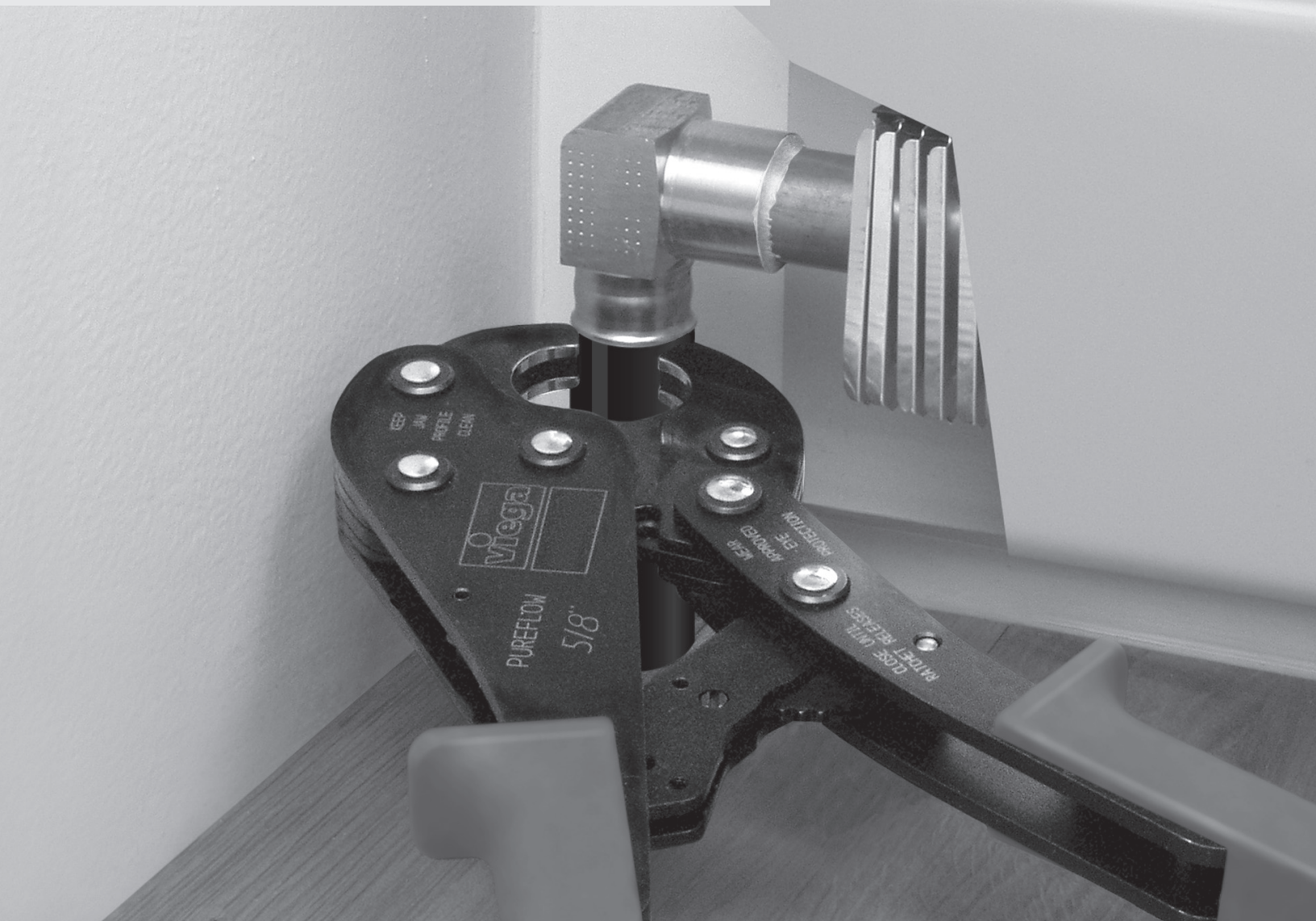
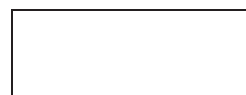


# ProRadiant™ Combiflex Viega's Hydronic Solution Installation Manual 2013



**viega**



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**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.***

## 1.1 Combiflex system concept

Viega's combiflex system offers greater efficiency and comfort over traditional high temperature systems through the use of:

- Innovations in piping technology
- Integration of manifolds
- Use of controls

### *Piping*

The combiflex system uses ViegaPEX Barrier or Viega FostaPEX tubing in lieu of copper tubing for hydronic piping. The stability, strength and flexibility of Viega's PEX tubing allows for fewer joints behind walls, floors and ceilings, which creates a quicker, more secure installation. ViegaPEX Barrier and Viega FostaPEX tubing utilize Viega's press technology so there are not fittings to sweat, no flame required and every press connection is leak free.

### *Manifolds*

One easy and common piping arrangement used in efficient radiant systems is a manifold system. Using ViegaPEX Barrier/Viega FostaPEX tubing and a manifold system eliminates additional fittings, valves and pumps. By incorporating manifolds in a high temperature hydronic system, balancing and zoning are simplified. Remote manifolds may be utilized to decrease the amount of pipe needed.

### *Controls*

Another means to increase efficiency and comfort on a traditional high temperature hydronic system is through constant circulation and outdoor reset control. Outdoor reset is the term used to describe a modulating water temperature system. As the outdoor temperature increases the water temperature decreases and vice versa. By using constant circulation expansion and contraction noises are eliminated.

## 1.2 Application benefits

### *Applications*

- Baseboard
- Radiators
- Kickspace Heaters
- Fan Coil Units
- Towel Warmers

### *Advantages*

- Reduced installation time
- Fewer joints and potential leaks hidden in walls, floors and ceilings
- Press connections assure secure, leak-proof connections
- Zoning advantages
- Minimizes contraction and expansion noise
- 30 year warranty on Viega tubing
- Eliminates zone pumps
- Same temperature for every heat emitter

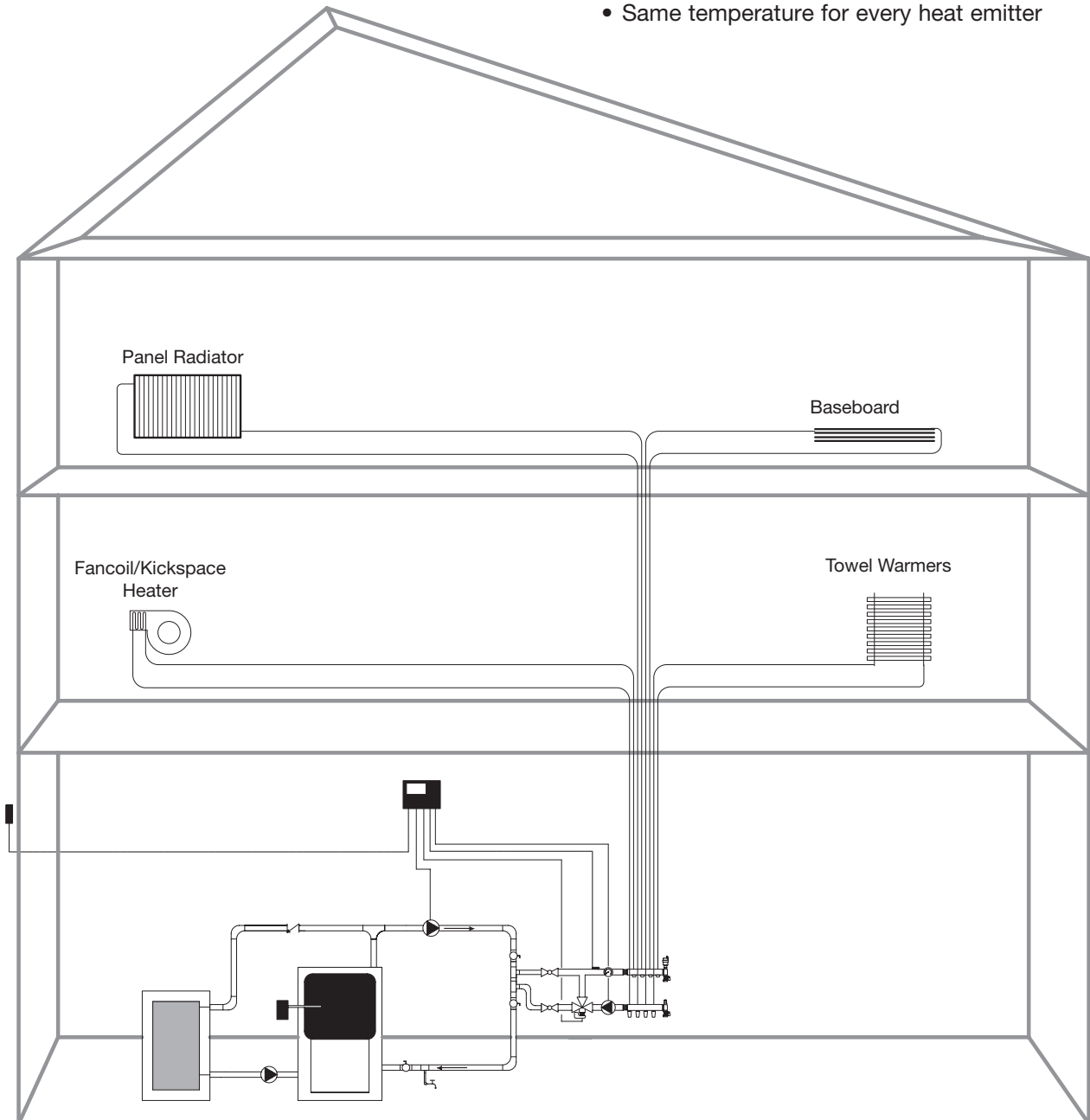


Figure 1.2

### 1.3 Manifold/mixing equipment benefits

#### 1 1/4" stainless manifolds

- 2-12 outlet
- Available with PEX press or compression SVC connections
- Available as shut-off/balancing/flow meters, shut-off/balancing or valveless
- Powerhead control
- Circuit temperature gauge
- Easy to install

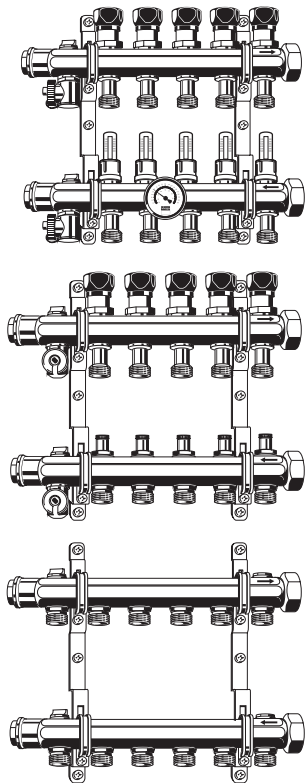


Figure 1.3a

#### Mixing station

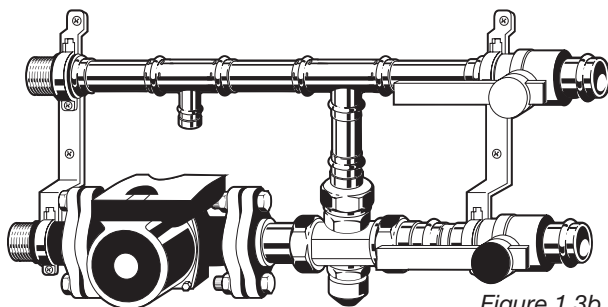


Figure 1.3b

- Color-coded isolation ball valves
- Mounting brackets
- Supply temperature sensor well
- Select from (2) 3-speed circulators
- Select from (3) boiler connection types

#### Enhanced mixing station

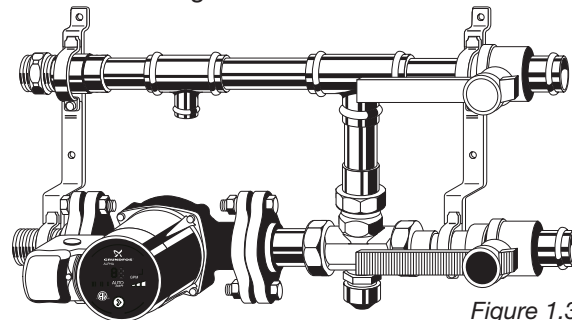


Figure 1.3c

- Reduces power consumption up to 50%
- Color-coded isolation ball valves
- Mounting brackets
- Supply temperature sensor well
- 7 different settings
- 3 boiler connection types

#### Hydronic mixing block

- Simple installation with only three connections
- Fittings and ports clearly labeled
- Mixing solution with built-in circulator, air vent and control
- Includes bracket, fittings and individually labeled components
- The control offers an intuitive menu structure that makes programming fast and simple
- Program and view only the settings selected

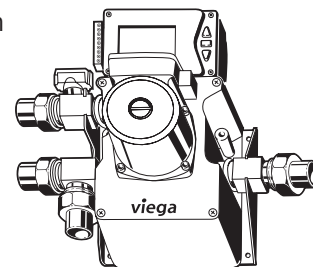


Figure 1.3d

#### Assembled mixing station

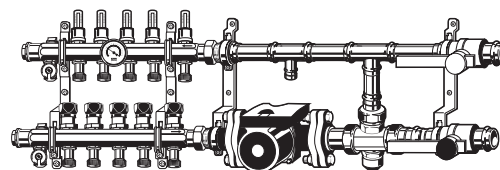


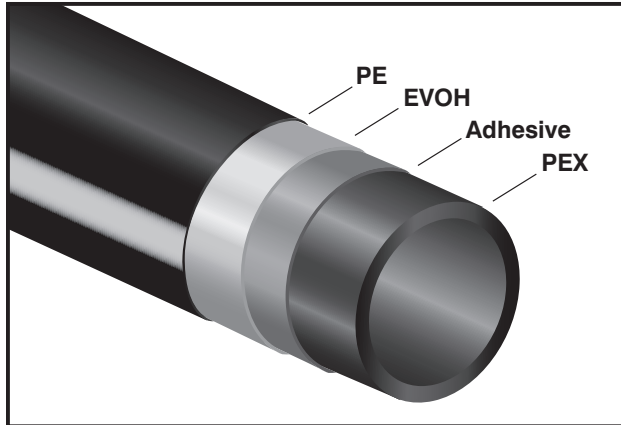
Figure 1.3e

- Factory assembled and tested
- Reduces installation time
- Select from (2) 3-speed circulators
- 4 configurations available
- Mounting brackets
- Color coded ball valves
- Select from (3) boiler connection types

## 1.4 Tubing

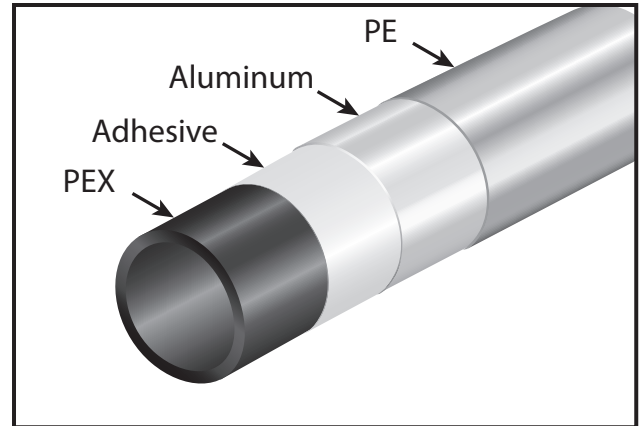
Viega offers two types of oxygen barrier tubing for use in heating and cooling applications: ViegaPEX Barrier and Viega FostaPEX.

### *ViegaPEX Barrier tubing*



- Is available coiled in sizes  $\frac{5}{16}$ " to 2".
- Is available in straight lengths in sizes  $\frac{3}{4}$ " 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 ViegaPEX Barrier tubing to keep the tubing manageable and easy to use.
- A PEX tubing cutter must be used to cut ViegaPEX Barrier 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.
- ViegaPEX Barrier tubing is recommended for use with PEX press fittings.

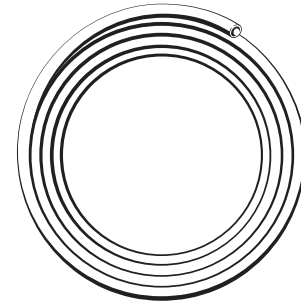
### *Viega FostaPEX*



- Is available in coils or in straight lengths in sizes from  $\frac{1}{2}$ " 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 Viega FostaPEX tubing to keep the tubing manageable and easy to use.
- A PEX tubing cutter must be used to cut Viega FostaPEX tubing as it makes a straight, clean, burr-free cut.
- A Viega FostaPEX Prep Tool must be used for stripping the aluminum layer before making a connection. (A utility knife should never be used.)
- Viega 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 above.
- Viega FostaPEX is recommended for use with ViegaPEX press fittings only.

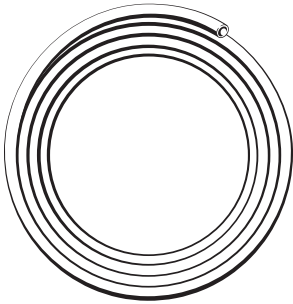
### ViegaPEX Barrier tubing - coils

ViegaPEX Barrier, a cross-linked polyethylene (PEX) tubing, is for use in hydronic heating and cooling systems. ViegaPEX Barrier includes an oxygen barrier layer that helps restrict the passage of oxygen through the wall of the tubing.



Part No	Size	Length (ft)	Unit
11400	5/16"	250	coil
11405	5/16"	1000	coil
11410	5/16"	4000	coil
11415	3/8"	300	coil
11418	3/8"	1200	coil
11420	3/8"	2400	coil
11428	1/2"	250	coil
11425	1/2"	300	coil
11430	1/2"	400	coil
11427	1/2"	500	coil
11436	1/2"	1000	coil
11435	1/2"	1200	coil
11440	1/2"	2000	coil
11445	5/8"	500	coil
11450	5/8"	1500	coil
11455	3/4"	150	coil
11457	3/4"	300	coil
11458	3/4"	500	coil
11460	3/4"	800	coil
11462	3/4"	1000	coil
11465	1"	150	coil
11470	1"	500	coil
11475	1 1/4"	100	coil
11480	1 1/2"	100	coil
11485 <sup>1</sup>	2"	100	coil

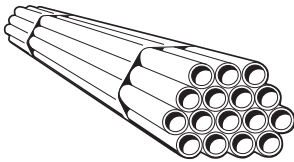
<sup>1</sup>coming soon



### Viega FostaPEX tubing - coils

Viega FostaPEX multilayer tubing is for hot and cold water distribution and hydronic heating and cooling applications. The multi-layered construction of the Viega FostaPEX tubing is made from one full dimensional inner PEX core with an aluminum and outer PE layer surrounding it. This construction allows the inner layer alone to meet all temperature and pressure requirements of the system. FostaPEX is available in two colors, silver and red.

Part No	Size	Length (ft)	Unit	Color
35020	1/2"	150	coil	silver
35019	1/2"	300	coil	silver
35021	1/2"	400	coil	silver
35030	5/8"	150	coil	silver
35031	5/8"	400	coil	silver
35040	3/4"	150	coil	silver
35060	1"	150	coil	silver
35120	1/2"	150	coil	red
35140	3/4"	150	coil	red
35160	1"	150	coil	red

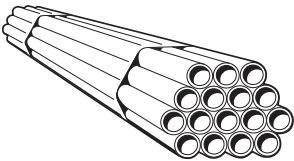


### ViegaPEX Barrier tubing - straight lengths

This tubing is the same ViegaPEX Barrier tubing used in our coils, but sold in 20 foot straight lengths for easy installation on straight runs.

Part No	Size	Length (ft)	Quantity	Unit
11500	3/4"	20	25	straight length
11505	1"	20	5	straight length
11510	1 1/4"	20	5	straight length
11515	1 1/2"	20	5	straight length
11520 <sup>1</sup>	2"	20	5	straight length

<sup>1</sup>coming soon



### Viega FostaPEX tubing - straight lengths

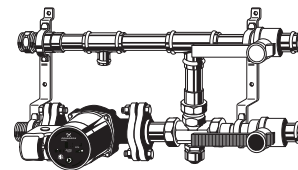
This tubing is the same Viega FostaPEX tubing used in our coils, but sold in 20 foot straight lengths for easy installation on straight runs.

Part No	Size	Length (ft)	Quantity	Unit	Color
35520	1/2"	20	25	straight length	silver
35530	5/8"	20	25	straight length	silver
35540	3/4"	20	25	straight length	silver
35560	1"	20	10	straight length	silver



### Enhanced mixing station

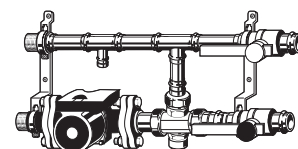
The Viega enhanced mixing station provides fluid temperature modulation when connected to a variety of heat sources. The circulator has seven different settings which allow the user flexibility in optimizing system performance. Boiler connections can be made with ProPress, PEX press or copper (male pipe end) for soldering. A built in sensor well allows for easy mounting of control sensors.



Part No	Version	Unit
12152	ProPress	pc
12153	PEX press	pc
12151	copper (male)	pc

### Base mixing station

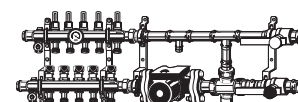
The Viega mixing station provides a simple solution for supply water modulation. Boiler connections can be made with ProPress, PEX press or copper (male pipe end) for soldering. A built in sensor well allows for easy mounting of control sensors.



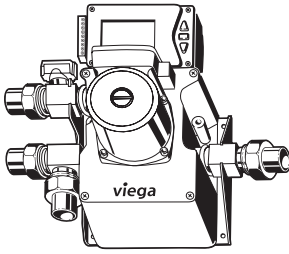
Part No	Version	Circulator	Unit
12121	ProPress	high head	pc
12123	PEX press	high head	pc
12125	copper (male)	high head	pc
12120	ProPress	low head	pc
12122	PEX press	low head	pc
12124	copper (male)	low head	pc

### Assembled mixing station

Viega's assembled mixing stations are prefabricated, pressure tested and ready for wall mounting. They come complete with circulator pump, diverting valve, supply and return manifold, isolation valves, manual air bleeders and purge valves.



