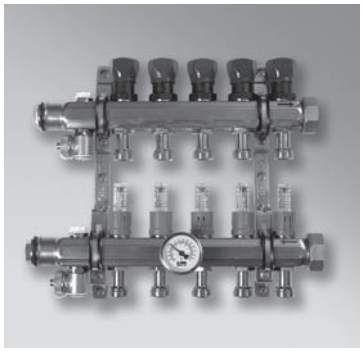
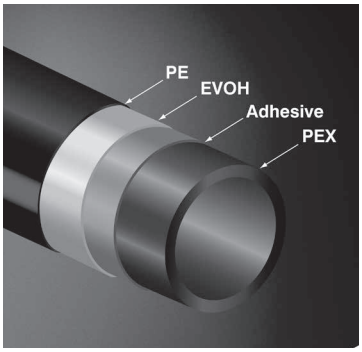
Installation Manual

Viega Climate Trak® Heating System





viega

Table of Contents

List of Tables

1 About this Document

1.1 Disclaimer

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

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

1.2 Symbols Used

The following symbols may be used within this document:

DANGER!
This symbol warns of possible life-threatening injury.

WARNING!
This symbol warns of possible serious injury.

CAUTION!
This symbol warns of possible injury.

NOTICE!
This symbol warns of possible damage to property.

Notes give additional helpful tips.

2 System Overview

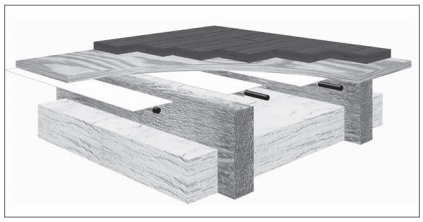
2.1 Application Benefits

In the following pages, you will be guided through the system design, layout, installation, and start-up of the Climate Trak System.

Climate Traks and Heat Transfer Plates are designed for retrofit applications or in applications where the buildup above the subfloor is a concern. These types of applications are not the most efficient kind of radiant heating compared to systems such as Viega Climate Panel and Viega Snap Panel, but deliver the comfort of having warm floors and full radiant heating throughout the house. Both methods utilize Viega Barrier PEX tubing and attach directly to the underside of the subfloor. This is a fast, lightweight application to install and provides the comfort of radiant heat the homeowner is looking for.

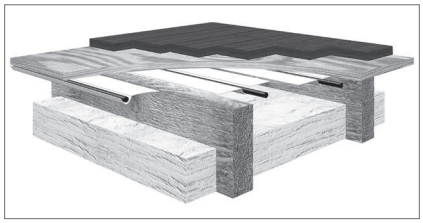
Systems should be protected from freezing at all times. Proper insulation or glycol mixture may be needed in system if not used for an extended period of the heating season.

2.1.1 Climate Trak



1. Heavier aluminum than the Heat Transfer Plates
2. Fastest installation time (does not require Groove Tube)
3. Easiest to install (Traks and tubing are installed separately, so there is no struggling with the tubing while the fastening is being done)
4. Predrilled holes for ease of fastening with screws
5. Comes in 4' or 8' long Traks that also help with installation time
6. Snap-in groove for tubing maximizes contact between the aluminum and the PEX Tubing for efficient heat transfer

2.1.2 Heat Transfer Plates



1. Made from thinner, more flexible aluminum than the Climate Traks
2. Comes in 20" long by 5" wide plates
3. Requires a small bead of Groove Tube down the channel where the tubing is run right before installation

3 System Design

3.1 Calculating a Materials List

Multipliers for Climate Traks			
Tubing OC	**Plate Size**	**Tubing Multiplier**	**Trak Multiplier**
6"	4 ft 8 ft	2.2	.47 .23
8"	4 ft 8 ft	1.7	.35 .18
9"	4 ft 8 ft	1.5	.31 .16
12"	4 ft 8 ft	1.1	.23 .12
16"	4 ft 8 ft	.85	.18 .09
18"	4 ft 8 ft	.75	.16 .08

