaPEX Tubing

- Is available in coils or in straight lengths in sizes from ½" to 1".
- Is available in silver or red.
- Has a bend radius of 8x O.D. or 3.5x O.D. with a Viega pipe bender.
- Has an extended UV exposure period.
- An uncoiler is typically used with coiled FostaPEX tubing to keep the tubing manageable and easy to use.
- A PEX tubing cutter must be used to cut FostaPEX barrier tubing as it makes a straight, clean, burr-free cut.
- A FostaPEX Prep Tool must be used for stripping the aluminum layer before making a connection. (A utility knife should never be used.)
- FostaPEX is for use with heating and cooling systems at ratings of 73.4°F @ 160 psi, 180°F @ 100 psi and 200°F @ 80 psi.
- Has four layers: a layer of PEX, followed by a layer of adhesive, a butt welded aluminum layer (that blocks oxygen permeation) and an outer layer of polyethylene. See below.
- FostaPEX is recommended for use with Viega PEX Press fittings only. For instructions on making a PEX press connection, please see Page 6.

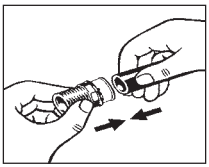


Making a PEX Press Connection

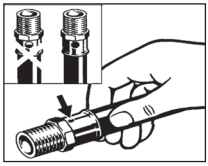
1. Square off tubing to proper length. Uneven, jagged or irregular cuts will produce unsatisfactory connections.



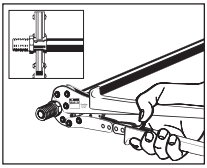
2. If using FostaPEX tubing, insert into prep tool, push and turn until no resistance is felt. If using Viega PEX, continue to Step 3.



3. Insert PEX Press fitting with attached sleeve into tubing and engage fully.

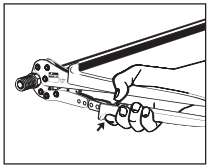


4. Ensure full tubing insertion at view holes in attached press sleeve. Full insertion means tubing must be completely visible in at least two view holes and partially visible in one.

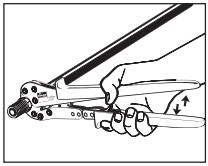


5. Position press tool perpendicular over press sleeve, resting it against the tool locator ring.

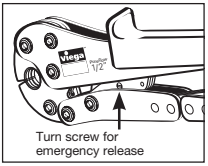
Note: The tool locator ring must be in the factory-installed position while making a press to ensure a consistent leakproof connection. It may be necessary to rotate the tool locator ring to avoid interference between the ring and tool.



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



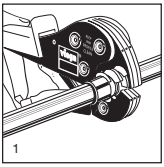
7. Extend handle and continue ratcheting until automatic tool release occurs at proper compression force.

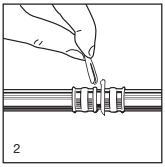


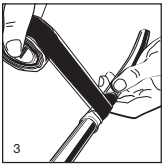
8. **Warning:** The connection is not leakproof when the tool has been opened by emergency release. The tool locator ring must be present to ensure a proper PEX Press connection.

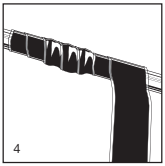
After making an in-slab or underground fitting connection, be sure to protect the fitting with pipe wrap prior to concealing the connection.

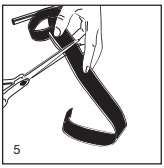
Viega PEX Repair Coupling Wrap

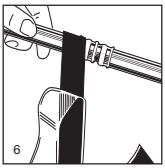


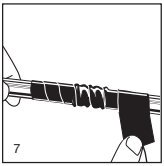












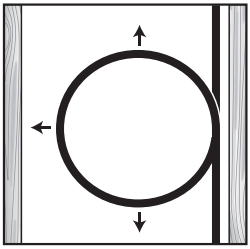
Repair coupling wrap (tape) is a self-sealing, silicone-based product designed to protect Viega PEX Press fittings from the corrosive nature of concrete. After making an in-slab fitting connection, protect the fitting with fitting wrap prior to embedding it in concrete.