Outlets	Low Head 3-Speed		High Head 3-Speed		Unit
	Shut Off/ Balancing Valves/ Flow Meters	Shut Off/ Balancing Valves	Shut Off/ Balancing Valves/ Flow Meters	Shut Off/ Balancing Valves	
	Part No	Part No	Part No	Part No	
2	15940	15740	15980	15780	pc
3	15941	15741	15981	15781	pc
4	15942	15742	15982	15782	pc
5	15943	15743	15983	15783	pc
6	15944	15744	15984	15784	pc
7	15945	15745	15985	15785	pc
8	15946	15746	15986	15786	pc
9	15947	15747	15987	15787	pc
10	15948	15748	15988	15788	pc
11	15949	15749	15989	15789	pc
12	15950	15750	15990	15790	pc

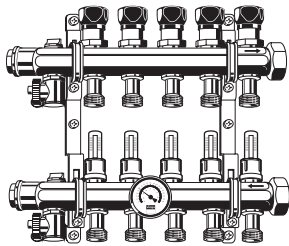


### Hydronic mixing block

Viega's hydronic mixing block is a highly engineered, user friendly, economical solution for controlling a heating system with built in mixing, system controller and system pump in a single unit.

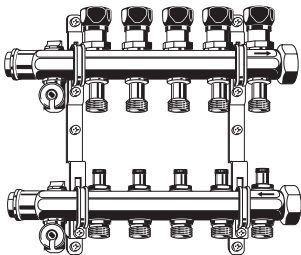
- Easy to install
- Clearly labeled connections
- Mounting bracket included
- Simple to program
- Modulating internal mixing
- Seasonal pump activation
- Boiler activation

Part No	Unit
56160	1

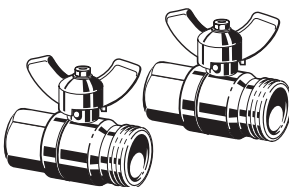
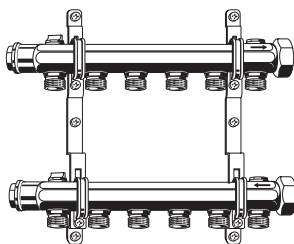


### 1 1/4" Stainless steel manifold

Viega 1 1/4" stainless steel manifolds come with 6 5/8" spacing brackets for compact remote mounting. Stainless manifolds offer a choice of shutoff/balancing/ flow meter (SOBFM), shutoff/balancing (SOB) and valveless configurations depending on your project requirements.



Outlets	Part No SOBFM	Part No SOB	Part No Valveless	Unit
2	15900	15700	16500	set
3	15901	15701	16501	set
4	15902	15702	16502	set
5	15903	15703	16503	set
6	15904	15704	16504	set
7	15905	15705	16505	set
8	15906	15706	16506	set
9	15907	15707	16507	set
10	15908	15708	16508	set
11	15909	15709	16509	set
12	15910	15710	16510	set



### Ball valve set

Viega's manifold ball valve sets are typically installed in conjunction with 1 1/4" stainless manifolds. These valve sets offer a fast and effective way to isolate manifolds from boiler piping.

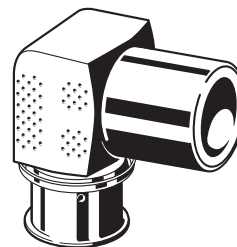
Part No	Size	Unit
15056	1 1/4 x 1	set

### ViegaPEX press elbow 90°

90 degree elbows connect PEX to copper tubing. Press connections make baseboard installation fast and simple. Tubing elbow fits over standard copper tubing or baseboard.

Part No	Size	Unit
99308	1/2" x 3/4"	10/pkg
89312	5/8" x 3/4"	5/pkg
99309	3/4" x 3/4"	10/pkg
89307*	1/2" x 3/4" or 1/2"	5/pkg
89313*	5/8" x 3/4" or 1/2"	5/pkg
89311*	3/4" x 3/4" or 1/2"	5/pkg

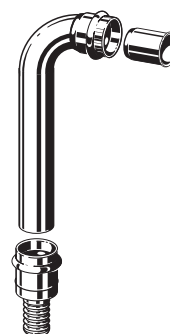
\*Available while supplies last



### Baseboard kit

Viega's baseboard kit allows for easy transition from baseboard to ViegaPEX Barrier/Viega FostaPEX tubing. Press fittings make flameless connections fast and simple. ProPress tools are required for the copper side.

Part No	Size	Unit
16428	3/4"	1



### SVC compression PEX adapters

These compression fittings attach PEX tubing to Viega manifolds or other SVC connections.

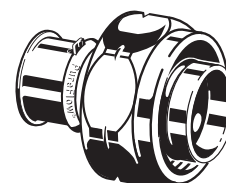
Part No	Size	Unit
19007	5/16"	2/pkg
19008	3/8"	2/pkg
19009	1/2"	2/pkg
19010	5/8"	2/pkg
19011	3/4"	2/pkg

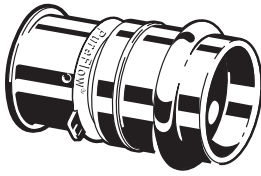


### SVC PEX press adapters

These adapters allow the Viega press connection system to be used on manifolds or other SVC connection components.

Part No	Size	Unit
89407	5/16"	5/pkg
89408	3/8"	5/pkg
89409	1/2"	5/pkg
89413	5/8"	5/pkg
89410	3/4"	5/pkg

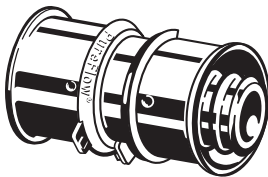




### ViegaPEX press adapter

Use these adapters to transition directly from PEX to copper tubing. Press fittings make flameless connections fast and simple. The ProPress tool is required for the copper side. ProPress is compatible with type K, L, and M copper tubing only.

Part No	Size	Unit
69627	1/2" x 5/8"	10/pkg
69628	5/8" x 3/4"	10/pkg
99620	1/2" x 1/2"	10/pkg
99626	1/2" x 3/4"	10/pkg
99630	3/4" x 1/2"	10/pkg
99640	3/4" x 3/4"	10/pkg
99645	1" x 3/4"	10/pkg
99660	1" x 1"	10/pkg
99665	1 1/4" x 1"	5/pkg
99670	1 1/4" x 1 1/4"	5/pkg
99675	1 1/2" x 1"	5/pkg
99680	1 1/2" x 1 1/2"	5/pkg
99685	2" x 1"	5/pkg
99690	2" x 2"	5/pkg



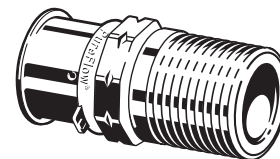
### ViegaPEX press couplings

These couplings join two sections of PEX tubing with the press connection. Used for repairing damaged sections or connecting long runs.

Part No	Size	Unit
83001	5/16" x 5/16"	5/pkg
93000	3/8" x 3/8"	5/pkg
93005	1/2" x 3/8"	5/pkg
93020	1/2" x 1/2"	5/pkg
93050	3/4" x 1/2"	5/pkg
83030	5/8" x 5/8"	5/pkg
93040	3/4" x 3/4"	5/pkg
93055	1" x 3/4"	5/pkg
93060	1" x 1"	5/pkg
93071	1 1/4" x 3/4"	5/pkg
93065	1 1/4" x 1"	5/pkg
93070	1 1/4" x 1 1/4"	5/pkg
93072	1 1/2" x 3/4"	5/pkg
93073	1 1/2" x 1"	5/pkg
93075	1 1/2" x 1 1/4"	5/pkg
93080	1 1/2" x 1 1/2"	5/pkg
93091	2" x 1 1/2"	5/pkg
93090	2" x 2"	5/pkg

### ViegaPEX press adapter

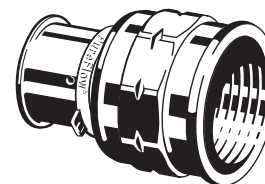
Use male adapters to make a press connection between PEX tubing and FPT connections.



Part No	Size	Unit
90506	3/8" x 1/2" MPT	10/pkg
90521	1/2" x 1/2" MPT	10/pkg
90526	1/2" x 3/4" MPT	10/pkg
90542	3/4" x 1/2" MPT	10/pkg
80527	5/8" x 1/2" MPT	5/pkg
80531	5/8" x 3/4" MPT	5/pkg
90541	3/4" x 3/4" MPT	10/pkg
90546	3/4" x 1" MPT	10/pkg
90562	3/4" x 1 1/4" MPT	2/pkg
90556	1" x 3/4" MPT	10/pkg
90561	1" x 1" MPT	10/pkg
90566	1" x 1 1/4" MPT	2/pkg
90571	1 1/4" x 1 1/4" MPT	2/pkg
90581	1 1/2" x 1 1/2" MPT	2/pkg
90591	2" x 2" MPT	5/pkg

### ViegaPEX press adapter

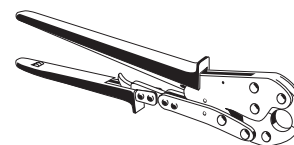
Use female adapters to make a press connection between PEX tubing and MPT threaded pipe.



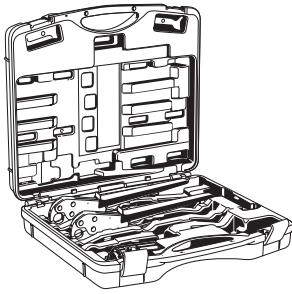
Part No	Size	Unit
91520	1/2" x 1/2" MPT	10/pkg
91525	1/2" x 3/4" MPT	10/pkg
91541	3/4" x 1/2" MPT	10/pkg
91540	3/4" x 3/4" MPT	10/pkg
91545	1" x 3/4" MPT	10/pkg
91560	1" x 1" MPT	10/pkg
91570	1 1/4" x 1 1/4" MPT	5/pkg
91580	1 1/2" x 1 1/2" MPT	5/pkg
91590	2" x 2" MPT	5/pkg

### ViegaPEX press hand tool

With its ratcheting design, the Viega press tool ensures a perfect connection every time. The tool cannot be opened until the fitting has been properly pressed. Color coded handles allow for easy identification of each size. Works with ViegaPEX Barrier and Viega FostaPEX tubing.



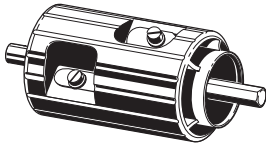
Part No	Size	Version	Unit
60010	5/16"	black	1
50000	3/8"	green	1
50020	1/2"	yellow	1
50030	5/8"	red	1
50040	3/4"	blue	1
50060	1"	orange	1



### PEX press complete heating tool set

This set is equipped with case, prep tool, and PEX press hand tool.

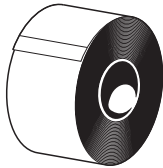
Part No	Size	Unit
56030	3/8", 1/2", 5/8", 3/4", 1"	1



### Viega FostaPEX prep tools

This tool peels the outer PE and aluminum layers from Viega FostaPEX tubing, allowing for the tube to be used with the standard press fitting system.

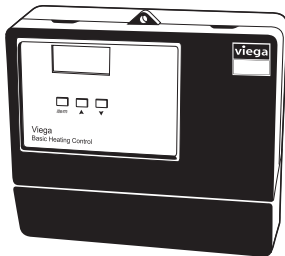
Part No	Size	Unit
54030	1/2", 3/4"	1
54050	5/8", 1"	1



### Repair coupling wrap

Used for wrapping PEX press fittings in a slab.

Part No	Size	Unit
15320	1" x 10'	1

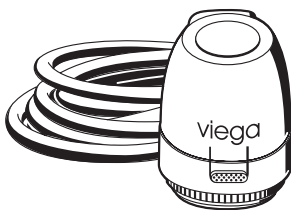


### Basic heating control

The basic heating control modulates system water temperature as outdoor temperature changes.

- Outdoor reset
- Modulating mixing valve control
- Supply temperature high limit
- Seasonal pump activation
- Boiler activation
- Mixing valve and pump exercising

Part No	Unit
16015	1



### Powerhead

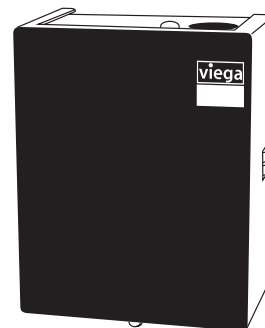
Fits 1 1/4" stainless steel manifold return valves to provide individual zone control. 24 VAC, normally closed. Connects to standard Zone Control or can be wired directly with thermostats.

Part No	V	Wire	Unit
15061	24 VAC	2	1
15064	24 VAC	4	1

### Pump and boiler relay

Provides activation to a circulator or boiler from various controls. 120 VAC supply. Includes internal 24 VAC transformer. Provides high-voltage contacts for pump activation and separate dry contacts for boiler T-T or low-voltage applications.

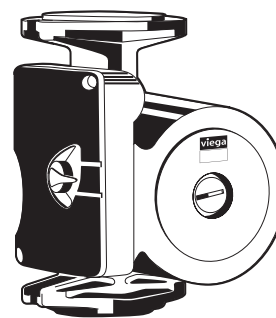
Part No	Unit
18033	1



### Circulator

The 3-speed, wet rotor, direct drive inline circulator pumps are designed for residential and light commercial applications. These circulators are quiet and maintenance free, making them ideal to use in primary and / or secondary loop piping.

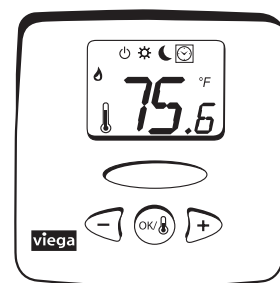
Part No	Circulator	Unit
12126	low head	1
12127	high head	1



### Digital thermostat

The Viega digital thermostat is ideal for individual room temperature control. A user friendly three button design allows for easy adjustment. The digital thermostat is compatible with Viega transformers, powerheads, zone controls and pump and boiler relay.

Part No	V	Unit
18050	24	1

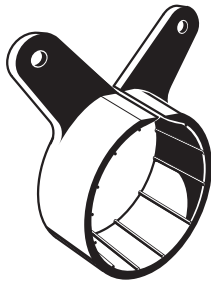




### Lock clip

Double ratchet allows easy and secure installation of tubing. Fasteners can be connected to allow for neat installation of multiple lines and quick installation using drywall or wood screws. Stand off design keeps tubing away from contact with subfloors, studs, or joists. Lock clips, with their ratchet design are an easy and secure method for attaching PEX tubing. Installation is made simple and quick through the use of drywall/wood screws.

Part No	Size	Unit
58070	5/16"	100/pkg
58071	3/8"	100/pkg
58072	1/2"	100/pkg
58073	3/4"	50/pkg
58074	1"	50/pkg
58075	1 1/4"	50/pkg
58076	1 1/2"	25/pkg
58077	2"	15/pkg



### Suspension clip tubing fasteners

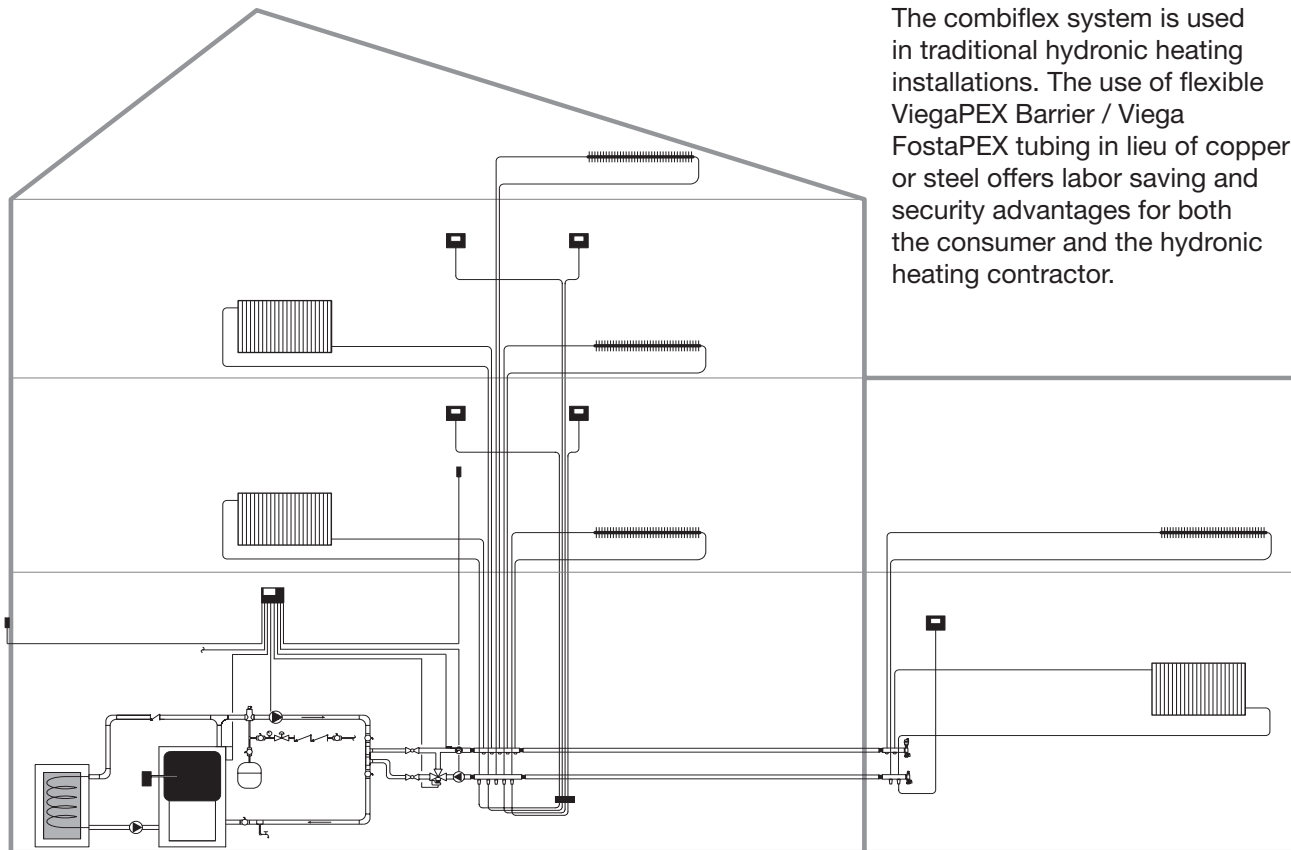
Suspension clips can be used to support and protect ViegaPEX Barrier and Viega FostaPex tubing from abrasions when running through joists or studs.

Part No	Size	Unit
55020	1/2"	50/pkg
55040	3/4"	50/pkg
55060	1"	50/pkg
55070	1 1/4"	50/pkg
55080	1 1/2"	25/pkg
55090	1"	25/pkg

**NOTE:** For 5/8" ViegaPEX Barrier use 1/2" clips for 5/8" Viega FostaPEX use 3/4" clips



## 3.1 Piping and controls



The combiflex system is used in traditional hydronic heating installations. The use of flexible ViegaPEX Barrier / Viega FostaPEX tubing in lieu of copper or steel offers labor saving and security advantages for both the consumer and the hydronic heating contractor.

Figure 3.1a

- S1 = Supply Sensor
- S2 = Outdoor Sensor
- S3 = Indoor Sensor
- P1 = Primary Loop
- P2 = System Pump
- P3 = DHW Pump
- T-stat = Room Thermostats

Note 1: Maximum distance between primary loop tees less than 4 x O.D. of primary loop diameter.

Note 2: Leave one circuit constantly operating solely off outdoor reset.

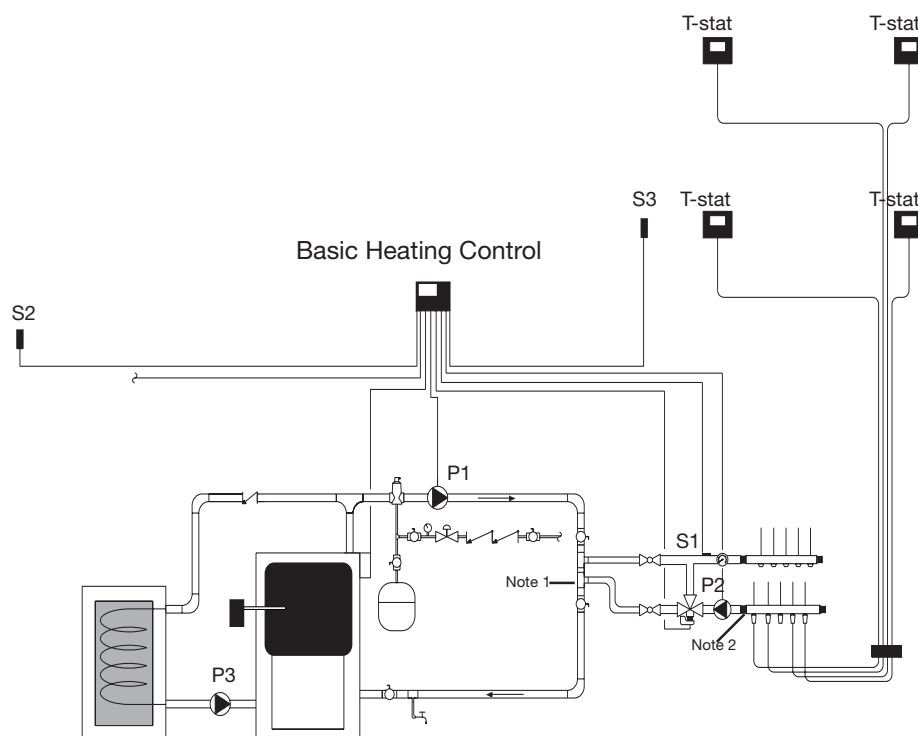


Figure 3.1b

### 3.2 Wiring schematics

A manifold system allows any one or more of the circuits to be adapted for control by a thermostat. By adding powerheads to a manifold it will allow for individual control over that circuit/circuits. The following are some typical zone wiring schematics.

**Important Note:** Installation by a licensed electrician is recommended. Installation and use of this equipment should be in accordance with provisions of the U.S. National Electric Code, applicable local code and pertinent industry standards.