Table 1: Multipliers for Climate Traks

Multipliers for Heat Transfer Plates		
Tubing OC	**Tubing Multiplier**	**Plate Multiplier**
6"	2.2	.93
8"	1.7	.70
9"	1.5	.62
12"	1.1	.47
16"	.85	.35
18"	.75	.31

Table 2: Multipliers for Heat Transfer Plates

Maximum Circuit Length		
	≤25 BTU/ft²	**26-35 BTU/ft²**
⅜"	300 ft	250 ft
½"	400 ft	350 ft

Table 3: Maximum Circuit Length

1. Calculate the total heated area.
2. Using the charts on the previous page and the total area, calculate the total number of Traks/Plates and amount of tubing needed for the job.
3. Using the circuit length chart, calculate the total number of circuits needed.

Example: Heated Area - 1,500 sq. ft.
Calculating Number of Traks:
8 ft. Climate Traks 8" O.C.
# of Traks = 1,500 sq. ft. x .18
# of Traks = 270
- Sold in packages of 20:
(round up to order 14 boxes)
Calculating Amount of Tubing:
Amount of Tubing = 1,500 sq. ft. x 1.7
Amount of Tubing = 2,550 ft.
Calculating Number of Circuits (≤25 BTU/ft2):
Amount of Tubing = 2,550 ft.
2550 ft./400 ft. = 6.375
# of 1/2” circuits = 7

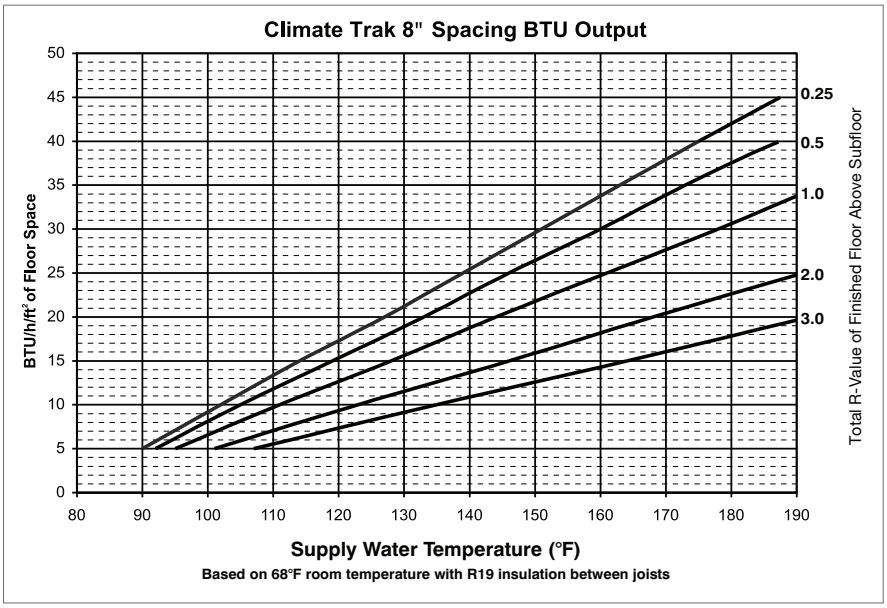
3.2 Heat Loss Calculations for Floor Heating Systems

Please reference ACCA Manual J, the ASHRAE Handbook, or CSA F280-12 to determine heat loads. Viega offers software that will perform a full, multi-temperature, room by room, detailed design while calculating a materials list and price quote for your system. Available in the program is a full list of all Viega Heating and Cooling Solutions and PureFlow products, instructions, specification sheets, manuals, and catalogs.

3.3 Calculating the Supply Water Temperature

1. Locate desired BTU output (from Radiant Wizard) on left vertical axis.
2. Follow to the right until you reach the selected total R-value curve.
3. Then move down to the horizontal axis and read the supply water temperature.

(For additional Climate Trak/Heat Transfer Plate BTU output charts, refer to Appendix E).