1. Press fitting as per Viega's PEX Press Product Instructions.
2. If using a fitting with removable tool locator rings, remove them, otherwise they will remain in place.
3. Leave the protective film in place as you measure the amount of tape required to completely wrap and seal the fitting.
4. Measure by completely covering the fitting with tape. Overlap each row by ½" and run the wrap out over the end of the fitting and onto the tubing by 1" minimum.
5. Cut required length of tape.
6. Carefully wrap fitting with tape, removing protective film as fitting is wrapped.
7. Ensure that the fitting is completely covered.

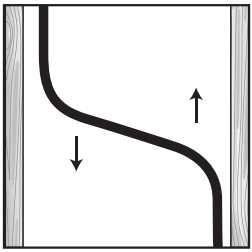
Note: The fitting wrap will bond within two minutes and create a permanent bond within 24 hours. The concrete pour will not affect the sealant's bonding process.

PEX Expansion Compensation

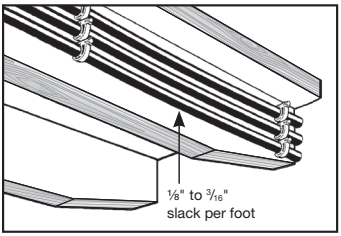
Viega Barrier PEX tubing, as with any PEX tubing, expands and contracts with temperature changes in the environment or the fluid inside the tubing. The longer the tubing run and the higher the temperature change, the more linear expansion the system will experience. This expansion and contraction can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



Using a loop to accommodate tubing expansion.



Offsets also provide room for tubing expansion.

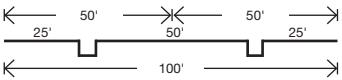


Allow some slack in all runs to prevent damage from tubing contraction.

Tubing sizes smaller than ¾" generally do not require expansion compensators with fittings and can easily be bent into loops and offsets to absorb linear expansion.

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 ft. apart.

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



There are three types of expansion offsets recommended for use with large-diameter PEX tubing: the corner expansion offset, the Z-type expansion offset and the U-type expansion loop. Descriptions, illustrations and dimensional charts for each type of offset are located in the following pages.

Tubing Fasteners:

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, as an expansion compensator will not be effective if the fasteners prevent linear movement of the piping system.

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

$$\Delta L = \frac{\text{PEX expansion rate}}{100' \times 10°F} \times \Delta T \times \text{tubing length ft}$$

Where:

Viega Barrier PEX tubing expansion rate = 0.96" per 100' per 10°F

ΔT = Change in temperature (in °F)

For example:
40' of 1" Viega Barrier PEX tubing going from 70°F to 130°F

$$\Delta L = \frac{0.96"}{1000} \times 60° \times 40' = 2.30"$$

$\Delta L = 2.30"$

Compensation Distance:
To calculate the dimensions of the expansion compensation offset needed, use the following formula:
$L = C\sqrt{OD \times \Delta L}$

Where:
L = length of compensation distance
C = 12 (PEX material specific constant)
OD = outer tubing diameter (⅛" + nominal tube size)
ΔL = change in length from temperature change

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

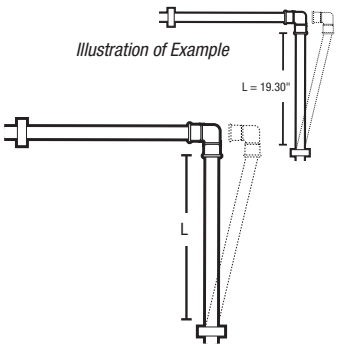
Calculate the necessary "L" dimension between elbow and nearest fastener or use the chart below, which was figured using the maximum run for a single expansion compensator (50 ft.).

Following the previous example:
$L = C\sqrt{OD \times \Delta L}$

Where:
C = 12
OD = 1.125 (1" PEX)
$\Delta L = 2.30"$

$L = 12\sqrt{1.125" \times 2.30"} = 19.30"$

$L = 19.30"$



Corner Expansion Offset (L, in) per 50 linear feet of run									
Tubing	ΔT(°F) / Tube nom.	60	80	100	120	140	160	180	200
Viega Barrier PEX	¾"	19.0	22.0	24.6	26.9	29.1	31.1	33.0	34.8
	1"	21.6	24.9	27.9	30.5	33.0	35.3	37.4	39.4
	1¼"	23.9	27.6	30.8	33.8	36.5	39.0	41.4	43.6
	1½"	26.0	30.0	33.5	36.7	39.7	42.4	45.0	47.4
	2"	29.7	34.3	38.3	42.0	45.3	48.5	51.4	54.2

Note: This chart was figured using the maximum run for a single expansion compensator (50 ft.). Refer to Viega installation manuals for recommended operating temperatures, pressures, tubing fasteners and fastener spacing.