#### Single zone application

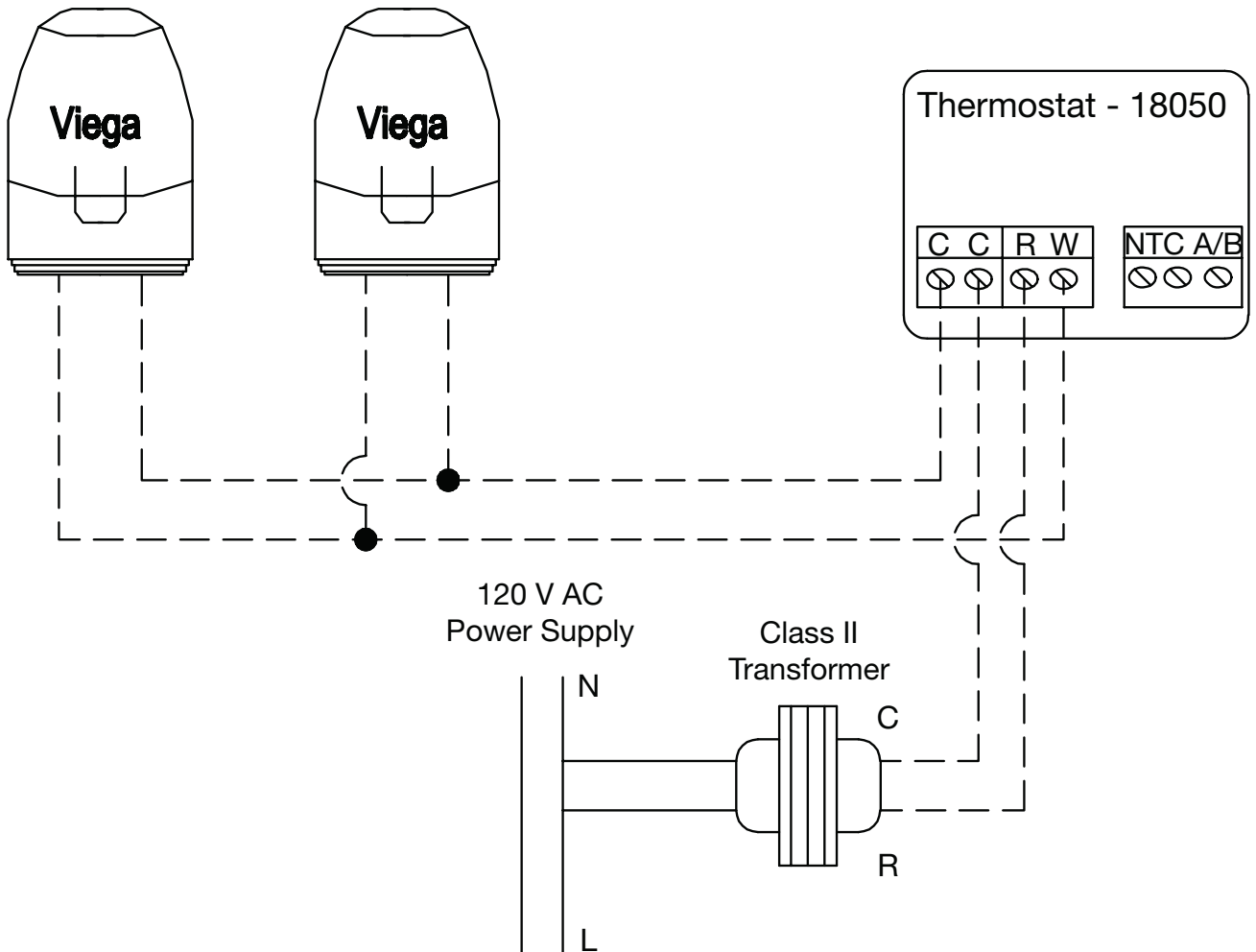


Figure 3.2a

Multi-zone application

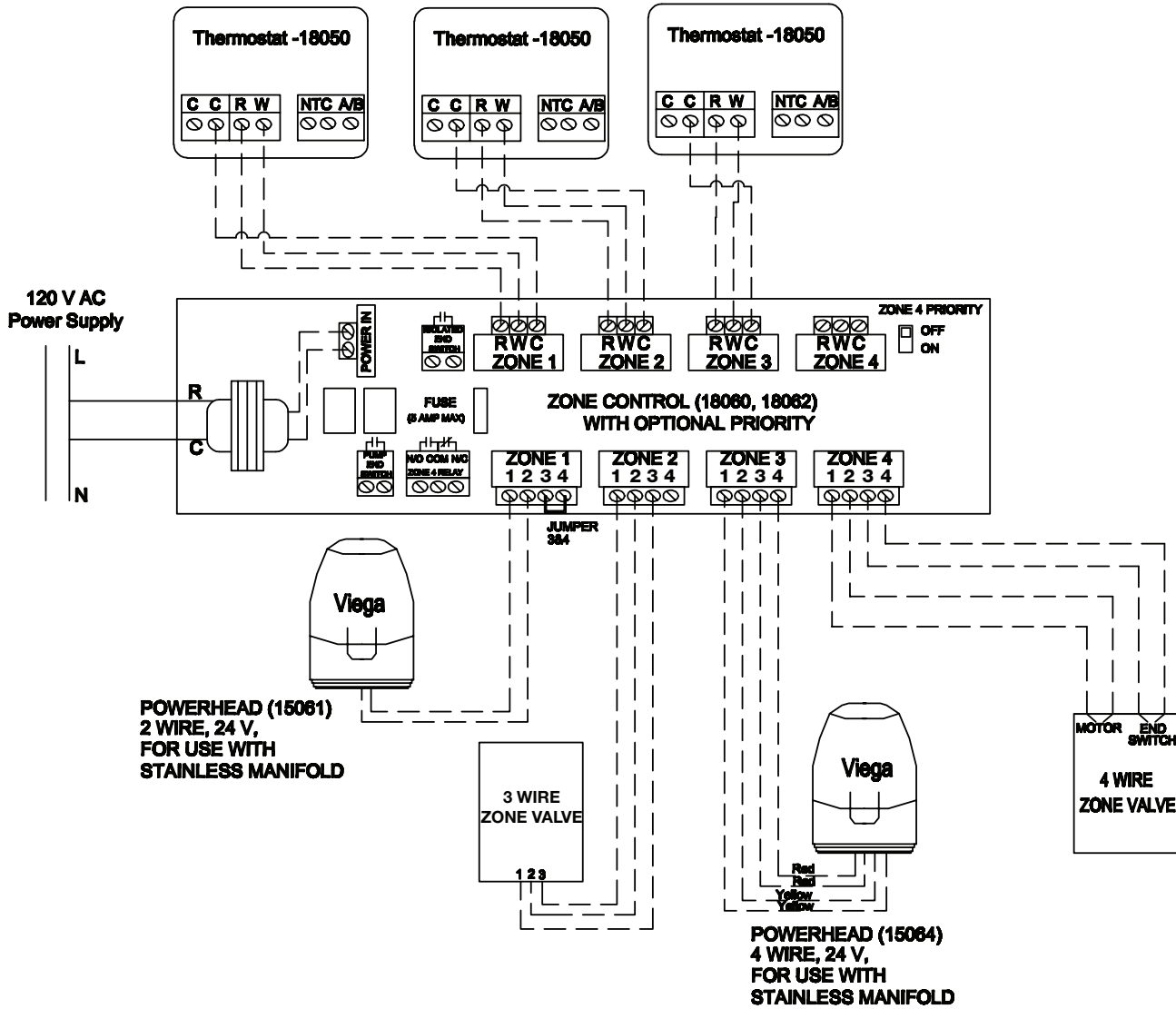


Figure 3.2b

### 3.3 Basic heating control

The Viega basic heating control is designed to control the supply water temperature within a hydronic system in order to provide outdoor reset. The basic heating control uses a floating action actuator mounted on a diverting valve to regulate the supply water temperature.

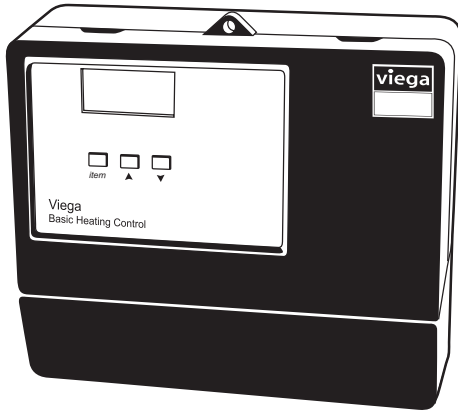


Figure 3.3a

#### Additional functions

- User comfort adjustment to increase or decrease building space temperature
- Advanced settings for fine tuning building requirements
- Optional indoor sensor for room air temperature control
- Test sequence to ensure proper component operation
- 120 VAC power supply
- Powered system pump output
- CSA C US certified (approved to applicable UL standards)

#### Outdoor reset

The basic heating control calculates a mixing supply water temperature based on outdoor air temperature. The control uses an outdoor sensor and a water supply sensor for the calculation. It utilizes a floating action actuator to control the mixing supply temperature. In the combiflex system the actuator is mounted on the three way diverting valve of the mixing station.

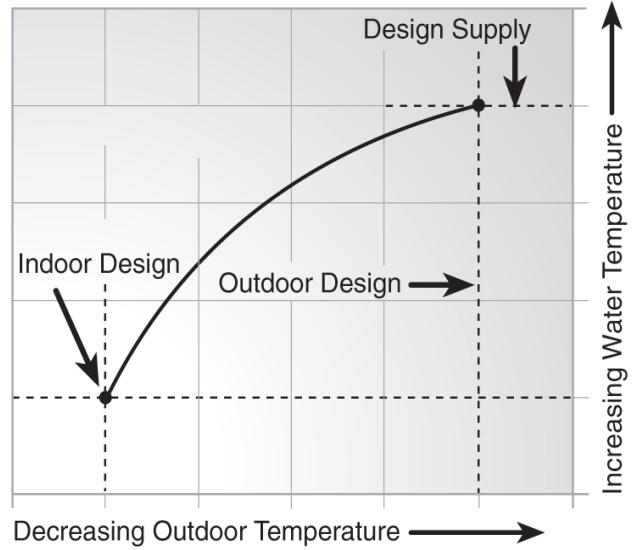


Figure 3.3b

**Note:** Refer to basic heating control operation manual for more detailed information.

### 3.4 Programming the basic heating control for the combiflex system

#### Adjusting the heating curve

The basic heating control adjusts the mixed supply water temperature based on outdoor air temperature. The relation between the outdoor air temperature and the water supply temperature is characterized by the heat curve. Since different types of heat emitters require different adjustments of the water supply temperature, the heat curve has to be adjusted to the heat emitter used.

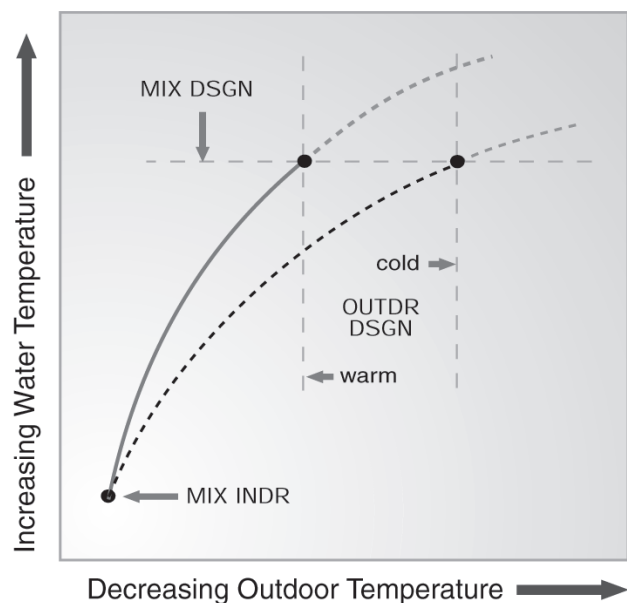


Figure 3.4a

Terminal Unit				
	Baseboard	Radiator	Towel Warmer	Fancoil
MIX DSGN	180°F	160°F	180°F	180°F
MIX MAX	190°F	180°F	200°F	200°F

Table 3.4a

#### Adjust menu display settings to change heat curve

To make an adjustment to a setting in the control, press and hold simultaneously for 1 second, the **Item**, **▲** and **▼** buttons. The display will then show the word **ADJUST** in the top right corner. Select the desired item using the **Item** button. Finally, use the **▲** and / or **▼** button to make the adjustment. See sections 3.2 and 3.3 (pages 6 and 7) of the basic heating control operation manual for further discussion on these items and their effect on control operation.

#### Example

Heat Emitter: Baseboard

#### MIX DSGN



Adjust the mix design supply temperature from 120°F to 180°F.

#### MIX MAX



Adjust the maximum supply temperature for the mixing system from 140°F to 190°F.

**NOTE:** This display setting is only visible with the Advanced/Installer DIP switch set to Advanced.






### 3.5 The hydronic mixing block for the combiflex system

#### Hydronic mixing block

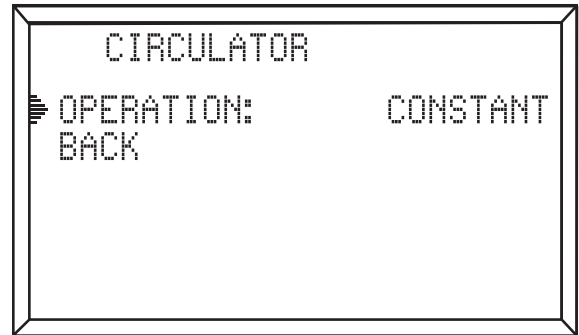
Viega's hydronic mixing block may also be used to supply fluid to a combiflex system. It can be used to control, mix, pump and provide outdoor reset all in one easy to use package.

#### Setup menu



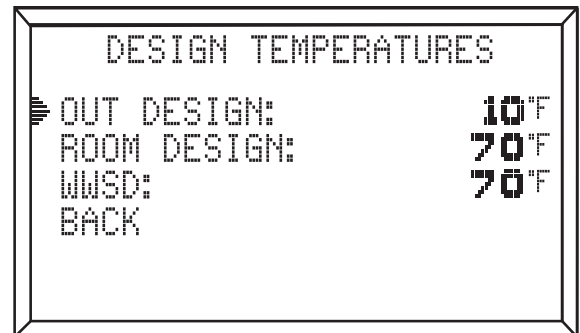
1. The SETUP MENU is used for entering the design values, as well as assigning different control options to the circulator and boiler. To access the SETUP MENU, push the middle rectangular button  on the STATUS MENU. Use the up  and down  arrow keys to scroll through the various settings.
2. To select an item, align the cursor arrow  with the item you wish to select and press the middle rectangular button . The arrow will become solid, which indicates that an item has been selected.
3. Once adjustment is complete, push the middle rectangular button. This will de-select the item.
4. To go to the previous screen, select BACK and press the middle rectangular button.
5. If the SETUP MENU is left idle for more than 90 seconds, the display will change to the STATUS MENU and the hydronic mixing block will begin operating.

#### Circulator control



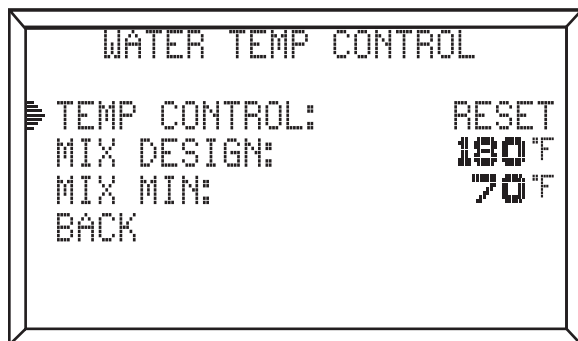
- **OPERATION: CONSTANT** — The circulator is constantly on and will only be shut off with warm weather shut down (WWSD). CONSTANT circulation is usually used with RESET mode.

#### Design temps



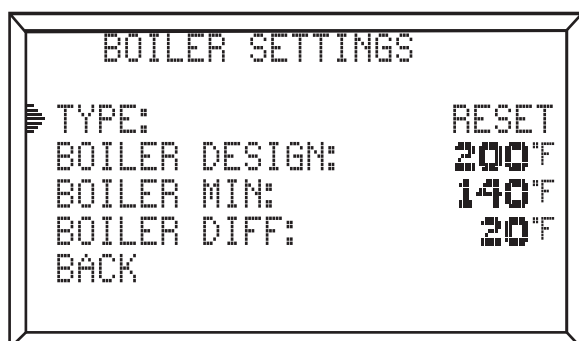
- **OUT DESIGN** — Outdoor temperature used to calculate heat loss. This temperature is based on location and can be obtained from Radiant Wizard or outdoor design charts.  
Range: -40°F to 70°F  
Default: 10°F  
Set to your local requirements
- **ROOM DESIGN** — Desired room temperature used in heat loss calculation.  
Range: 35°F to 120°F  
Default: 70°F  
Set to your local requirements
- **WWSD** — Temperature at which the building does not need heat and the control will no longer activate the circulator.  
Set to your local requirements  
Range: 35°F to 120°F  
Default: 70°F  
Set to your local requirements

### Water temp control



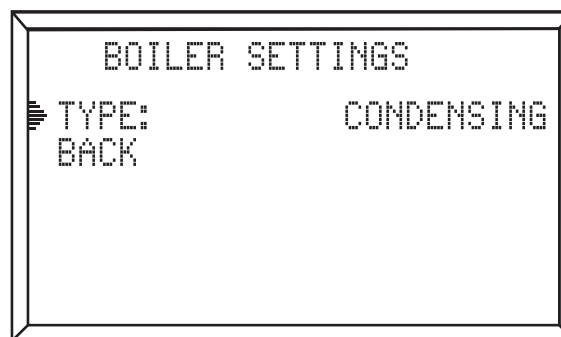
- TEMP CONTROL: RESET** — Water temperature will adjust based on outdoor temperature; as the outdoor temperature increases, the water temperature will decrease, and vice versa. By using this type of control strategy the output of the system will meet the load of the structure, resulting in an energy savings for the building owner.  
 Set to: RESET
- MIX DESIGN** — The design water temperature specified by the design. This is the maximum water temperature that will be supplied.  
 Range: 50°F to 180°F  
 Default: 120°F  
 Set to 180°F
- MIX MIN** — The minimum supply temperature for the mixing system.  
 Range: 50°F to 180°F  
 Default: 70°F  
 Keep set to 70°F

### Boiler settings



- TYPE: RESET** — This setting allows for the boiler to change supply water temperature based on outdoor temperatures.  
 If you would like to RESET your boiler, set this to RESET

- BOILER DESIGN** — The water temperature needed on design day.  
 Range: 70°F to 200°F  
 Default: 180°F  
 Set to 200°F
- BOILER MIN** — Lowest temperature the boiler is allowed to supply. This temperature needs to be set high enough for the boiler to be able to maintain mixed water temperatures.  
 Range: 70°F to 200°F  
 Default: 140°F  
 Keep set to 140°F if using RESET
- BOILER DIFF** — Determines turn on and shut off temperatures. This setting will allow the boiler to go above the boiler target by half of this setting. Example: if the BOILER DIFF is set at 20°F, the boiler will run until the temperature is 10°F above the boiler target setting, and turn on when the temperature is 10° below the boiler target temp.  
 Range: 10°F to 50°F  
 Default: 20°F  
 Keep set to 20°F



- TYPE: CONDENSING** — Used when the boiler is a condensing boiler that maintains its own temperature settings. If you would like to allow the boiler to maintain its own temperature, set this to CONDENSING.

**NOTE:** These are the recommended settings for the hydronic mixing block when using it with a combiflex system. For additional information about the installation, programming or troubleshooting, please see the complete hydronic mixing block product instructions, or contact Technical Services 1-877-843-4262 ext. 350

### 3.6 ViegaPEX Barrier or Viega FostaPEX tubing and pump sizing

Use Table 3.5a to help design your combiflex system.

*Procedure*

1. Find the heat output needed in the Btu/h column.
2. Follow the row to the right and read the recommended pump and tubing pressure drop under the column representing the length of the ViegaPEX Barrier or Viega FostaPEX tubing used.

**NOTE:** If insulation is not used, select a pump in the non-shaded area. In the shaded area without pipe insulation the temperature drop in the tubing is greater than 10°F.

**NOTE:** Assumed a median value of 550 Btu/h per linear foot of baseboard at 180°F supply water temperature with a 10°F maximum temperature drop through the ViegaPEX Barrier or Viega FostaPEX tubing. Pump curve information was based on Viega's low head 3 speed circulator, part number 12126, and Viega's High head circulator part number 12127. Shaded blocks indicate a temperature drop greater than 10°F in uninsulated ViegaPEX Barrier or Viega FostaPEX supply and return lines.

See Appendix C for pump selection when using 1/2", 3/4" or 1" ViegaPEX Barrier or Viega FostaPEX tubing.