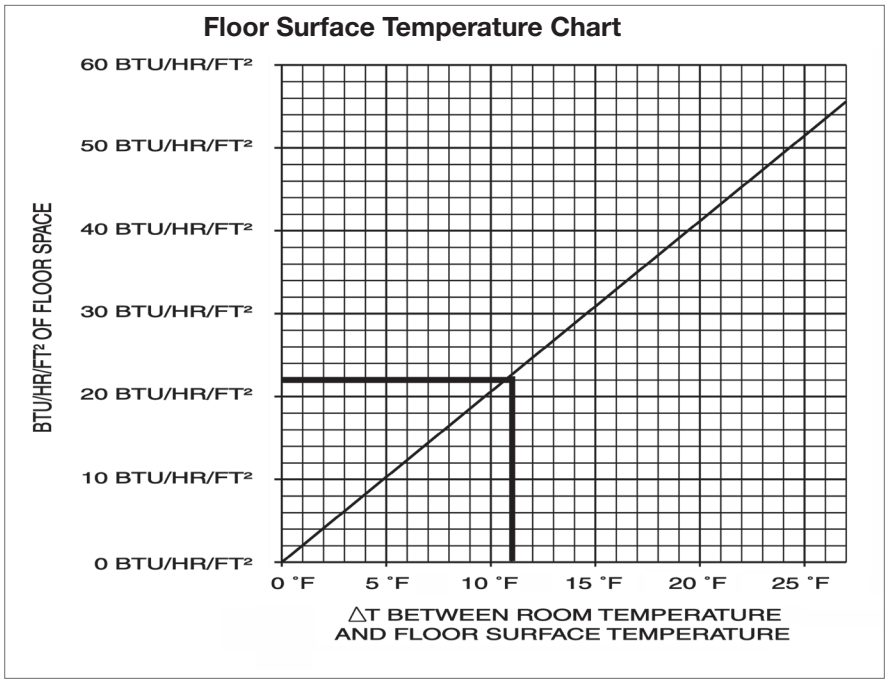
3.4 Calculating the Floor Surface Temperature

1. Locate desired output (from Radiant Wizard or other source) on left vertical axis.
2. Follow to the right until you reach the curve.
3. Then move down to the horizontal axis and read the ΔT between the room temperature and the floor surface temperature.
4. Add the room temperature and the ΔT to get the floor surface temperature.

Example:
Output needed: 25 BTU/h/ft^2
Room temperature: 68°F
Temperature ΔT (from chart): ~ 12°F
Floor surface temperature: 68°F + 12°F = 80°F

The floor surface temperature will be 80°F with 25 BTU/h/ft^2 output and 68°F room temperature.

This chart shows the relation between room temperature and floor surface temperature for floor heating systems.



3.5 Calculating the Pressure Drop

In order to select the correct pump size for the system, the pressure drop must be calculated. Use the chart below to calculate the pressure drop.

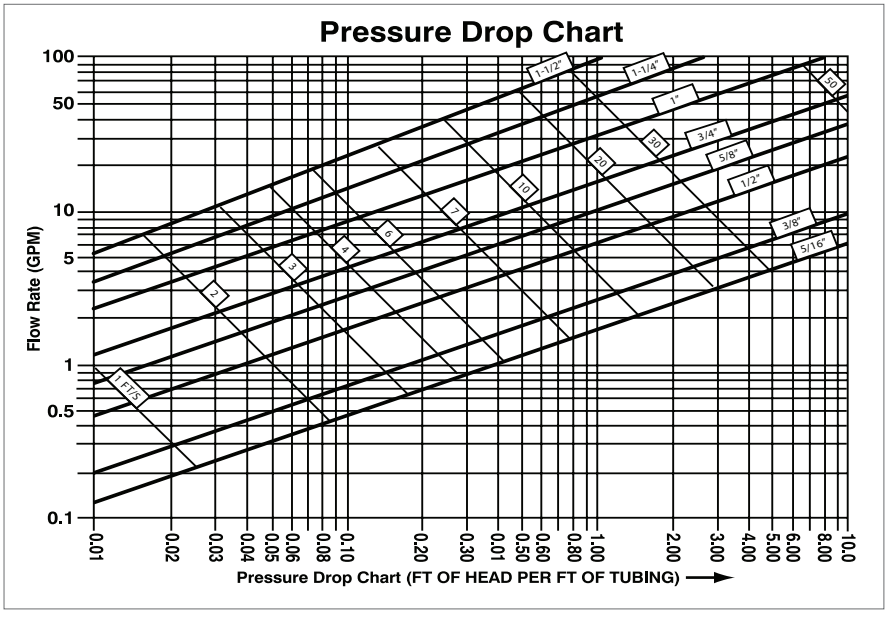
1. Locate desired flowrate for one circuit on the left vertical axis (receive circuit flowrate from the Radiant Wizard program).
2. Follow to the right until you reach the selected tubing size.
3. Then move down to the horizontal axis and read the pressure drop in feet of head per foot of tubing.
4. Multiply pressure drop per foot by length of longest circuit.