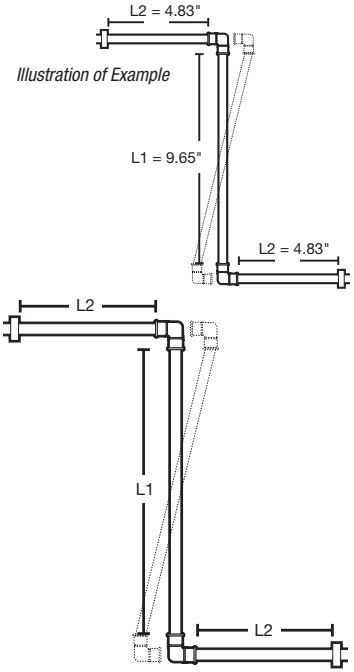
Z-type Expansion Offset:
The Z-type expansion offset integrates two 90° elbows that form a "Z" pattern.

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 ft.).

L = 19.30"
L1 = ½ (L)
L1 = 19.30"/2 = 9.65"
L1 = 9.65"

L2 = ¼ (L)
L2 = 19.30"/4 = 4.83"
L2 = 4.83"



Z-Type Expansion Offset (in) 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 Barrier PEX	¾"	9.5	4.8	11.0	5.5	12.3	6.1	13.5	6.7	14.5	7.3	15.6	7.8	16.5	8.2	17.4	8.7
	1"	10.8	5.4	12.5	6.2	14.0	7.0	15.3	7.6	16.5	8.2	17.6	8.8	18.7	9.4	19.7	9.9
	1¼"	11.9	5.9	13.8	6.9	15.4	7.7	16.9	8.4	18.2	9.1	19.5	9.7	20.7	10.3	21.8	10.9
	1½"	13.0	6.5	15.0	7.5	16.8	8.4	18.4	9.1	19.8	9.9	21.2	10.6	22.5	11.2	23.7	11.8
	2"	14.8	7.4	17.1	8.6	19.2	9.58	21.0	10.5	22.7	11.3	24.2	12.1	25.7	12.9	27.1	13.5

Note: This chart was figured using the maximum run for a single expansion compensator (50 ft.). Refer to Viega installation manuals for recommended operating temperatures, pressures, tubing fasteners and fastener spacing.

U-type Expansion Loop:

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

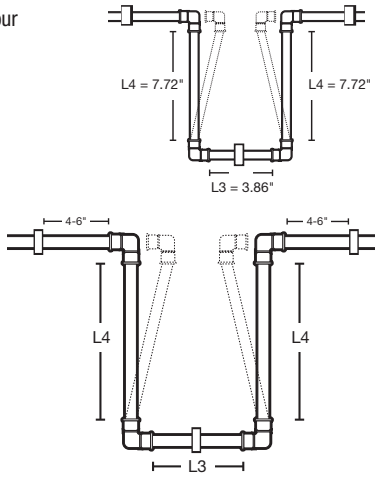
With this arrangement ⅕ of the "L" dimension is applied as the width (represented as L3) while ⅖ of "L" is applied as each leg in the other dimension (represented as L4).

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 ft.).

L = 19.30"
L3 = ⅕ (L)
L3 = 19.30"/5 = 3.86"
L3 = 3.86"

L4 = ⅖ (L)
L4 = 2(19.30")/5 = 7.72"
L4 = 7.72"

Illustration of Example



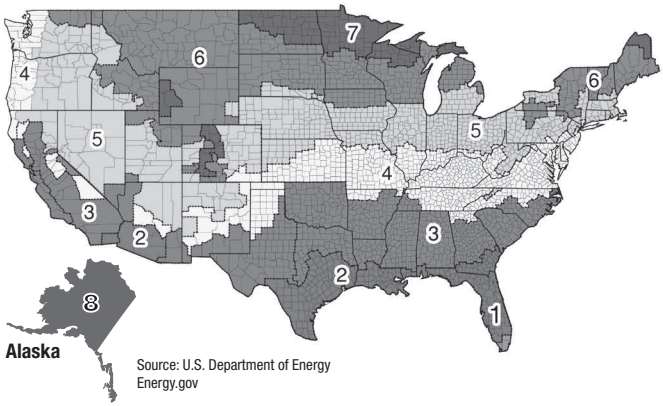
The fastener shown on the L3 leg may be required to provide additional support depending on how the expansion loop is installed (horizontal / vertical).