**Combiflex sizing: Pump selection for 5/8" ViegaPEX Barrier or Viega FostaPEX tubing (pressure drop through tubing in feet of head)**

<b>NOTE:</b> For additional tubing sizes see Appendix C, page 52.			Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)								
10000	1	18 (0.07)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.2)	Low (4.0)	Low (4.9)	Low (5.7)	Low (6.5)
20000	2	36 (0.47)	Low (2.7)	Low (5.5)	Low (8.2)	Low (11.0)	High (13.8)	High (16.5)	High (19.2)	High (22.0)
30000	3	54 (1.44)	Low (5.6)	Low (11.2)	High (16.8)	High (22.4)				
40000	4	72 (3.15)	Low (9.3)	High (18.6)						

**NOTE:** The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

Table 3.5a



**Example**

Output needed: 20,000 Btu/h

Flow rate: 2 gpm

Tubing size: 5/8" (use Table 3.5)

Total tubing length: 40 ft + 10 ft = 50 ft

Feet of baseboard needed: 36 ft

Pump selected: Low head

**NOTE:** For additional tubing sizes see Appendix C, page 52.

Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
10,000	1	18 (0.07)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.2)	Low (4.0)	Low (4.9)	Low (5.7)	Low (6.5)
20,000	2	36 (0.47)	Low (2.7)	Low (5.5)	Low (8.2)	Low (11.0)	High (13.8)	High (16.5)	High (19.2)	High (22.0)
30,000	3	54 (1.44)	Low (5.6)	Low (11.2)	High (16.8)	High (22.4)				
40,000	4	72 (3.15)	Low (9.3)	High (18.6)						

**NOTE:** The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

Table 3.5b

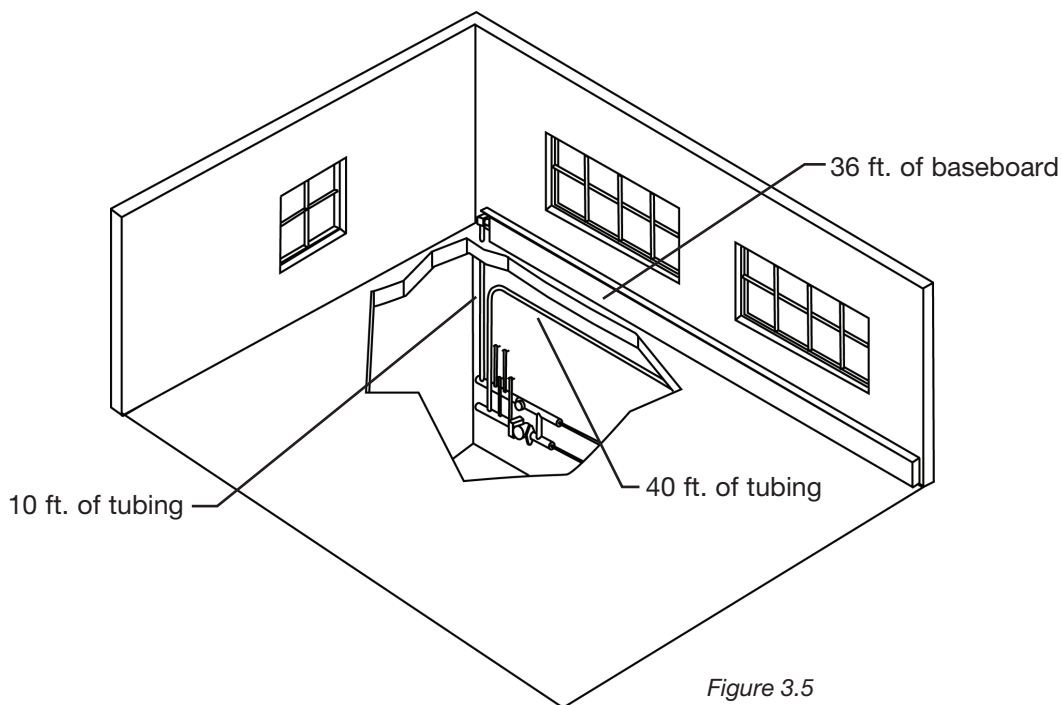


Figure 3.5

## 4 Combiflex Installation

### 4.1 Baseboard connections

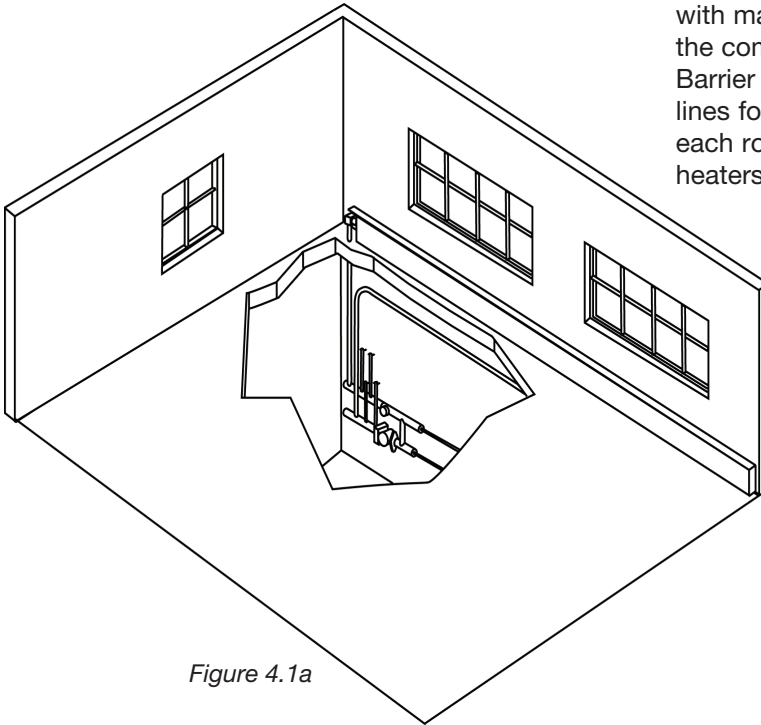


Figure 4.1a

A Viega mixing station / hydronic mixing block with manifolds installed in the mechanical room is the combiflex distribution starting point. ViegaPEX Barrier or Viega FostaPEX tubing supply and return lines for various high temperature zones are run to each room where baseboard, radiators, kickspace heaters or fan coil units are used.

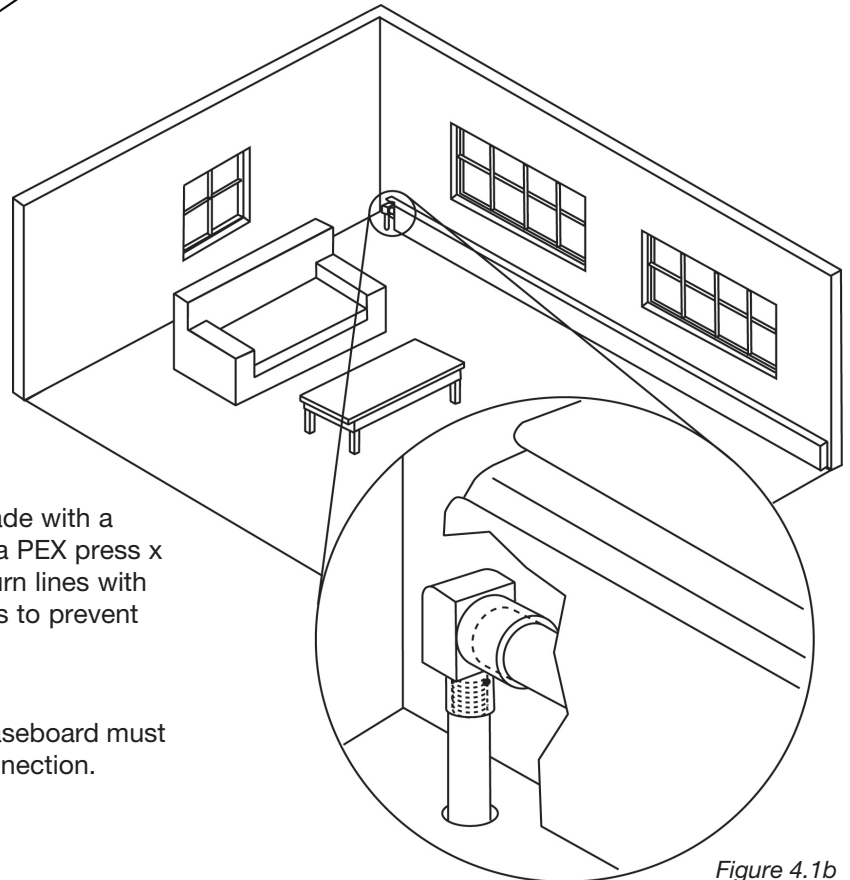


Figure 4.1b

A secure, leak-proof connection is made with a Viega ProPress baseboard kit or Viega PEX press x solder elbow. Insulate supply and return lines with pipe insulation in unheated basements to prevent heat loss.

**NOTE:** Soldering connection to the baseboard must be done prior to making the press connection.

## 4.2 Handling PEX tubing

The properties of PEX tubing make it very easy to work with. Some care must be taken to prevent damage to the tubing before and during installation:

- Do not store PEX tubing outdoors where it may be exposed to UV light.
- ViegaPEX Barrier tubing has a 6 month UV rating.
- Use care to protect 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.
- Viega FostaPEX, with its aluminum layer, is resistant to UV light, but long term exposure should still be avoided.

## 4.3 Wood frame construction

ViegaPEX Barrier and Viega FostaPEX tubing are ideal for use in woodframe construction. The ability to bend the tubing around corners and obstacles greatly simplifies installation. PEX eliminates the expensive and time consuming use of fittings where tubing turns within a wall. The press tool eliminates the potential fire hazard of soldering close to exposed framing members.

A few rules should be followed when running tubing in woodframe construction:

- Use nailing plates to protect the tubing from nails and screws where it passes through studs.
- Suspension clips are optional but recommended to reduce the potential for noise.

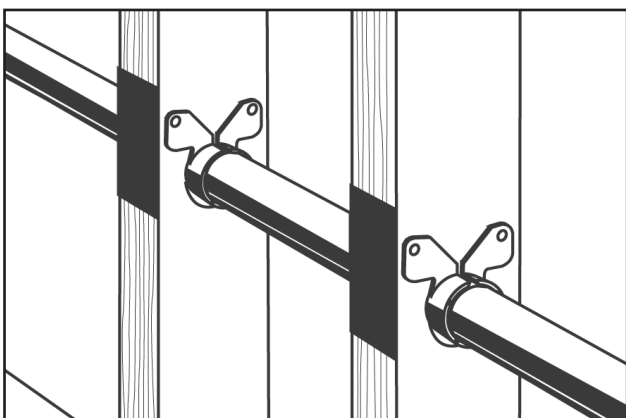


Figure 4.3: Nailing plates protect tubing from nails as it passes through studs and joists.

## 4.4 Steel construction

ViegaPEX Barrier/ Viega FostaPEX tubing also works in steel frame construction. Where tubing runs through metal studs, suspension clip fasteners should be used to protect tubing from sharp stud edges. Follow the same guidelines for fastening and supporting the tubing as you would for wood frame construction.

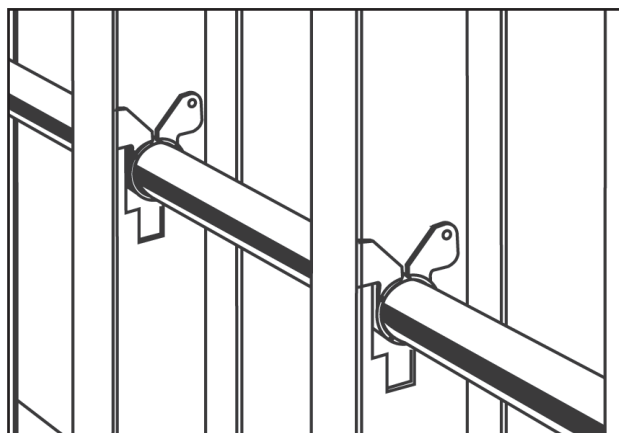


Figure 4.4: Suspension clip fasteners used to protect tubing from abrasion when passing through steel studs.

## 4.5 Supporting PEX tubing

Use only plastic tubing supports. Metal supports may damage the tubing. Tubing should be allowed freedom to move slightly as it expands and contracts. Do not clip it tightly into place or locate it where it will be tightly constrained. Use suspension clips where tubing passes through studs or joists to prevent abrasion and possible noise as tubing moves.

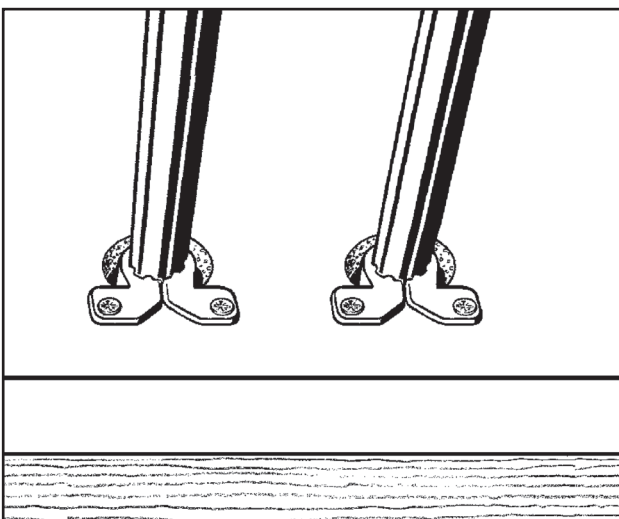


Figure 4.5a: Suspension clips support tubing in joist penetrations or anywhere abrasion is a concern.

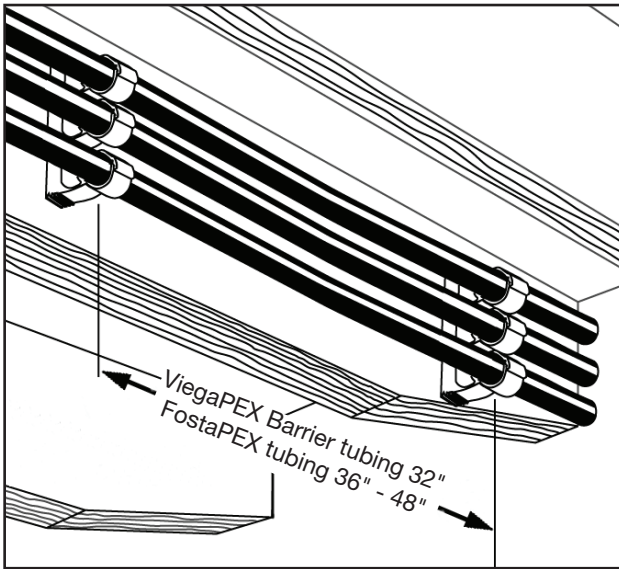


Figure 4.5b: Tubing supported with lock clip on horizontal runs.

Tubing must be fastened at 32" - 48" intervals in horizontal runs, depending on the tubing used. Use Viega lock clips for easy alignment of multiple lines. The stand off design of the clips keeps tubing away from ceilings and subfloors.

#### 4.6 Electric grounding

ViegaPEX Barrier and Viega FostaPEX may not be used as an electrical ground.

#### 4.7 Repairs

Sections of damaged tubing should be repaired by cutting out the damaged section and installing a repair coupling. If the repair will be contained within a slab it should be protected with Viega's repair coupling wrap. See page 29.

On vertical runs ViegaPEX Barrier and Viega FostaPEX tubing should be fastened at intervals of a maximum of 48". The lock clips stand off design keeps the tubing away from studs.

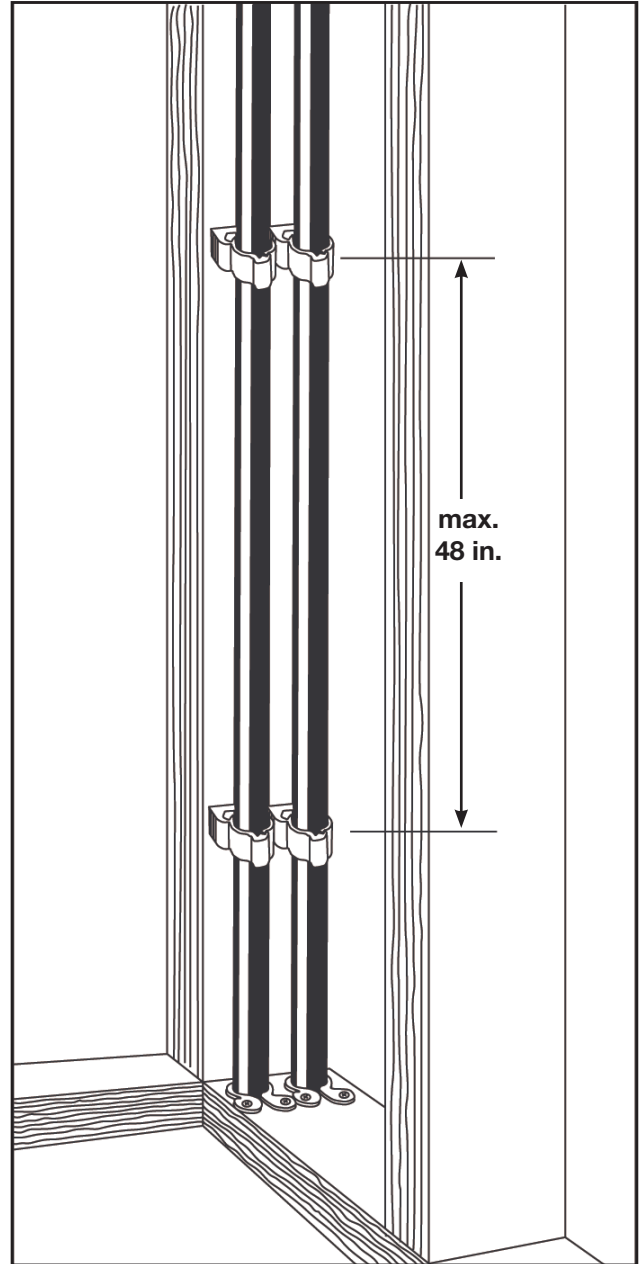
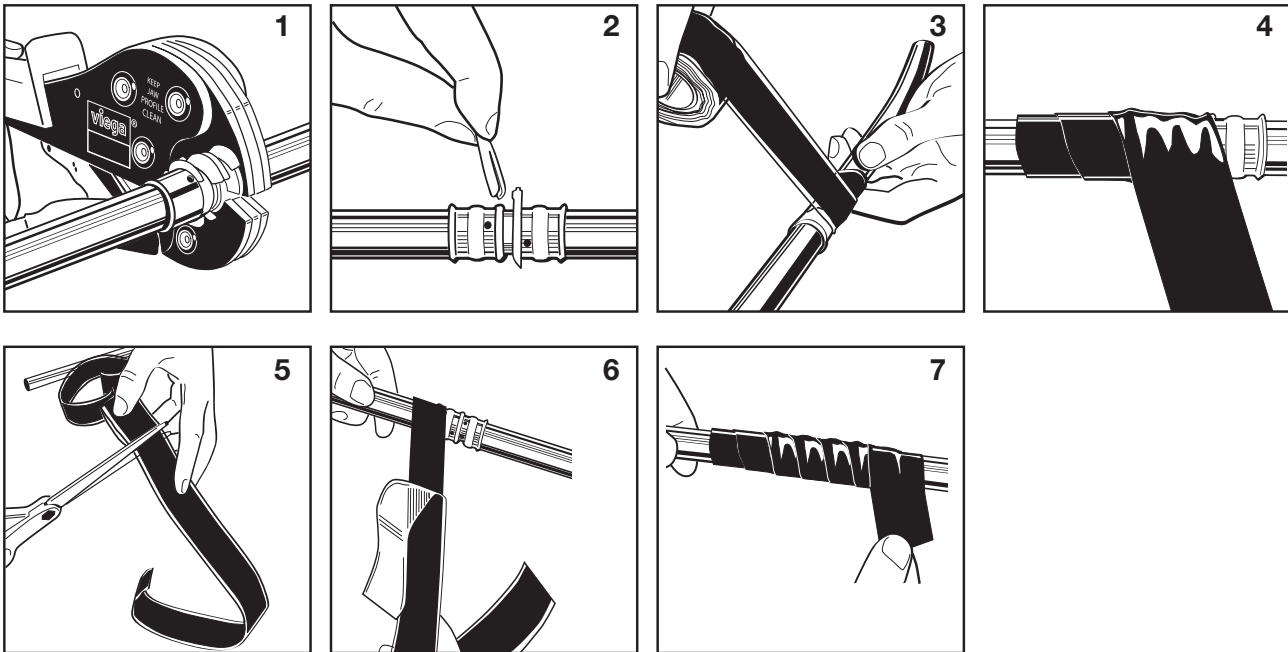


Figure 4.7: Lock clip fasteners support tubing in vertical runs between floors.

#### 4.7.1 ViegaPEX repair coupling wrap



1. Press fitting as per Viega's PEX press product instructions.
2. Remove tool locator rings to ensure a proper seal.
3. Leaving protective film in place, measure amount of tape required for sealing fitting by wrapping fitting completely.
4. Overlap by ½" - 1" to ensure proper seal
5. Cut required length of tape.
6. Carefully wrap fitting with tape, removing protective film as fitting is wrapped.
7. Completely cover fitting. The silicone will bond within 2 minutes and create a permanent bond within 24 hours.

**NOTE:** Concrete pour will not affect sealant's bonding process.

#### 4.8 Concrete construction

ViegaPEX Barrier and Viega FostaPEX tubing may be run within concrete slabs or below grade where necessary. 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 or fire stopping compound where specified. Do not use oil based caulk. For help with selecting a caulk that is compatible with PEX tubing contact Technical Services 1-877-843-4262, ext. 350. Below grade, support tubing on a firm, packed base and allow sufficient slack for expansion and contraction.

Every effort should be made to use only continuous lengths of tubing within a slab. If the use of fittings buried in concrete is necessary for repairs, all such fittings must be wrapped with Viega repair wrap to prevent corrosion (this is not necessary in soil).

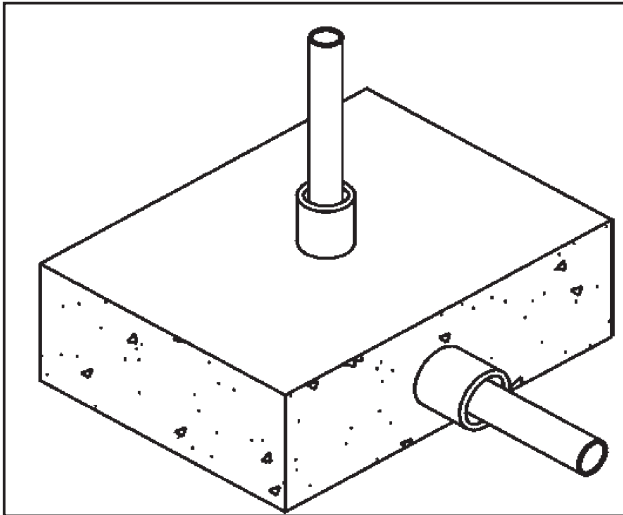


Figure 4.8a

#### 4.9 PEX tubing expansion and contraction

A slight amount of slack should be left in each run to allow for this contraction without stressing the fittings. Fasteners should not grip tubing tightly so that the tubing can move slightly as expansion takes place. Offsets will give tubing a place to expand and contract without stressing fittings.