Example:
GPM through ½" Viega Barrier PEX tubing: 0.7 GPM
Pressure drop per foot: ~ 0.022 ft. of head / ft.
Total pressure drop: 0.022 x 350 total ft. = 7.7 ft. of head

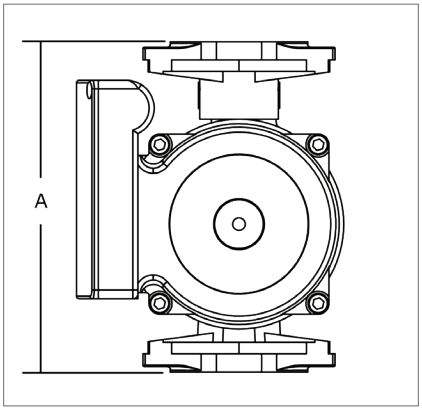
Viega Barrier PEX Tubing Data			
Nominal Size (in)	**Outside Diameter (in)**	**Inside Diameter (in)**	**Water Content (in)**
5/16*	0.430	0.292	0.004
3/8	0.500	0.350	0.005
½	0.625	0.475	0.009
5/8	0.750	0.574	0.014
¾	0.875	0.671	0.018
1	1.125	0.862	0.030
1¼	1.375	1.053	0.045
1½	1.625	1.243	0.063

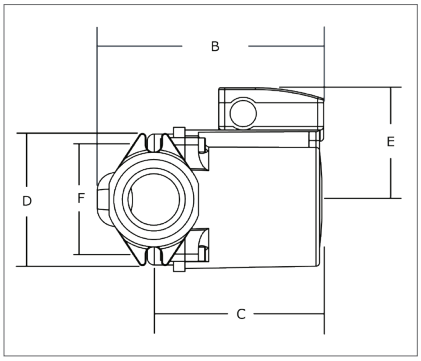
** 5/16" used in Climate Panel installation.*

Table 4: Viega Barrier PEX Tubing Data



3.6 Selecting a Circulator Pump





The pump must have a capacity equal to the system flow rate and a head equal to the system pressure loss. These two system characteristics are the primary ones in selecting a pump. Flow rates come from the Radiant Wizard program.

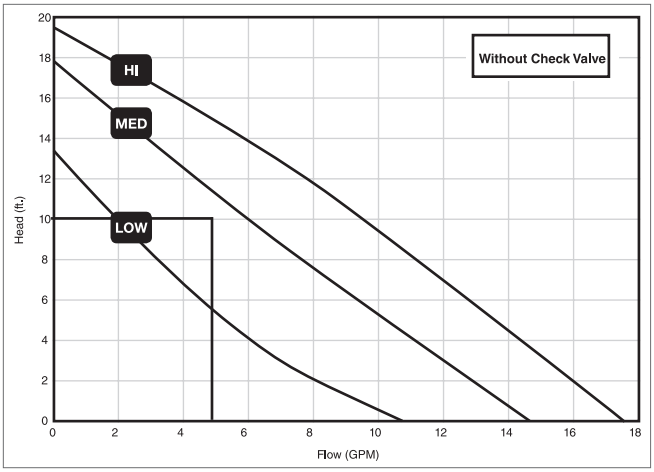
Pressure drop comes from the previous page or from the Radiant Wizard program. Remember that for pressure drop, use the highest pressure drop of all the circuits fed by their circulator. If the circulator can overcome that pressure drop, then it can overcome all the others.