U-Type Expansion Loop (in) per 50 linear feet of run																	
Tubing	ΔT(°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 Barrier PEX	¾"	3.8	7.6	4.4	8.8	4.9	9.8	5.4	10.8	5.8	11.6	6.2	12.4	6.6	13.2	7.0	13.9
	1"	4.3	8.6	5.0	10.0	5.6	11.2	6.1	12.2	6.6	13.2	7.1	14.1	7.5	15.0	7.9	15.8
	1¼"	4.8	9.6	5.5	11.0	6.2	12.3	6.8	13.5	7.3	14.6	7.8	15.6	8.3	16.5	8.7	17.4
	1½"	5.2	10.4	6.0	12.0	6.7	13.4	7.3	14.7	7.9	15.9	8.5	17.0	9.0	18.0	9.5	19.0
	2"	5.9	11.9	6.9	13.7	7.7	15.3	8.4	16.8	9.1	18.1	9.7	19.4	10.3	20.6	10.8	21.7

Note: This chart was figured using the maximum run for a single expansion compensator (50 ft.). Refer to Viega installation manuals for recommended operating temperatures, pressures, tubing fasteners and fastener spacing.

Insulation Recommendations

Before getting started, refer to the table below to ensure the proper amount of insulation is provided. Refer to the table below for residential installations.



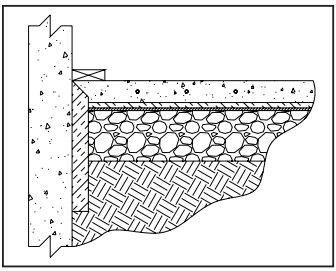
Source: U.S. Department of Energy
Energy.gov

Climate Zone	Slab with Ground Contact, Perimeter Insulation	Slab or Floor in Conditioned Space, Horizontal Insulation	Slab or Floor over Unconditioned Space, Horizontal Insulation	Wall Cavity R-Value, Exterior	Wall Cavity R-Value, Interior
1	R-5.0, 24-inch depth	R-value that is five times the value of the floor covering's R-value	R-13	R-20	R-13
2					
3			R-19		
4 except Marine	R-15, 24-inch depth				
5 and Marine 4			R-30		
6	R-15, 48-inch depth				
7-8			R-38		

Recommended R-values for residential new construction. It may not be feasible to attain these values in existing construction. All installations should comply with local code.

Application	Slab with Ground Contact, Perimeter Insulation by Climate Zone	Suspended Slab (e.g. between floors) Horizontal Insulation
Heating Only	CZ 1-2: R-7.5, 12-inch depth CZ 3: R-10, 24-inch depth CZ 4-5: R-15, 24-inch depth CZ 6-8: R-20, 48-inch depth	R-value that is five times the value of the floor covering's R-value.
Cooling Only	R-5 where chilled slab abuts unconditioned space	Same as heating
Heating and Cooling	Same as heating	Same as heating

Minimum recommended R-values for slab insulation of conditioned slabs. Perimeter insulation may be applied on the interior or exterior of the foundation. Perimeter insulation should be applied vertically or a combination of vertically and horizontally, when it extends to at least the depth of the slab. Listed depths are measured from the top of the slab.



- Perimeter insulation may be applied on the interior or exterior of the foundation.
- Perimeter insulation should be applied vertically. Please refer to tables for reference of depth.
- Listed depths are measured from the top of the slab.
- Viega also recommends installing a minimum R-5 horizontal foam board insulation under the entire slab for small residential applications (<2000 ft^2).
- The top of this insulation should be cut at a 45-degree angle and be 4" higher than a piece of horizontal insulation.