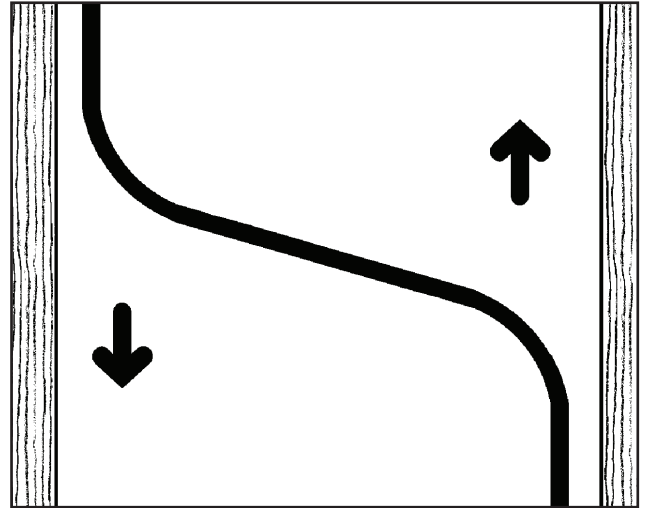


Figure 4.9a

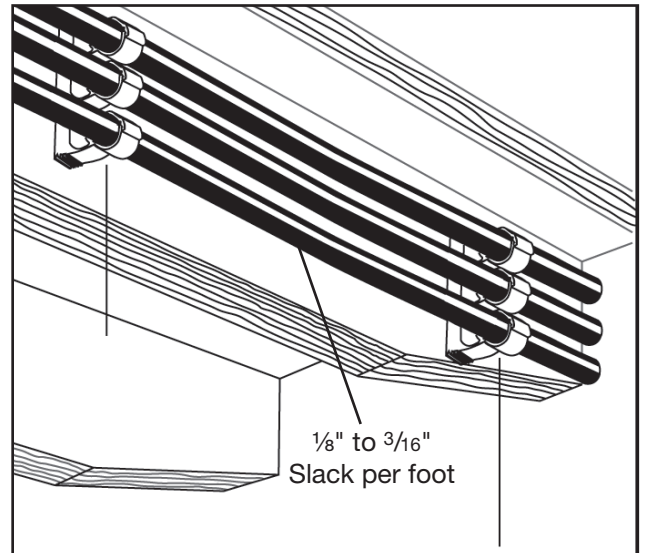


Figure 4.9b

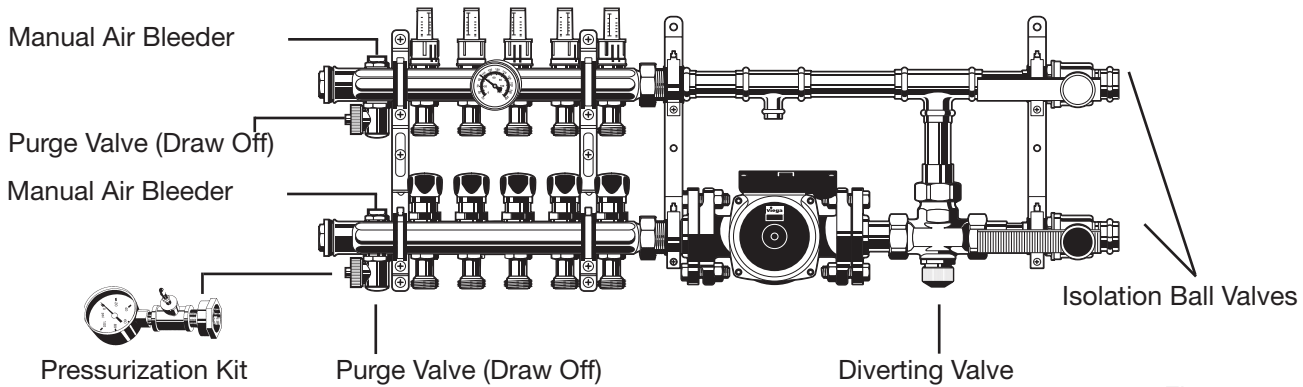


Figure 5.1a

## 5.1 Assembled mixing station

Viega's patented assembled mixing stations provide a simple solution for water supply modulation. The station comes pressure tested and pre-assembled making jobsite installation easy, fast and reliable. The station is equipped with either a low or high head pump. The attached 1 1/4" stainless steel manifold includes air vents and purge valves. Two 1" isolation ball valves are on the boiler supply and return side to allow the connection to any primary loop or boiler. For zoning, the return header is fitted with shut off valves to accommodate 24V powerheads. The flow rate of each individual circuit can be adjusted at the balancing valves which are located on the supply header. In a combiflex system ViegaPEX Barrier or Viega FostaPEX can be connected to the manifold with Viega's PEX press or compression adapters.

### Water supply modulation

The diverting valve in Viega's mixing station is located on the system return side of the station. It can direct the system's return flow out of the system (open position) or it can recirculate it back into the system (closed position). When the valve is fully open and the system return flow is diverted to the boiler return side, 100% boiler supply flow will consequently enter the system. If the valve is fully closed, the return flow will recirculate in the system. In combination with Viega's basic heating control and three position actuator the diverting valve modulates the system return flow between the open and closed position which causes a mix of boiler supply and system return flow. Another feature of the diverting valve is the integrated high limit which controls the maximum system water supply temperature.

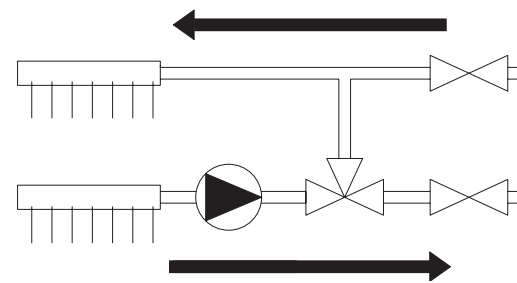


Figure 5.1b: Diverting valve open

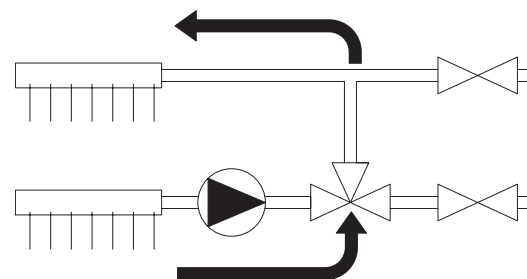


Figure 5.1c: Diverting valve closed

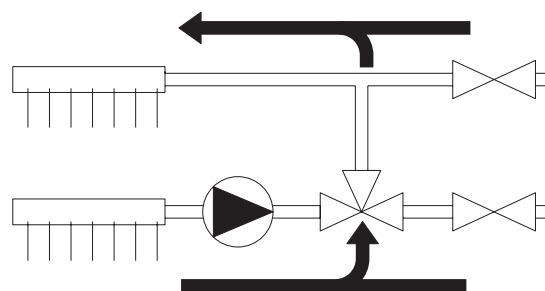


Figure 5.1d: Diverting valve modulating between open and closed position

The Viega assembled mixing station is shipped ready to hang on the wall. The stainless manifolds are available with compression (COM), press (PPS), PEX press (PRS) or copper (male) (COP). Station comes pre-assembled and factory tested. Boiler feed, tubing size and circuit connection must be specified - see ordering example below.

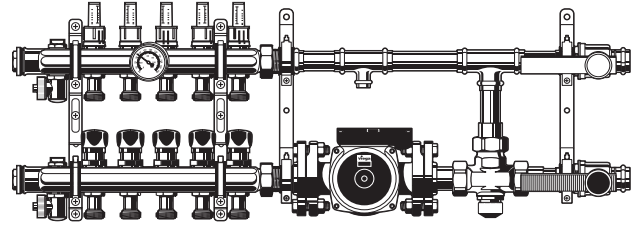
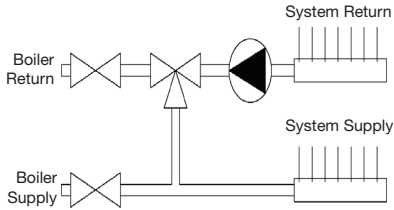
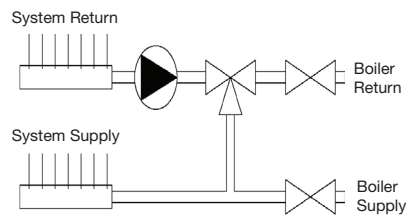


Figure 5.3a

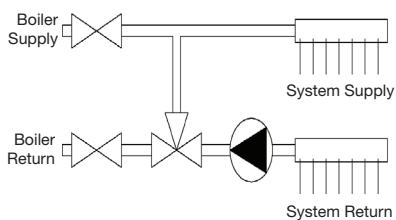
**TL (Top Left Configuration)**



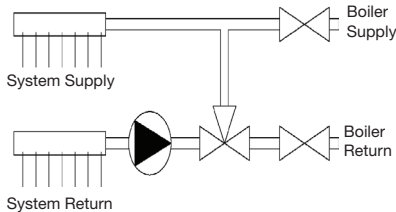
**TR (Top Right Configuration)**



**BL (Bottom Left Configuration)**



**BR (Bottom Right Configuration)**



**When ordering, specify:**

Part No - Configurations - Tubing Size - Circuit Connection - Boiler Adapter

Example:

**15940-BR-1/2-PRS-PPS**

Part No      Bottom Tubing Right Boiler Feed (Configuration)      1/2" Tubing      Press Circuit Connection      Boiler Adapter

Circulator	Outlets	Low Head 3 Speed		High Head 3 Speed	
		Shut Off/ Balancing Valves/ Flow Meters	Shut Off/ Balancing Valves	Shut Off/ Balancing Valves/ Flow Meters	Shut Off/ Balancing Valves
		Part No	Part No	Part No	Part No
Mixing Station	2 outlets	15940	15740	15980	15780
Mixing Station	3 outlets	15941	15741	15981	15781
Mixing Station	4 outlets	15942	15742	15982	15782
Mixing Station	5 outlets	15943	15743	15983	15783
Mixing Station	6 outlets	15944	15744	15984	15784
Mixing Station	7 outlets	15945	15745	15985	15785
Mixing Station	8 outlets	15946	15746	15986	15786
Mixing Station	9 outlets	15947	15747	15987	15787
Mixing Station	10 outlets	15948	15748	15988	15788
Mixing Station	11 outlets	15949	15749	15989	15789
Mixing Station	12 outlets	15950	15750	15990	15790



## 5.2 Specifications for the base mixing station

### Dimensions\*

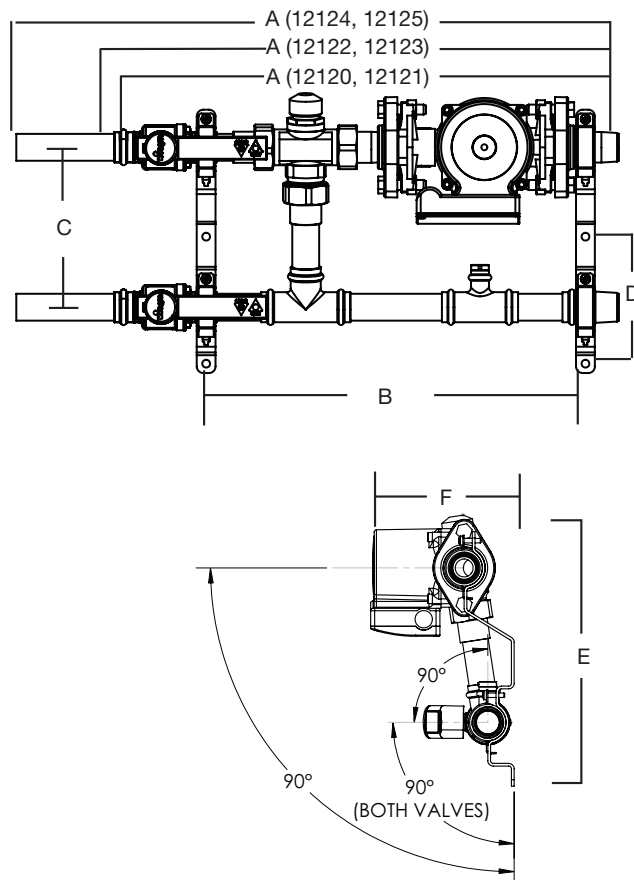
# Outlets	Mixing Station Stainless Manifold
2 outlets	28.89"*
3 outlets	30.89"*
4 outlets	32.89"*
5 outlets	34.79"*
6 outlets	36.79"*
7 outlets	38.79"*
8 outlets	40.69"*
9 outlets	42.69"*
10 outlets	44.69"*
11 outlets	46.59"*
12 outlets	48.59"*

\*Dimensions based off stock code 12120/12121

\*When using stock code 12122/12123, add .98"

\*When using stock code 12124/12125, add 4.27"

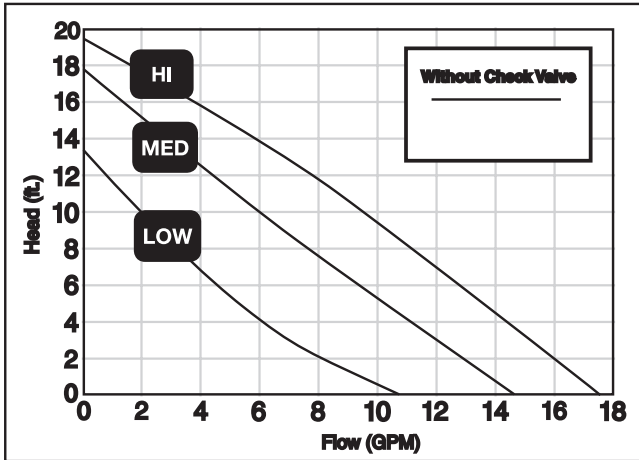
Part No	A(in)	B(in)	C(in)	D(in)	E(in)	F(in)
12120	20.69	16	6.69	5.31	11.72	6.14
12121	20.69	16	6.69	5.31	11.72	6.98
12122	21.67	16	6.69	5.31	11.72	6.14
12123	21.67	16	6.69	5.31	11.72	6.98
12124	24.78	16	6.69	5.31	11.72	6.14
12125	24.78	16	6.69	5.31	11.72	6.98



### Materials

Description	Part No
ProPress 1" Ball Valves (2)	19688
ProPress 1" Tee	77412
ProPress 1" x 1/2" Tee	77432
ProPress 1" C x M NPT	79245
Sensor Well Set	12128
3 Speed Circulator Pump	12126 (low) 12127 (high)
Diverting Valve	20002
Strap On Temp. Gauge	15055
1" PEX Press x 1" Copper (male)	97560

### 3 Speed low head circulator pump



Flow Range: 0 - 17.5 U.S. GPM

Head Range: 0 - 19 feet

Motor: 2 Pole, Single Phase, 120V

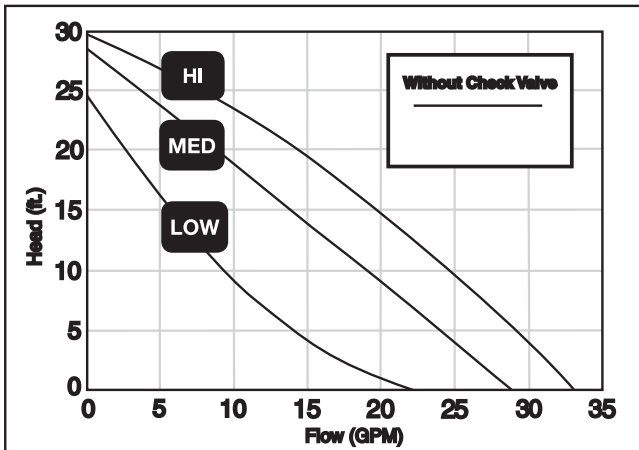
Maximum fluid temperature: 230°F (110°C)

Minimum fluid temperature: 36°F (2°C)

Maximum working pressure: 145 PSI

Stock Code	SPEED	AMPS	WATTS	HP
12126	HI	0.75	87	1/25
	MED	0.66	80	1/25
	LOW	0.55	60	1/25

### 3 Speed high head circulator pump



Flow Range: 0 - 34 U.S. GPM

Head Range: 0 - 30 feet

Motor: 2 Pole, Single Phase, 120V

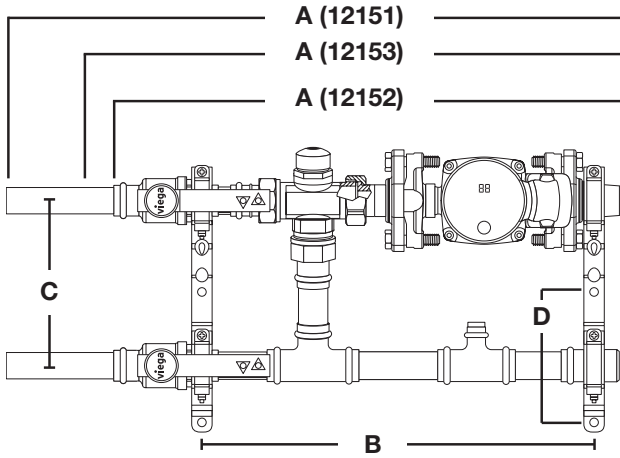
Maximum fluid temperature: 230°F (110°C)

Minimum fluid temperature: 36°F (2°C)

Maximum working pressure: 145 PSI

Stock Code	SPEED	AMPS	WATTS	HP
12127	HI	1.8	197	1/6
	MED	1.5	179	1/6
	LOW	1.3	150	1/6

### 5.3 Specifications for the enhanced mixing station



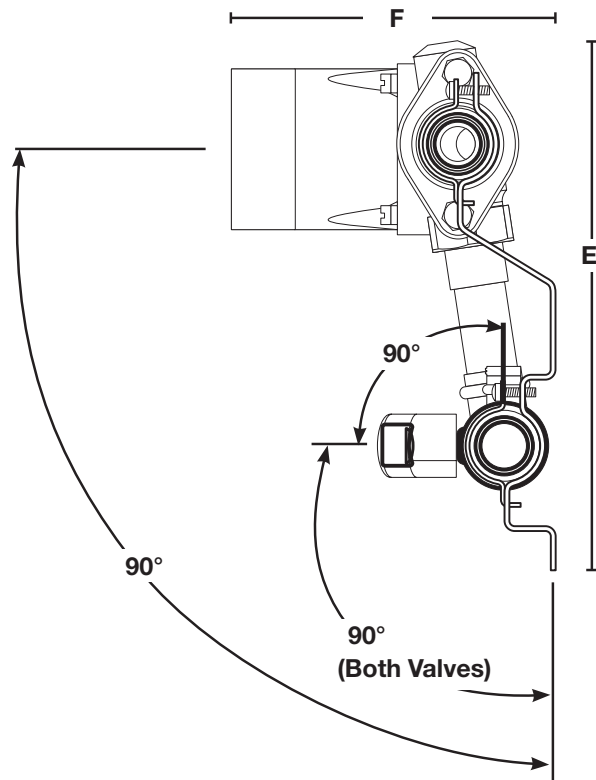
#### Dimensions

# Outlets	Dimensions*	
	Mixing Station	Stainless Manifold
2 outlets		28.96
3 outlets		30.96
4 outlets		32.96
5 outlets		34.86
6 outlets		36.86
7 outlets		38.86
8 outlets		40.76
9 outlets		42.76
10 outlets		44.76
11 outlets		46.66
12 outlets		48.66

\* Dimensions based off stock code 12152

\* When using stock code 12153 add .98"

\* When using stock code 12151 add 4.04"

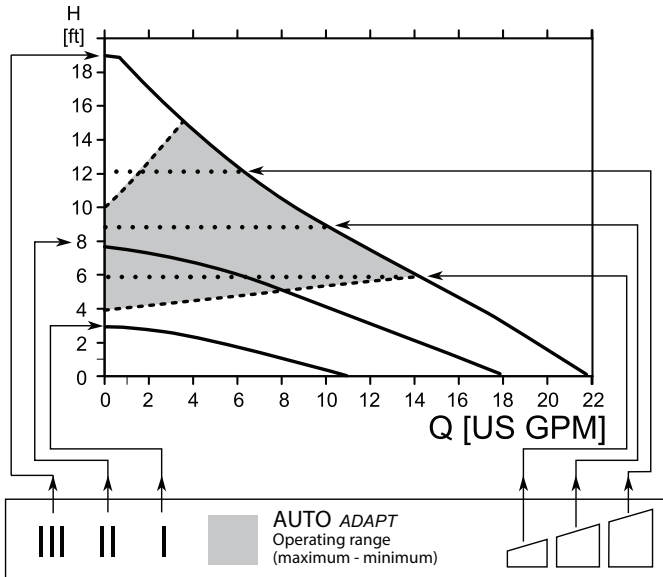


Stock Code	A (in)	B (in)	C (in)	D (in)	E (in)	F (in)
12151	24.79	16	6.69	5.31	11.72	7.39
12153	21.73	16	6.69	5.31	11.72	7.39
12152	20.75	16	6.69	5.31	11.72	7.39

#### Materials

Description	Stock Code
ProPress 1" Ball Valves (2)	19688
ProPress 1" Tee	77412
ProPress 1" x 1/2" Tee	77432
ProPress 1" C x M NPT	77482
Sensor Well Set	12128
Diverting Valve	20002
Strap On Temp Gauge	15055
1" PEX press x 1" Copper (Male)	67560

Enhanced mixing station pump performance



\*Hydraulic performance without check valve

Flow Range: 0 - 34 U.S. GPM  
 Head Range: 0 - 22 feet  
 Motor: 2 Pole, Single Phase, 120V  
 Maximum fluid temperature: 230°F (110°C)  
 Minimum fluid temperature: 36°F (2°C)  
 Maximum working pressure: 150 psi

Approximate power usage:

Speed Setting	Min.	Max.
High fixed speed	39W	45W
Medium fixed speed	15W	30W
Low fixed speed	5W	8W
Constant pressure	8W	45W
Constant pressure <b>I</b>	14W	45W
Constant pressure	22W	45W
AutoADAPT	5W	45W

**Pos. Description**



- Push-button for selection of pump setting
- Every time the push-button is pressed, the circulator setting is changed

**High Fixed Speed**



- Runs at a constant speed and consequently on a constant curve. In Speed III, the pump is set on the maximum curve under all operating conditions. Quick Vent of the pump can be obtained by setting the pump to Speed III for a short period.