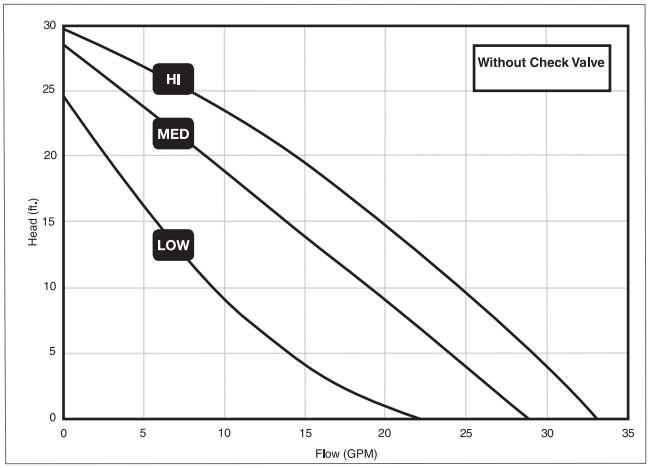
Procedure:

1. Locate the pressure drop on the left vertical axis.
2. Locate the total system flow rate on the bottom horizontal axis.
3. Follow to the intersection of both variables.
4. Select the pump with a curve higher than this point.

Example:

Total GPM through ½" Viega Barrier PEX: 5 GPM
Longest circuit pressure drop: 10 ft. of head
Pump selected: Low Head Pump

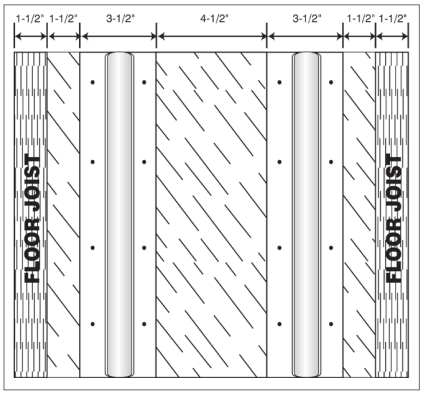




Stock Code	Speed	Amps	Watts	HP
12126	HI	0.75	87	1/25
	MED	0.66	80	1/25
	LOW	0.55	60	1/25

4 Climate Trak / Heat Transfer Plate System Installation

4.1 Pre-Installation Tips

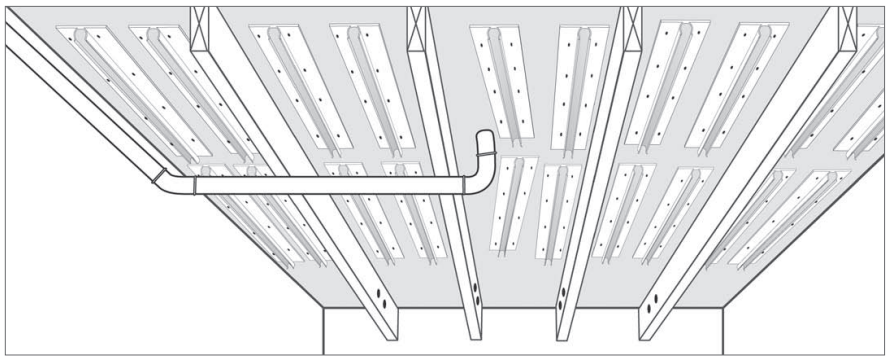


Place the Traks for the most even heat distribution.

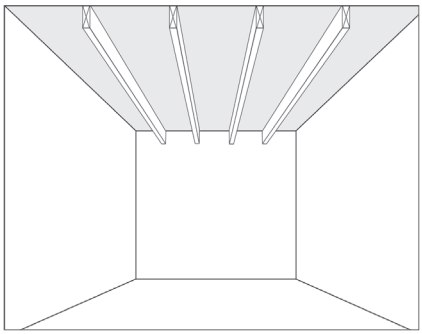
Dimensions in drawing are based on standard 2" by 8", 2" by 10", or 2" by 12" floor joists on 16" centers. Adjust spacing as needed when using engineered joists or different spacing.