**Medium Fixed Speed**

- Runs at a constant speed and consequently on a constant curve. In Speed II, the pump is set on the medium curve under all operating conditions.

**Low Fixed Speed**

- Runs at a constant speed and consequently on a constant curve. In Speed I, the pump is set on the minimum curve under all operating conditions.

**Constant Pressure I**

- The duty point of the pump will move left and right along the lowest constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.



**Constant Pressure II**

- The duty point of the pump will move left and right along the middle constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.

**Constant Pressure III**

- The duty point of the pump will move left and right along the highest constant-pressure curve depending on water demand in the system. The pump head (pressure) is kept constant, irrespective of the water demand.

**AutoADAPT (Factory Setting)**



- This function controls the pump performance automatically within the defined performance range (shaded area). AutoADAPT will adjust the pump performance to system demands over time.

## 5.4 High temperature limit

### Operation high limit

Viega stations (base, assembled and enhanced) are provided with a pre-installed temperature high limit kit. This kit is installed into the diverting valve to allow a maximum supply water temperature to be set. This kit must be unscrewed when purging the system and should then be set according to the instructions below.

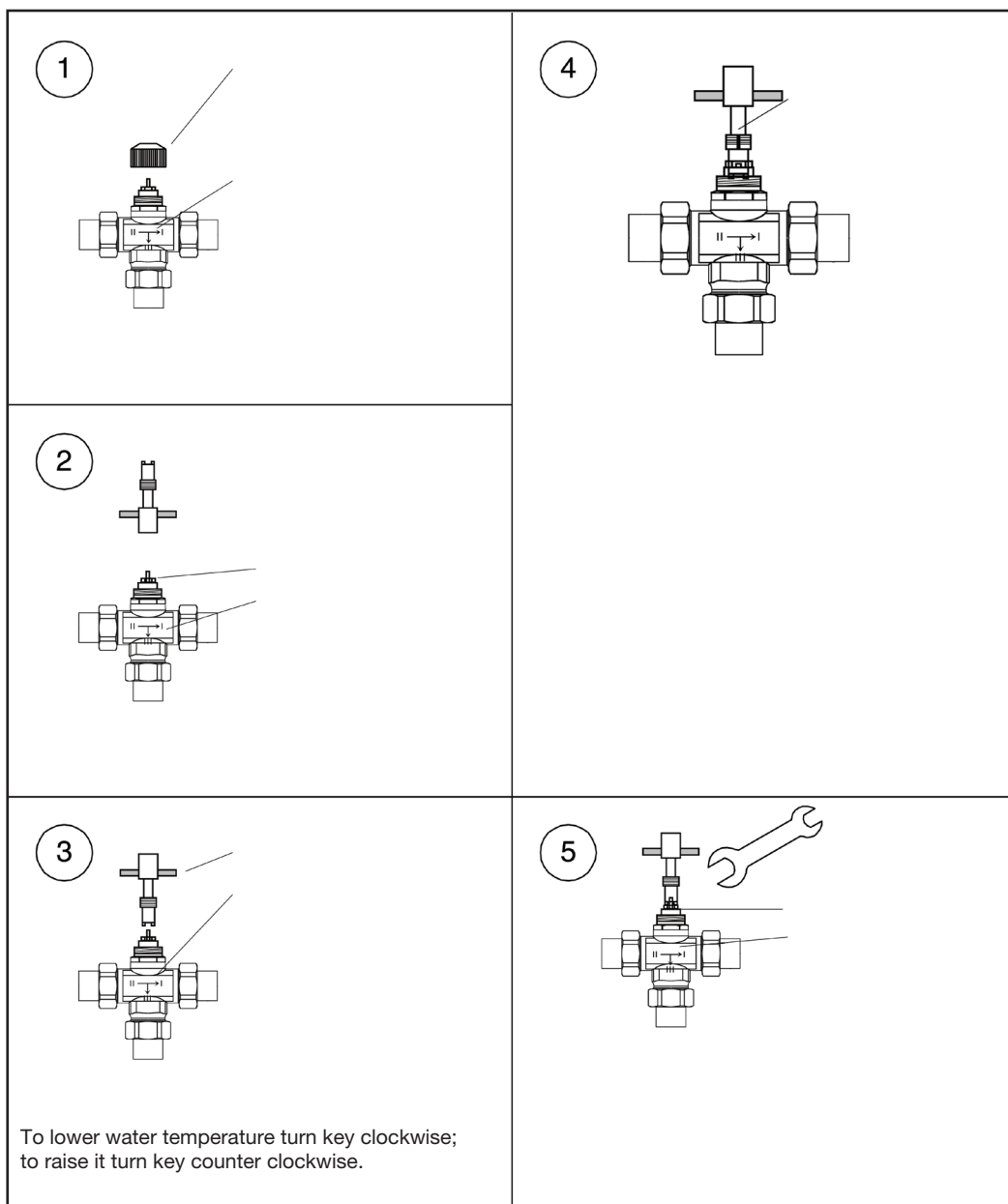


Figure 5.5

## 5.5 Specification for hydronic mixing block

### Technical Data

#### Input voltage/current

120 VAC  $\pm$  10% 60 Hz, 2A

#### Sensors

(2) 10k $\Omega$  - 1 boiler sensor, 1 outdoor sensor  
 Sensor wiring may be extended up to 500'  
 Use 18 gauge wire when extending

#### Boiler relay

24VAC 1.0 MAX AMPS

#### Circulator relay

24VAC 1.0 MAX AMPS

#### Microprocessor

8 Bit, 32 MHz

#### Fluid

Water

Propylene or Ethylene glycol to 50% concentration

#### Temperature

Maximum Temperature: 203°F

#### Pressure

Maximum Working Pressure: 45 psi  
 Maximum Test Pressure: 100 psi

#### Weight

10 lbs.

#### Dimensions

12.18"W x 10"H x 6.7"D

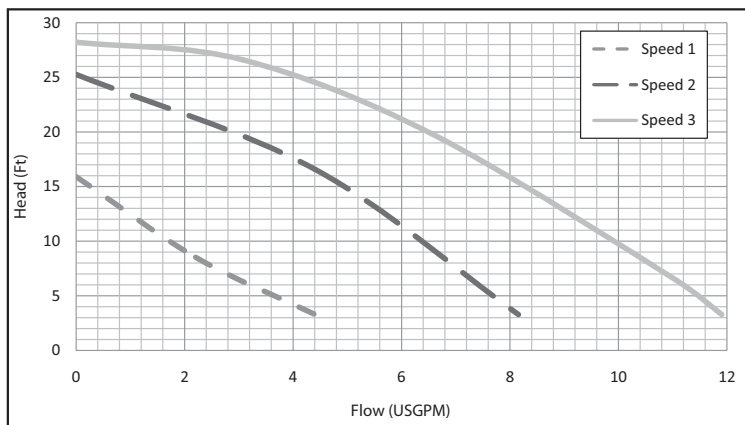
#### ETL listings

Meets CSA C22.2 No. 24  
 Meets UL Standard 873  
 ETL Control No. 3068143

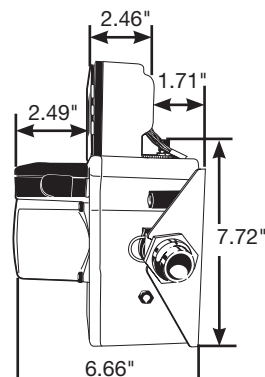
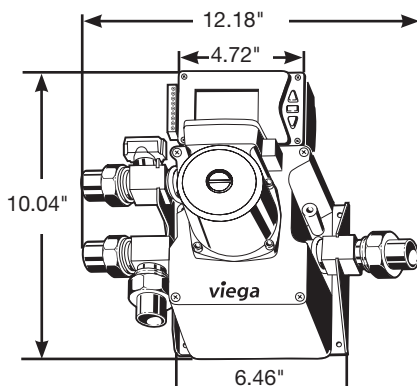
#### Part No

56160

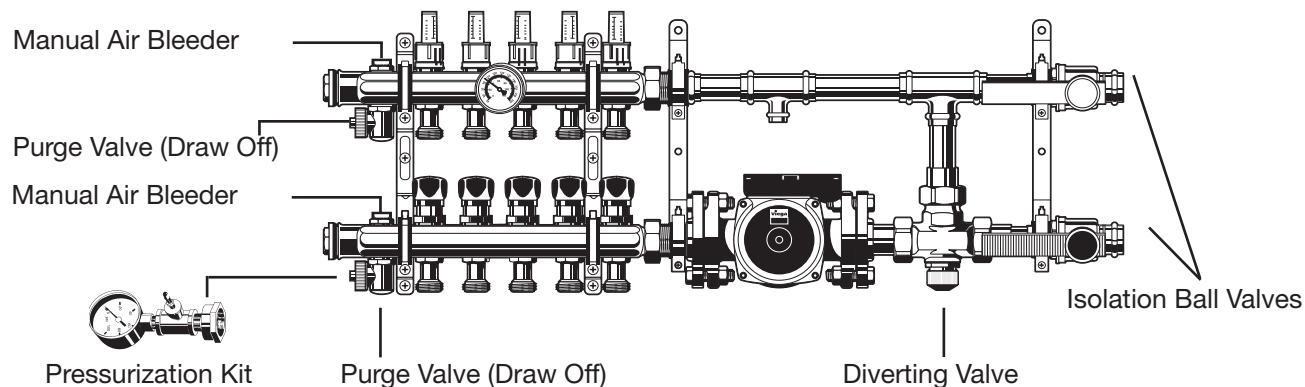
### Pump curve for hydronic mixing block



### Dimensions



## 5.6 System start-up for mixing stations



### *Pressure testing*

Before the finish floor is installed and during concrete pouring the radiant system must be pressure tested. Air or water may be used as the medium. The following procedure is recommended by Viega. Check the local building code for compliance or additional test requirements.

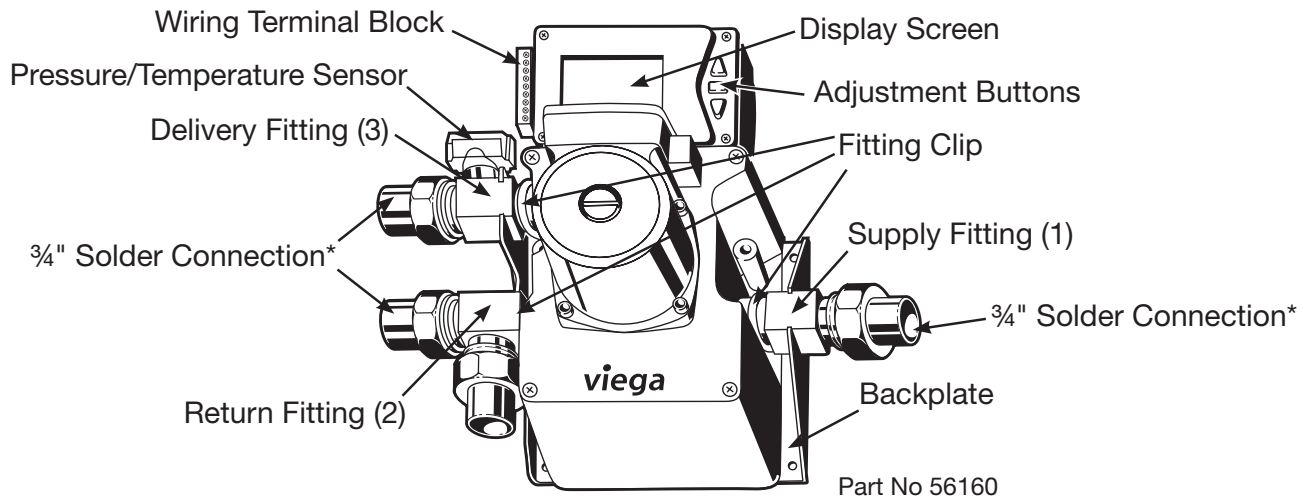
1. Double check all connections to manifold to ensure proper seal.
2. Connect manifold pressurization kit (1) to any purge valve (2).
3. Pressurize the system to 100 psi to detect potential nail or screw penetrations.
4. The system should hold the 100 psi for a minimum of 1 hour.

### *Filling and purging*

1. Attach drain hose to purge valve hose connection on return header and open valve.
2. Close all but one circuit. Close isolation ball valve on boiler return line. Remove plastic dust cap or temperature controller from 3-way valve, and make sure that high limit kit is fully open.
3. Open boiler fast fill valve to purge circuit. After purging first circuit, close red balancing valve and open next one. Continue with one circuit at a time until all circuits have been purged.
4. Close purge valve and open all balancing and boiler valves. Reset high-limit kit, and reinstall temperature controller or actuator onto 3-way valve.
5. Any remaining air pockets in the system will be eliminated through the automatic air vent after a few hours of constant circulation.

**NOTE:** If the system must be purged again in the future for any reason, the high limit kit must be re-opened during purging for full flow.

## 5.7 System start-up for hydronic mixing block



### Pressure testing

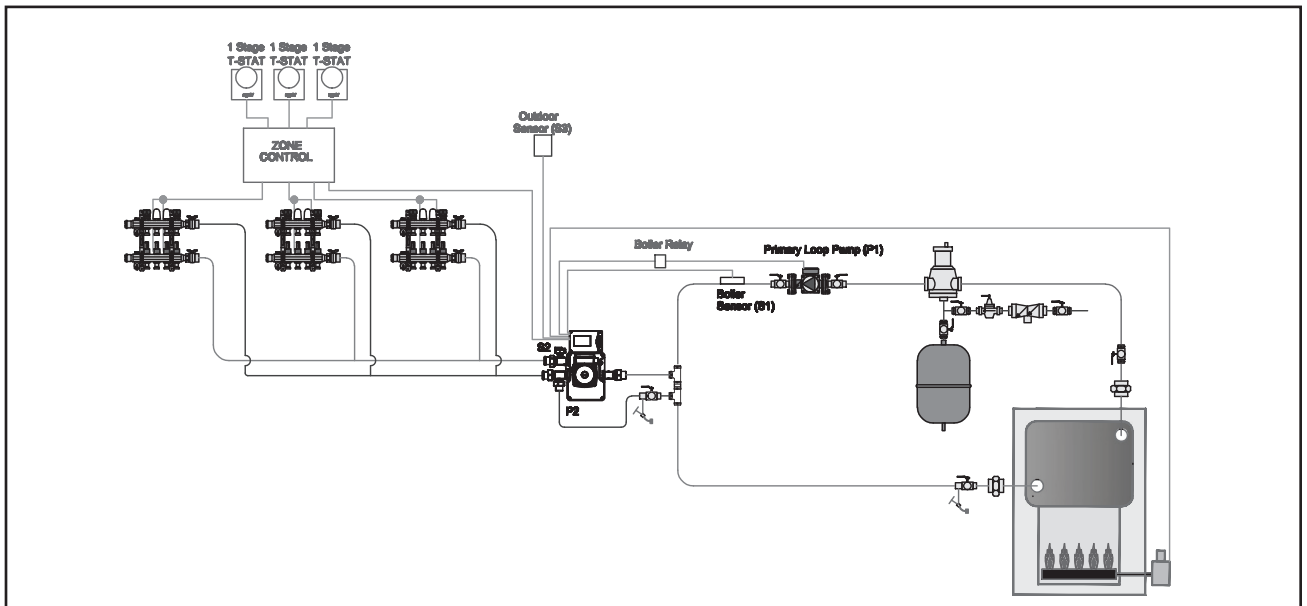
When piping is complete, test the hydronic mixing block.

1. Ensure air vent cap is tight before testing.
2. Pressurize the system to a maximum of 100 psi for one hour.
3. Once the system maintains 100 psi for one hour, carefully remove air pressure from the system and fill with fluid. Inspect all piping and fitting joints for leaks.

### Filling and purging

When testing is complete, purge the hydronic mixing block.

1. Allow the hydronic mixing block to be filled with fluid from the supply side piping.
2. Close the valve on the return piping to the boiler.
3. Open the purge valve to allow trapped air to be eliminated.
4. Continue to allow fluid to run into the block and out the purge valve until all air is removed from the system.
5. Open the air vent cap to allow air to escape under normal operation.





## 6.1 ViegaPEX Barrier tubing

### Scope

This specification designates the requirements for ViegaPEX Barrier cross-linked polyethylene (PEX) tubing for use in hydronic heating and cooling systems. ViegaPEX Barrier includes an oxygen barrier layer that helps restrict the passage of oxygen through the wall of the tubing. All ViegaPEX is manufactured and tested to the requirements of ASTM F876, F877, CSA B137.5 and is CTS-OD (copper tube size outer dimension controlled) with an SDR - (standard dimension ratio) 9 wall thickness. ViegaPEX Barrier is compatible with both ViegaPEX press fittings and F1807 PEX Crimp fittings. Viega has no control over the quality of other manufacturers, therefore, we do not extend any warranty to those components that are not supplied by Viega.

### Materials

ViegaPEX Barrier tubing is produced from cross-linkable, high density polyethylene resin. This cross-linkable resin is produced by grafting organo-silane molecules onto a base polyethylene chain. A catalyst that initiates the cross-linking process is blended with the resin before extrusion. Cross-linking is conducted after extrusion by exposing the tubing to heat and moisture (steam). ViegaPEX Barrier includes four (4) layers. The first layer is cross-linked, high density polyethylene. The second layer is an adhesive for the third layer, the ethylene vinyl alcohol layer (EVOH oxygen barrier). The fourth layer is another thin layer of polyethylene, applied on the outside to protect the EVOH layer from damage. EVOH is highly resistant to the passage of oxygen.

### Marking and certification

Tubing is marked with manufacturer, ViegaPEX Barrier, nominal size, rating, codes and standards, approvals, date, material code and location of production (i.e., xxxFT Viega ViegaPEX Barrier ½" SDR-9 CTS PEX5306 100 PSI @ 180F [cNSF@us-pw-rfh ASTM F876/F877 CSA B137.5] FS/SD 25/50 CAN/ULC S102.2 ICC ES-

PMG™-1015/1038 HUD MR 1276 Date Code Material Code MADE IN THE USA 0005FT. Tubing is third party tested to the requirements of the stated ASTM and CSA standards. Tubing includes incremental footage markings to assist with loop layout. ViegaPEX Barrier tubing is certified to NSF 61 and 14 for use as part of, or connected to a potable water system.

### Recommended uses

Install ViegaPEX Barrier in accordance with installation manuals provided by manufacturer and applicable code requirements. Water or air can be used to pressure test the system. Please follow manufacturer's requirements on pressure and length of time. ViegaPEX Barrier comes with a 6 month UV protection. For information on the suitability for other applications, contact your Viega representative.

### Handling and installation

ViegaPEX Barrier tubing is recommended for hydronic radiant heating, cooling and snow melting systems using water or a water/glycol mix as the heat transfer media. Tubing may be installed in concrete, gypsum based lightweight concrete, sand, asphalt (in accordance with special guidelines) in or under wood flooring or behind wallboard or plaster. ViegaPEX Barrier may also be used as transfer lines for baseboard heating systems with a maximum operating temperature of 200°F @ 80 psi.

PROPERTY	ASTM TEST METHOD	TYPICAL VALUES	
		ENGLISH UNITS	SI UNITS
Density	D 792	–	0.952 g/cc
Melt Index <sup>1</sup>	D 1238	–	0.7g/10 min
Flexural Modulus <sup>2</sup>	D 638	150,000 psi	1000 MN/m <sup>2</sup>
Tensile Strength @ Yield (2 in/min)	D 638	3,900 psi	26 MN/m <sup>2</sup>
Coefficient of Linear Thermal Expansion @ 68°F	D 696	9.2 x 10 <sup>-5</sup> /°F	1.4 x 10 <sup>-4</sup> /°C
Hydrostatic Design Basis @ 73°F (23°C)	D 2837	1,250 psi	8.6 MPA
Hydrostatic Design Basis @ 180°F (82°C)	D 2837	800 psi	5.5 MPA
Vicat Softening Point	D 648	255°F	124°C
Thermal Conductivity	D 177	2.7 Btu/hr/ft <sup>2</sup> /°F	1.1 x 10 <sup>-3</sup> cal/sec/cm <sup>2</sup> /°C

1. Before Cross-linking

2. 73°F

### Quality assurance

ViegaPEX Barrier tubing is manufactured and tested to the requirements of ASTM F876, F877 and CSA B137.5. The degree of cross-linking of finished tubing is determined by method ASTM D2765.

### Certifications

- NSF-pw** - Tested for health effects to ANSI/NSF standard 61 and performance to ANSI/NSF standard 14.
- NSF-rfh** - Products meet all applicable performance requirements for a pressure rated floor heating application specified in NSF/ANSI Standard 14.

**PEX 5306** - Tested and listed to the NSF-pw (CL5) 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 NSF-pw (CL5) designation, it affirms the product is approved for use in continuous domestic hot water circulation systems with up to 140°F water temperatures.



- IAPMO Certified



- ICC ES-PMG™ 1015 Hydronic Piping



- NSF certified to CSA B137.5 (Canadian Standards Association)

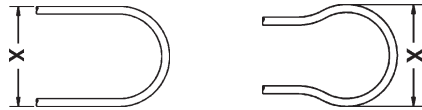


- Certified to CAN/ULC S102.2 FS/SD (25/50) (Canadian plenum rating)

### Tube spacing

When the tube spacing is less than the minimum recommended bending dimension, the loops ends should be swept out to at least the dimensions shown.

Otherwise, if tube spacing is equal or greater than "X", a standard loop may be used.



Dimension X

Tubing Size	With the Coil
5/16"	7"
3/8"	8"
1/2"	10"
5/8"	12"
3/4"	14"
1"	18"
1 1/4"	22"
1 1/2"	26"
2"	34"

### SDR-9 PEX tubing

#### ASTM F876/F877/CTS-OD SDR-9

Tubing Size	O.D.	Wall Thickness	Nom. I.D.	Weight Per Ft	Vol. (gal./ 100 Ft)
5/16"	.430±.003	.064+.010	0.292	.0340	0.34
3/8"	.500±.003	.070+.010	0.350	.0413	0.50
1/2"	.625±.004	.070+.010	0.475	.0535	0.92
5/8"	.750±.004	.083+.010	0.574	.0752	1.34
3/4"	.875±.004	.097+.010	0.671	.1023	1.82
1"	1.125±.005	.125+.010	0.862	.1689	3.04
1 1/4"	1.375±.005	.153+.015	1.053	.2523	4.52
1 1/2"	1.625±.006	.181+.019	1.243	.3536	6.30
2"	2.125±.006	.236+.024	1.629	.6026	10.8

NOTE: Dimensions are in English units. Tolerances shown are ASTM requirements. ViegaPEX is manufactured within these specifications.

ViegaPEX Barrier tubing is available in both straight lengths and coils.

### ViegaPEX Barrier oxygen permeation

All sizes have less than 0.1 gram/m<sup>3</sup>/day

**NOTE:** ViegaPEX Barrier tubing meets DIN 4726 requirements for oxygen tight pipes.

### Pressure drop table expressed as PSI/ft.

#### SIZE

GPM	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"
.1	.002	.001							
.2	.009	.004	.001						
.3	.018	.008	.002	.001					
.4	.031	.013	.003	.001					
.5	.047	.020	.004	.002					
.6	.066	.027	.006	.003	.001				
.7	.088	.036	.008	.003	.002				
.8	.111	.047	.011	.004	.002				
.9	.135	.058	.013	.005	.002				
1	.161	.070	.016	.007	.003	.001			
1.5	.241	.104	.024	.010	.006	.002			
2	.321	.138	.032	.013	.008	.003			
3	.481	.204	.048	.019	.011	.004			
4	.641	.270	.064	.025	.015	.005			
6	.961	.402	.096	.038	.022	.007			
8	1.281	.534	.128	.051	.029	.009			
10	1.601	.666	.160	.064	.036	.011	.023		
12	1.921	.798	.192	.077	.043	.013	.032		
14	2.241	.930	.224	.090	.050	.015	.042		
16	2.561	1.062	.256	.103	.057	.017	.052	.022	
18	2.881	1.194	.288	.116	.064	.019	.065	.027	
20	3.201	1.326	.320	.129	.071	.021	.078	.033	
22	3.521	1.458	.352	.142	.078	.023	.093	.039	
24	3.841	1.590	.384	.155	.085	.025	.108	.045	
26	4.161	1.722	.416	.168	.092	.027	.123	.052	
28	4.481	1.854	.448	.181	.100	.029	.138	.060	
30	4.801	1.986	.480	.194	.107	.031	.153	.067	
32	5.121	2.118	.512	.207	.114	.033	.168	.075	.021
34	5.441	2.250	.544	.220	.121	.035	.183	.083	.023
36	5.761	2.382	.576	.233	.128	.037	.198	.091	.026
38	6.081	2.514	.608	.246	.135	.039	.213	.099	.028
40	6.401	2.646	.640	.259	.142	.041	.228	.107	.031
45	7.201	2.946	.720	.285	.155	.045	.258	.117	.038
50	8.001	3.246	.800	.311	.168	.049	.288	.127	.046
55	8.801	3.546	.880	.337	.181	.053	.318	.137	.055
60	9.601	3.846	.960	.363	.194	.057	.348	.147	.064
65	10.401	4.146	1.040	.389	.207	.061	.378	.157	.075
70	11.201	4.446	1.120	.415	.220	.065	.408	.167	.085
75	12.001	4.746	1.200	.441	.233	.069	.438	.177	.097

## 6.2 Viega FostaPEX tubing

### Scope

This material specification designates the requirements for Viega FostaPEX multilayer pressure pipe for hot and cold water distribution tubing and hydronic radiant heating applications. All Viega FostaPEX tubing has a fully dimensioned inner PEX core to the copper tube size dimension (CTS), SDR-9 wall thickness and meets the respective requirements of ASTM Standard F876 and F877.

### Materials

The multi-layered construction of the Viega FostaPEX tubing is made from one full dimensional inner PEX core with an aluminum and outer PE layer surrounding it. This construction allows the inner layer alone to meet all temperature and pressure requirements of the system. Using the prep tool to remove the outer layers allows the use of the standard PureFlow PEX press fitting system.

### Marking and certification

All Viega FostaPEX tubing is marked with the name Viega as the manufacturer, nominal size, plastic tubing material designation code PEX 5006, Chlorine resistance rating NSF-pw (CL5), design pressure and temperature ratings, relevant ASTM standards, manufacturing date and production code, as well as the NSF-pw stamps indicating third-party certification by NSF International for meeting and exceeding performance and toxicological standards, as well as achieving the highest chlorine resistance rating in the PEX industry. NSF conducts random on-site inspections of Viega manufacturing facilities and independently tests Viega FostaPEX tubing for compliance with physical, performance and toxicological standards. Viega FostaPEX is also certified to meet the Uniform Plumbing Code, IAPMO UPC®, CSA (Canadian Standards Association) B137.5, the ICC (International Code Council) Evaluation Service, and HUD (Housing and Urban Development).

### Recommended uses

Viega FostaPEX tubing is intended and recommended for use in hot and cold potable water distribution systems and hydronic radiant heating and cooling systems. Like ViegaPEX Barrier, which has a barrier layer that resists the passage of oxygen through the wall of the tubing, the aluminum layer in Viega FostaPEX offers even higher resistance to oxygen permeation in radiant heating applications. Viega FostaPEX tubing can also be used in water service applications and is virtually impermeable to any soil contaminants. Design temperature and pressure ratings for Viega FostaPEX are 160 psi @ 73°F, 100 psi @ 180°F, and 80 psi @ 200°F. For information on the suitability for other hot and cold water applications not listed here, consult with your Viega representative.

### Handling and installation

Viega FostaPEX cross-linked polyethylene tubing is tough yet flexible. The aluminum layer allows tubing to be bent into position and remain in position when released. However, use of these materials in hot and cold water distribution systems must be in accordance with good plumbing practices, applicable code requirements, and current installation practices available from Viega. Viega FostaPEX is manufactured to meet written national standards. Contact a Viega representative or the applicable code enforcement bureau for information about approvals for specific applications.

PROPERTY	ASTM TEST METHOD	TYPICAL VALUES	
		ENGLISH UNITS	SI UNITS
Density	D 792	–	0.944 g/cc
Melt Index <sup>1</sup> (190° C/2.16 kg)	D 1238	–	8.5g/10 min
Coefficient of Linear Thermal Expansion @ 68° F	D 696	1.3x10 <sup>-5</sup> in/in/°F	2.4x10 <sup>-5</sup> mm/mm/°C
Hydrostatic Design Basis @ 73°F (23°C)	D 2837	1250 psi	8.6 MPa
Hydrostatic Design Basis @ 180°F (82°C)	D 2837	800 psi	5.5 MPa

1. Before Cross-linking

**Quality assurance**

When the product is marked with the ASTM F876 designation, it affirms that the product was manufactured, inspected, sampled and tested in accordance with these specifications and has been found to meet the specified requirements.

**Certifications**

**NSF-pw** - Tested for health effects to ANSI/NSF standard 61 and performance to ANSI/NSF standard 14.

**PEX 5006** - Tested and listed to the NSF-pw (CL5) 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 5006 NSF-pw (CL5) designation, it affirms the product is approved for use in continuous domestic hot water circulation systems with up to 140°F water temperatures.



- **IAPMO Certified**



- **ICC ES-PMG™ 1038/1015** plumbing and heating systems



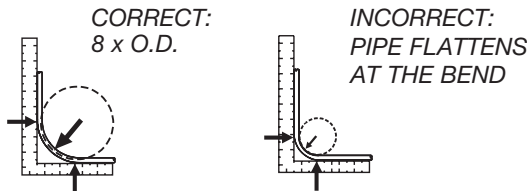
- **NSF certified to CSA B137.5** (Canadian Standards Association)



- **Certified to ASTM E84 and CAN/ULC S102.2 FS/SD (25/50)** (U.S. & Canadian plenum rating)

**HUD** (Housing and Urban Development) - MR 1276

**Minimum bend radius**



**NOTE:** Viega FostaPEX tubing may be bent to a minimum of 3.5 x O.D. with use of a Viega pipe bender.

**Minimum burst pressure (PSI) per ASTM F876/F877**

SIZE	73°F (23°C)	180°F (82°C)
1/2"	480	215
5/8"	475	200
3/4"	475	210
1"	475	210

**Thermal conductivity**

SIZE	BTU/h/ft/°F	W(m.°C)
1/2"	.484	.838
5/8"	.516	.892
3/4"	.547	.946
1"	.711	1.230

**SDR-9 PEX tubing  
ASTM F876/F877/CTS-OD SDR-9**

Part No	Tubing Size	Wall O.D.	Nom. Thickness	I.D.	Weight Per Ft	Volume(Gal.) Per 100 Ft
35020	1/2"	0.625±.004	0.070+.010	0.475	.0600	0.92
35030	5/8"	0.750±.004	0.083+.010	0.574	.0900	1.34
35040	3/4"	0.875±.004	0.097+.010	0.671	.1200	1.82
35060	1"	1.125±.005	0.125+.013	0.863	.2000	3.04

**NOTE:** Dimensions are in English units. Tolerances shown are ASTM requirements. Viega FostaPEX is manufactured within these specifications. (These dimensions do not reflect the outer aluminum and PE layers.)

**Pressure drop table  
Expressed as PSI/ft. pressure drop**

GPM	1/2"	5/8"	3/4"	1"
1	.016	.007	.003	.001
1.5	.034	.014	.006	.002
2.2	.069	.034	.013	.004
2.5	.087	.043	.016	.005
3	.122	.050	.023	.007
3.5	.162	.080	.030	.009
4	.208*	.100	.039	.011
5	.314	.154	.059	.017
6	.440	.181	.082	.024
7	.586	.287	.109	.032
8		.368	.140	.041
9		.457	.174*	.051
10		.556	.211	.062
11			.252	.074
12			.296	.087
13			.343	.101
14				.116
15				.132*
16				.148
17				.166
18				.184
19				.204
20				.224
21				.245
22				.267

**EXAMPLE:** To calculate the pressure drop of a 1/2" line, 40 ft. long, with a 3 gpm flow rate, calculate .122 psi x 40 ft. = 4.9 psi pressure drop. Most plumbing codes require 8 psi residual pressure at the fixture. Refer to your local code requirements.

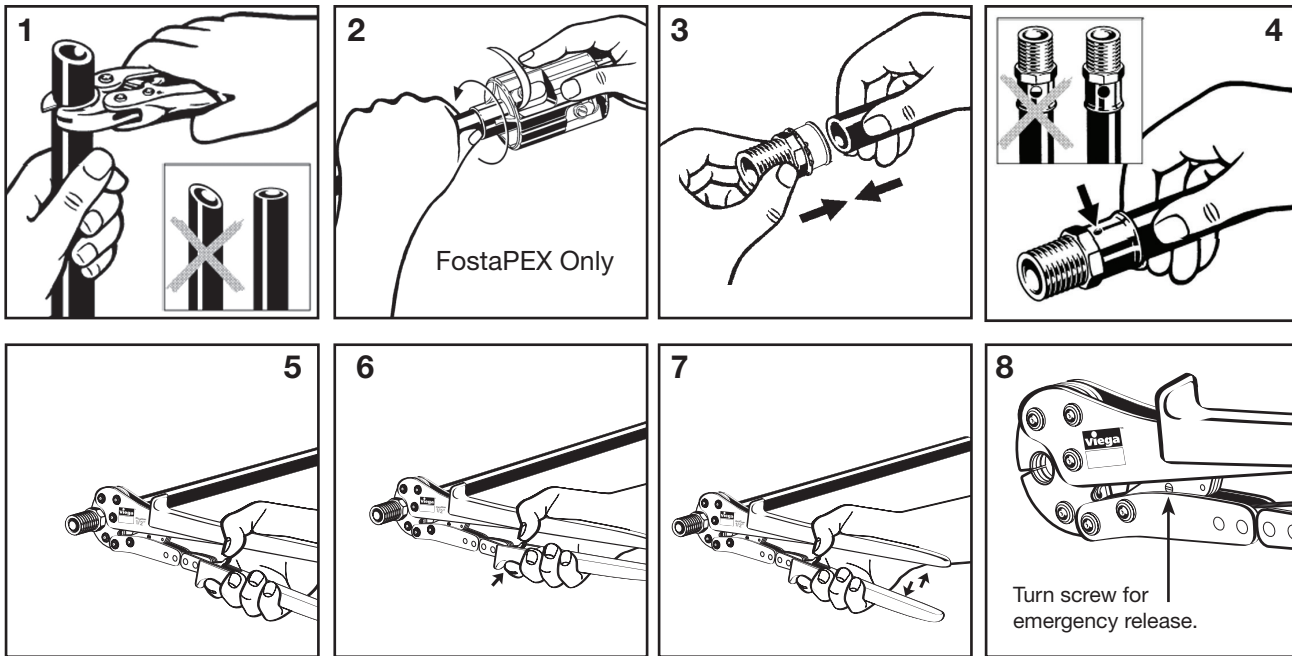
\*Indicates 8 fps maximum velocity required by some plumbing codes.

**NOTE:** Maximum flow for each size based on 12 FPS velocity.

PSI x 2.307 = head loss.

## Making a PEX press connection

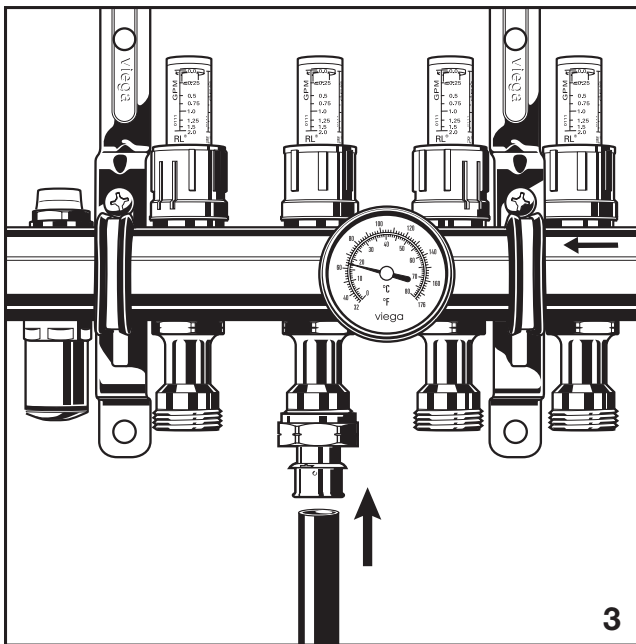
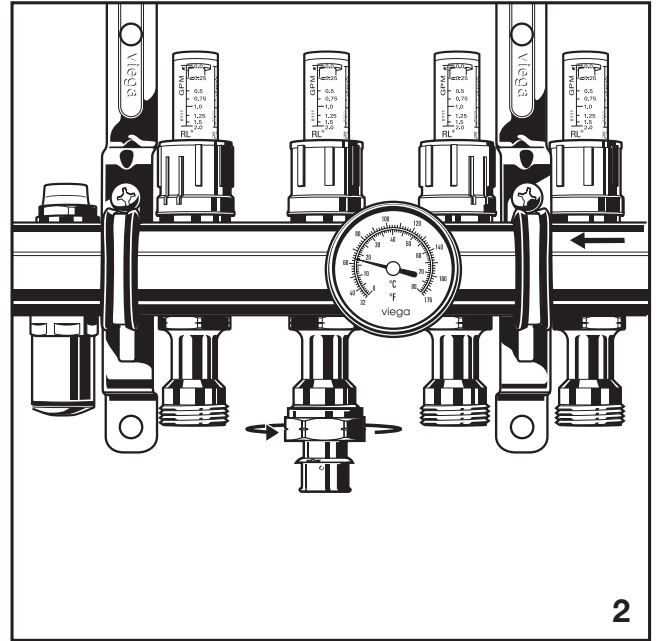
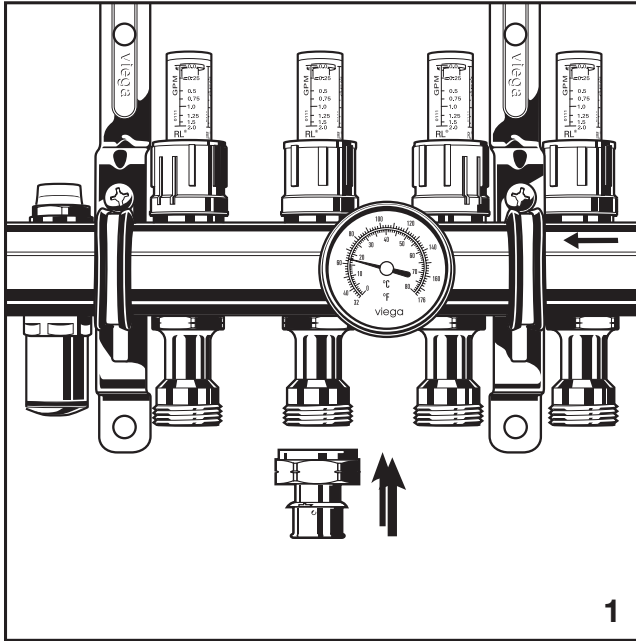
Follow these steps to make a press connection.



1. Square off tubing to proper length. Uneven, jagged or irregular cuts will produce unsatisfactory connections.
2. If using Viega FostaPEX tubing, insert into prep tool, push and turn until no resistance is felt. If using ViegaPEX Barrier, 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 the 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.

## Manifold connection - PEX press

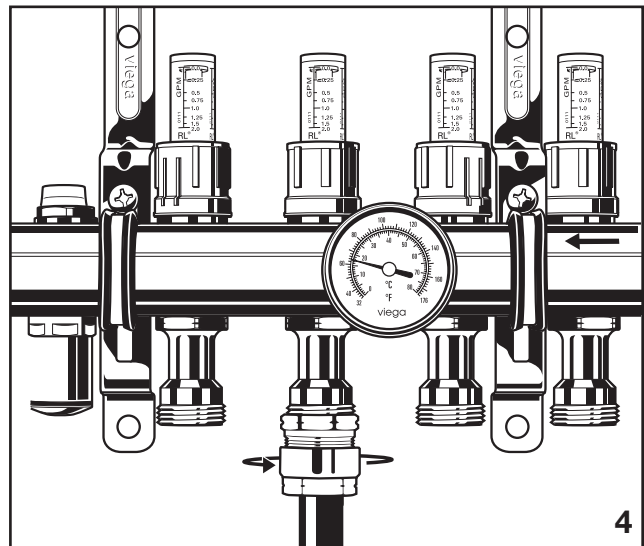
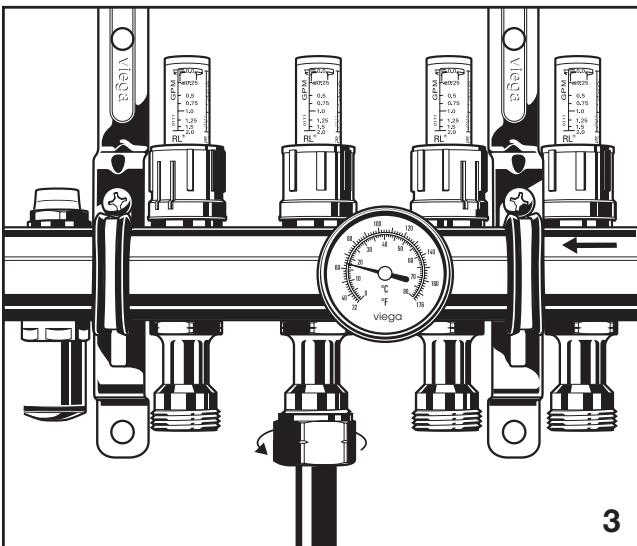
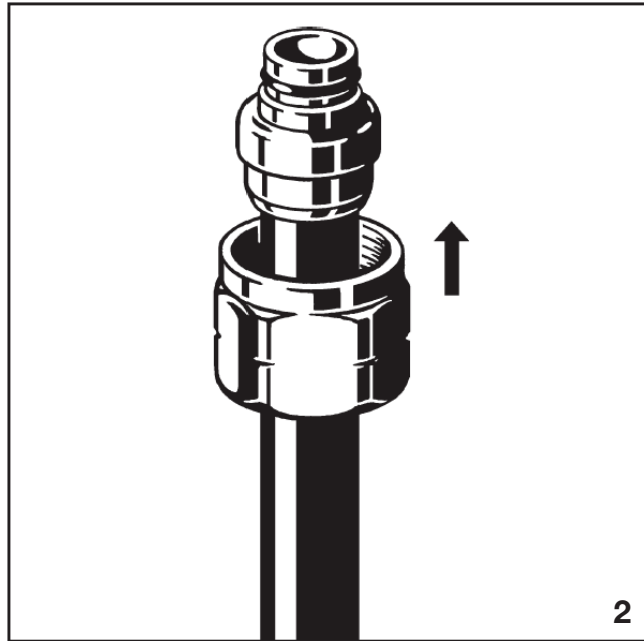
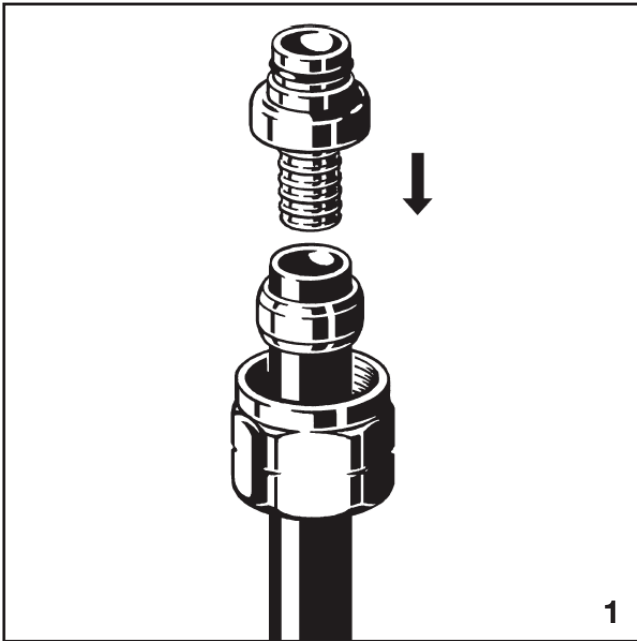
Follow these steps to make a  $\frac{5}{16}$ " -  $\frac{3}{4}$ " press connection.