4.1.1 Avoiding Obstructions

It is important not to install the Traks around objects that will restrict the tubing from being installed into the Traks. In the example below, if the Traks were run on the inside of the dropping pipe, you would find that the tubing would be unable to be snapped in. This is why the Traks are shown going to the outside of the dropping pipe.



4.2 Clearing the Bays

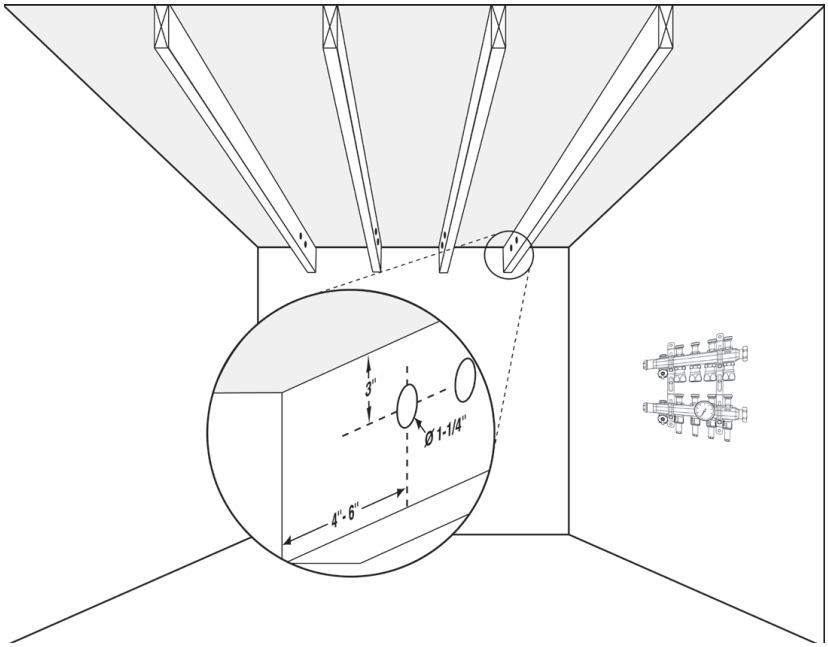


If support crosses can be easily removed, take them out to clear bays for easier installation of the plates and Traks. If crosses are unable to be removed, DO NOT drop tubing below them and resume on the other side; install both plates and tubing above crosses so that no area is lost. Nails must also be removed from bays. Whether you cut them, grind them, or carefully bend them over, be careful not to damage the finished floor above. (When cutting nails, be sure to wear safety glasses.)

4.3 Drilling Tubing Holes

Determine where the manifold will be located, then from there, decide which end of the bays the tubing will be returning down. Use a right angle drill with a 1¼" bit to drill a series of holes through each floor joist. Be sure to keep holes at least 3" from the subfloor to avoid floor nails, although having the holes centered would be the best for structural strength.

Map out the circuits and determine which bays go to which circuits. Be careful not to exceed maximum circuit length for the size of tubing you are using (⅜" - 300 ft., ½" - 400 ft.).

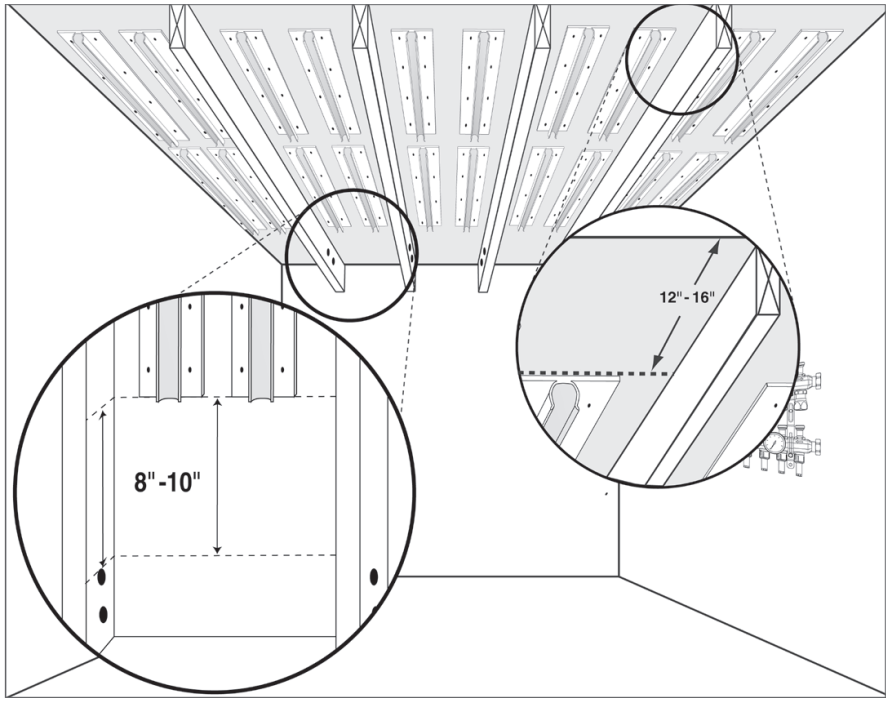


Be sure to check with local building codes to ensure no structural damage will occur with drilling the joists.

4.4 Attaching the Traks/Plates

Start attaching the Traks via staples or zip screws (staples: 7/16" to ½" crown by ¾" to 1", depending upon subfloor thickness; putting in 18 to 20 staples for an 8 ft. piece and 10 to 12 staples for a 4 ft. piece; zip screws ¾" to 1", depending on subfloor thickness). Begin attaching Traks 8" to 10" from the closest hole that was drilled to allow ample room for tubing to turn. Continue to install Traks the entire length of the bay (or to where desired circuit ends) keeping the space in between Traks to around 1". Stop Trak installation 12" to 16" short of where you want circuit to end (i.e., wall, main beam, room above) to allow for a non-stressful loop. When stapling up Traks, be sure to keep staple gun square to avoid staple deflection.

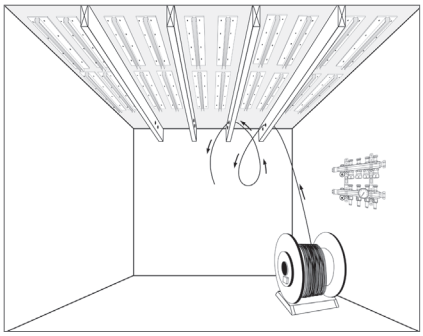
Safety glasses and ear protection are recommended.



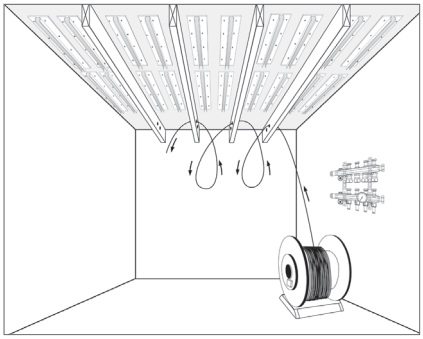
Traks should be attached as flush as possible to the subfloor for best heat transfer.

When Traks are cut, be sure to debur them to avoid any tubing damage.

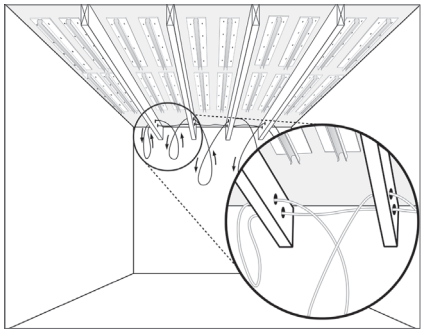
4.5 Installing the Tubing



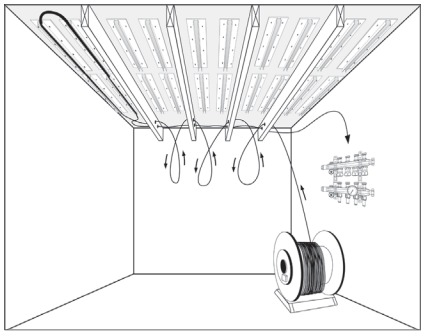
Begin to make non-stressful (teardrop) type loops for each of the bays, keeping loops small and manageable.