1. Insert SVC adapter into seat (manifold or other fitting).
2. Tighten nut onto seat to secure press adapter.
3. Ensure full tubing insertion at view holes and make press connection.

## Manifold connection - compression

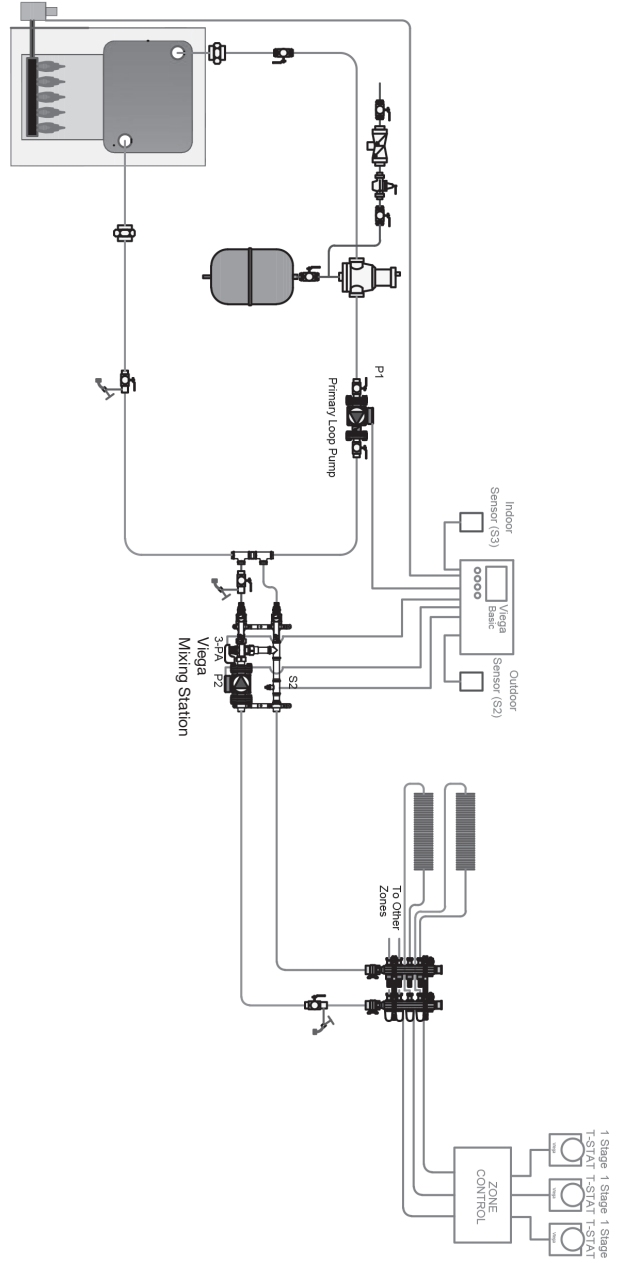
Follow these steps each time you make a  $\frac{5}{16}$ " -  $\frac{3}{4}$ " compression connection.



1. Square off tubing to proper length. Slide compression nut up tubing and slip brass ferrule over tubing.
2. Slide tubing over end of SVC adapter, pushing it on fully until tubing is flush with shoulder of fitting.
3. Insert SVC adapter into seat (manifold or other fitting) and tighten compression nut with wrench.  
Re-tighten compression nut slightly after 30 mins.
4. For  $\frac{3}{4}$ " connections, connect adapter to manifold before making connection.

Mixing equipment piping / wiring

Piping of mixing stations for high temperature applications.



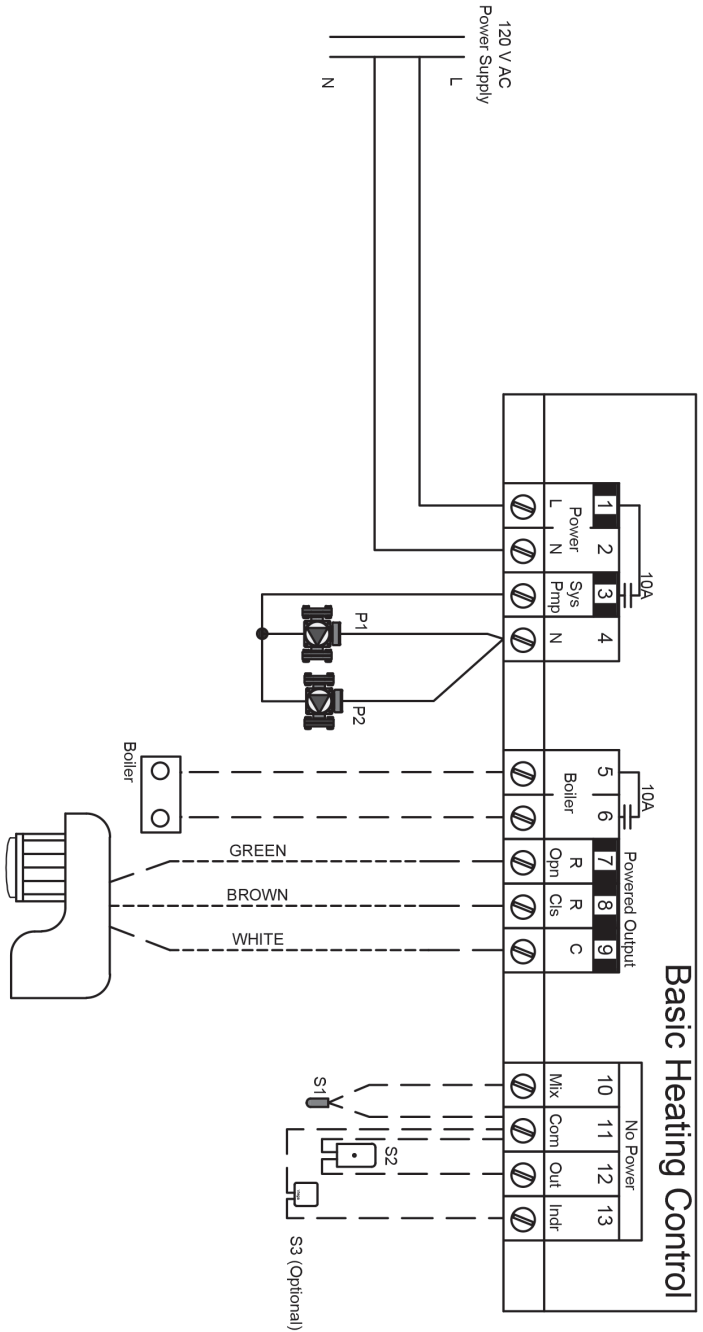
LEGEND: Mixing Station	
	Mixing Station
	Spring check
	Circulator
	Draw Off (Purge Valve)
	Make - Up Water
	Pressure Differential Bypass Valve
	Stainless Manifold w/ Flow Gauges
	Baseboard
	Zone (s)
	Diaphragm-Type Expansion Tank
	Zone Valve

NOTES: Piping

1. This drawing shows system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
2. Size header piping for maximum flow velocity of 2 feet / second.
3. All other piping should be sized for a maximum flow velocity of 4 feet/second.
4. Install a minimum of 12 diameters of straight pipe upstream of all circulators and check valves.
5. Install isolating flanges or isolating valves on all circulators.
6. Install purging valve(s) on all circuits.
7. All closely spaced tees shall be within 4 pipe diameter center to center spacing.
8. Install minimum of 6 pipe diameters of straight pipe upstream and downstream of all closely spaced tees.
9. Differential pressure bypass valve prevents flow noise under partial load conditions (some zone valves closed).
10. Set differential pressure bypass valve to delta P of distribution system with all zones open + 1 psi.
11. Not all components may be required depending on control strategy (i.e. constant circulation).



Wiring of mixing stations for high temperature applications.



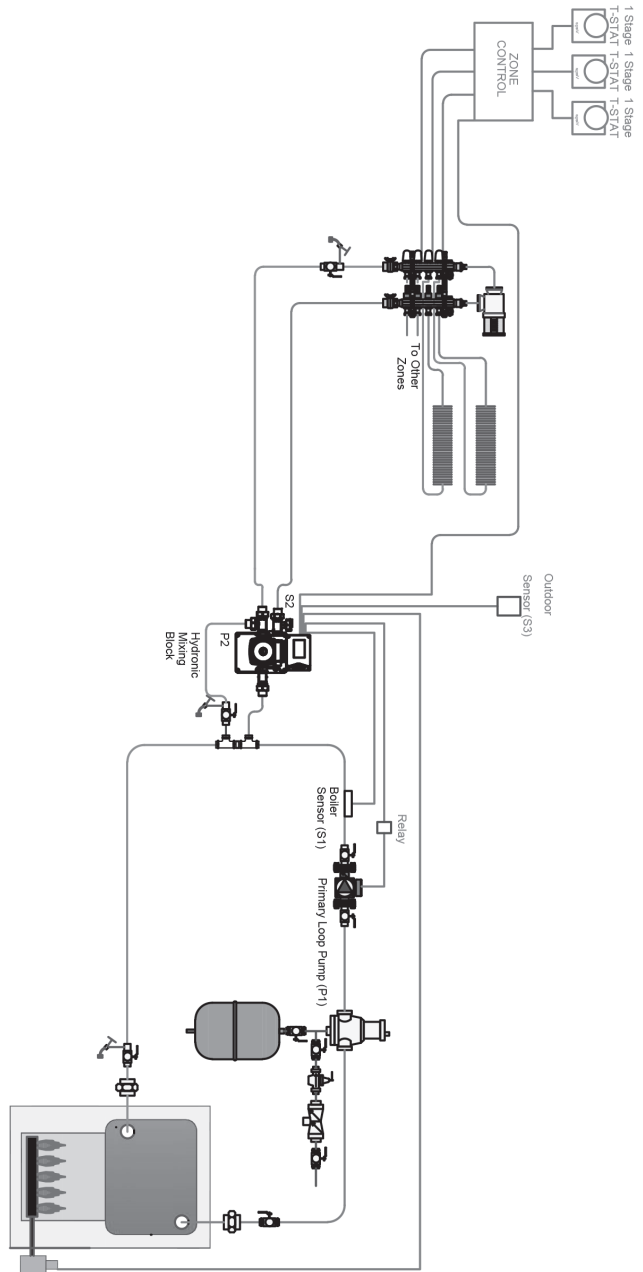
**LEGEND: Basic Heating Control**

—	Sensors
---	Low Voltage
---	Line Voltage
—	P1 = Primary Loop Circulator
—	P2 = Mixed Temperature Circulator
—	S1 = Mix Sensor
—	S2 = Outside Sensor
—	S3 = Inside Sensor

**NOTES: Wiring**

1. This drawing shows system wiring concept only. Installer is responsible for all equipment & detailing required by local codes.
2. All wiring shall be in conformance with the latest edition of the National Electrical Code.
3. Maximum current rating of hydronic mixing block Relay is 1 Amps, Basic and Advance Snow Melting Control Relay is 5 Amps, Maximum current rating of Zone Control Relays is 5 Amps, if circulator draw exceeds this use pilot relay with 120 VAC coil operated by Viega Control.
4. Consult with control / boiler manufacturer for limitations and installation instructions.
5. Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground. Use 18 AWG copper wiring for all sensor wiring.
6. DHW priority relay must be rated to handle full amperage load of zone circulator relay center.
7. Other configurations are possible, but all space heating zone circulators must turn off when DHW mode is on or heat source needs to be sized for multiple loads.

Piping of the hydronic mixing block for high temperature applications.

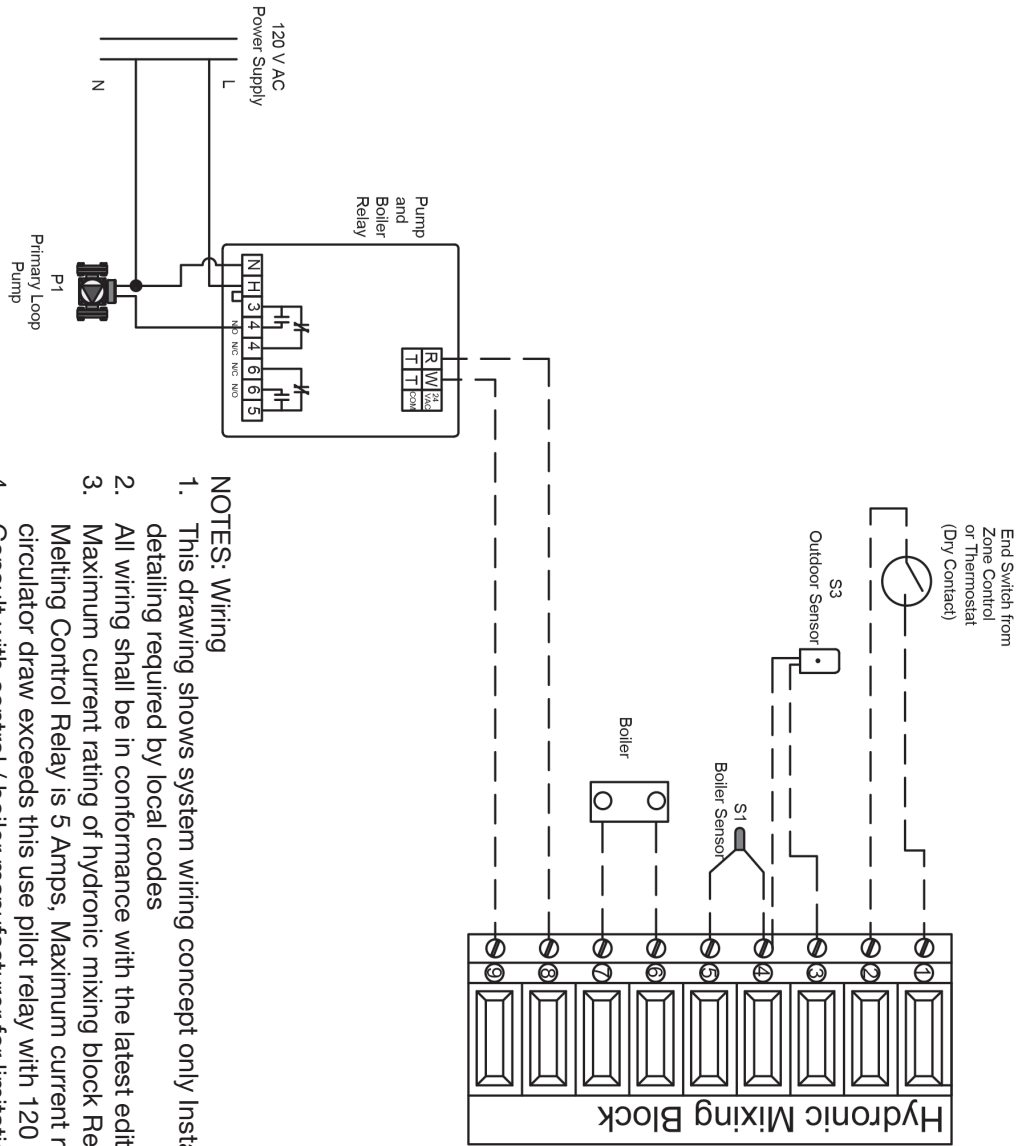


LEGEND: Hydronic Mixing Block	
	Hydronic Mixing Block
	Spring check
	Circulator
	Draw Off (Purge Valve)
	Make - Up Water
	Pressure Differential Bypass Valve
	Stainless Manifold w/ Flow Gauges
	Baseboard
	Diaphragm-Type Expansion Tank
	Zone Valve

NOTES: Piping

1. This drawing shows system piping concept only. Installer is responsible for all equipment & detailing required by local codes.
2. Size header piping for maximum flow velocity of 2 feet / second.
3. All other piping should be sized for a maximum flow velocity of 4 feet/second.
4. Install a minimum of 12 diameters of straight pipe upstream of all circulators and check valves.
5. Install isolating flanges or isolating valves on all circulators.
6. Install purging valve(s) on all circuits.
7. All closely spaced tees shall be within 4 pipe diameter center to center spacing.
8. Install minimum of 6 pipe diameters of straight pipe upstream and downstream of all closely spaced tees.
9. Differential pressure bypass valve prevents flow noise under partial load conditions (some zone valves closed).
10. Set differential pressure bypass valve to delta P of distribution system with all zones open + 1 psi.
11. Not all components may be required depending on control strategy (i.e. constant circulation).

Wiring of the hydronic mixing block for high temperature applications.



— — — — —	Sensors
- - - - -	Low Voltage
— — — — —	Line Voltage
P1 = Primary/Loop Circulator	
P2 = Mixed Temperature Circulator	
S1 = Boiler Sensor	
S2 = Mix Sensor	
S3 = Outdoor Sensor	

NOTES: Wiring

1. This drawing shows system wiring concept only. Installer is responsible for all equipment & detailing required by local codes.
2. All wiring shall be in conformance with the latest edition of the National Electrical Code.
3. Maximum current rating of hydronic mixing block Relay is 1 Amps, Basic and Advance Snow Melting Control Relay is 5 Amps, Maximum current rating of Zone Control Relays is 5 Amps, if circulator draw exceeds this use pilot relay with 120 VAC coil operated by Viega Control.
4. Consult with control / boiler manufacturer for limitations and installation instructions.
5. Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground. Use 18 AWG copper wiring for all sensor wiring.
6. DHW priority relay must be rated to handle full amperage load of zone circulator relay center.
7. Other configurations are possible, but all space heating zone circulators must turn off when DHW mode is on or heat source needs to be sized for multiple loads.

## Appendix C

### Pump sizing

#### Combiflex sizing: Pump selection for 1/2" ViegaPEX Barrier or Viega FostaPEX tubing (pressure drop through tubing in feet of head)

Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			25	50	75	100	125	150	175	200
10000	1	18 (0.07)	Low (0.8)	Low (1.9)	Low (2.9)	Low (3.8)	Low (4.8)	Low (5.7)	Low (6.7)	Low (7.6)
20000	2	36 (0.47)	Low (3.8)	Low (7.5)	Low (11.3)	High (15.0)	High (18.8)	High (22.5)	High (26.3)	
30000	3	54 (1.44)	Low (7.0)	High (14.0)	High (21.0)					
40000	4	72 (3.15)	High (11.0)	High (22.0)						

**NOTE:** The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

**NOTE:** For 3/8" refer to page 24

Table Appendix C.a

#### Combiflex sizing: Pump selection for 3/4" ViegaPEX Barrier and Viega FostaPEX tubing (pressure drop through tubing in feet of head)

Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.5)	Low (1.0)	Low (1.5)	Low (2.0)				
20000	2	36 (0.47)	Low (1.4)	Low (2.8)	Low (4.2)	Low (5.6)	Low (7.0)	Low (8.4)	Low (9.8)	Low (11.2)
30000	3	54 (1.44)	Low (2.8)	Low (5.5)	Low (8.3)	Low (11.0)	High (13.8)	High (16.5)	High (19.3)	High (22.0)
40000	4	72 (3.15)	Low (4.5)	Low (9.0)	High (13.5)	High (18.0)	High (22.5)			

**NOTE:** The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

**NOTE:** For 3/8" refer to page 24

Table Appendix C.b

#### Combiflex sizing: Pump selection for 1" ViegaPEX Barrier and Viega FostaPEX tubing (pressure drop through tubing in feet of head)

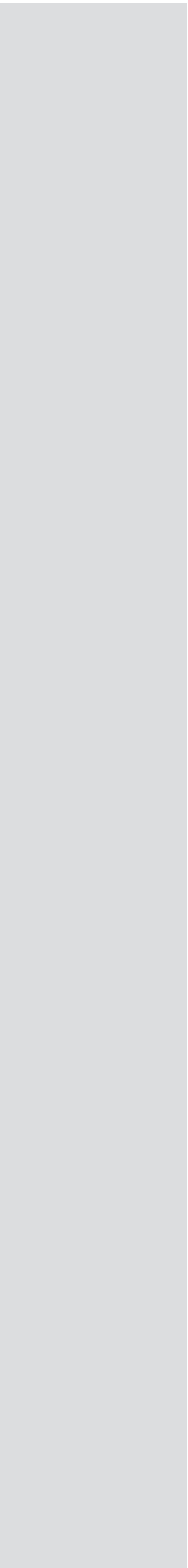
Btu/h	Flow Rate (gpm)	Total Feet of Baseboard (Pressure drop, ft of hd)	Total Tubing Length (ft)							
			50	100	150	200	250	300	350	400
10000	1	18 (0.07)	Low (0.1)	Low (0.2)	Low (0.4)	Low (0.5)	Low (0.6)	Low (0.7)	Low (0.8)	Low (0.9)
20000	2	36 (0.47)	Low (0.4)	Low (0.8)	Low (1.2)	Low (1.6)	Low (2.0)	Low (2.4)	Low (2.8)	Low (3.2)
30000	3	54 (1.44)	Low (0.8)	Low (1.6)	Low (2.4)	Low (3.3)	Low (4.1)	Low (4.9)	Low (5.7)	Low (6.5)
40000	4	72 (3.15)	Low (1.4)	Low (2.7)	Low (4.0)	Low (5.4)	Low (6.7)	Low (8.0)	High (9.4)	High (10.8)

**NOTE:** The enhanced mixing station and hydronic mixing block can be used in low head applications, as called out above.

**NOTE:** For 3/8" refer to page 24

Table Appendix C.c







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