Continue making the “teardrop” loops, being sure not to install any of the tubing into the Traks yet. Keep loops fairly small and manageable to prevent twisting while keeping the loops easy to transfer tubing through.

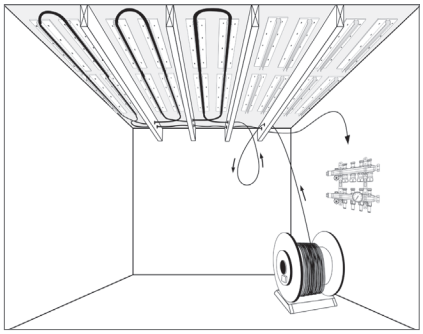


Transfer tubing from the decoiler through loops until there is enough tubing to fill the final bay and make the run back to the manifold using the second set of drilled holes.



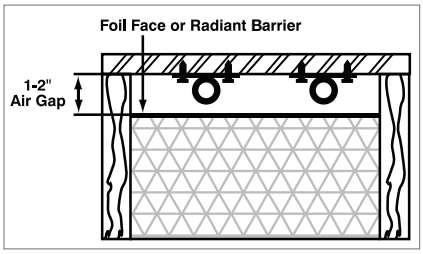
Once the final bay is installed, transfer tubing from coil to fill next bay and so on.

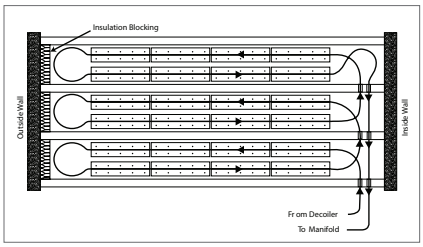
Tubing can be installed into Traks using a rubber mallet or a palm hammer with a medium plastic tip.



Continue transferring the tubing through the loops, finishing one bay at a time.

4.6 Post-Installation Tips - Insulation





Insulation should always be used in a staple-up radiant installation. Ideally there should a 1" to 2" air gap in between the insulation and the Traks/Plates.

However, the air gap should only be left if that space is considered a dead air space (absolutely no air current through it, whether it be from an outside wall, from below, or through holes in the subfloor).

To create a dead air space, begin by insulating the outside ends of the joist bays with a separate piece of insulation (insulation blocking) between the top of the foundation and the bottom of the subfloor to keep cold air from entering through sills and outside walls.

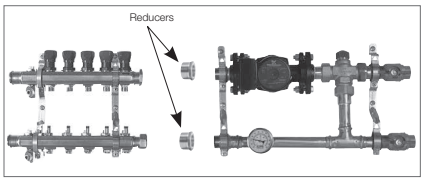
Any air current through this space will decrease the performance of the system and the insulation. By insulating outside walls, sealing any large gaps in the subfloor, and ensuring that the insulation is tight against the joist, this will create a situation where the air gap is beneficial to the performance of the system.

If a dead air space is unable to be achieved, then the insulation should be pushed up lightly against the Traks/Plates.

When using expanding foam insulation on and around the PEX tubing, please contact the manufacturer of the foam or Viega for PEX compatibility issues. Some foams my cause excessive heat if installed improperly. This excessive heat may cause damage to the PEX.

5 Piping and Controls

5.1 Mixing Station and Manifolds



In many applications either an Injection or Mixing Station can be used; however, because a staple-up system generally uses 10-20° higher water temperature, Viega recommends only using a Mixing Station with this type of application.

Mixing Station includes:
2 - Ball valves
1 - Pump (low, medium, high)
1 - Diverting valve with integrated high temp. limit
2 - 6⅝" Spacing mounting brackets

Options:
- Two position actuator
- Three position actuator

1¼" Stainless Manifold includes:
2 - 6⅝" - Spacing brackets (for compact remote mounting)
2 to 12 - Outlets per header
2 to 12 - Balancing valves on supply header for flow adjustment from 0-2 GPM
2 to 12 - Shut-off valves on return header designed to receive powerheads (15061)
Built-in purge valves and air bleeders
1¼" Union Connections
1" NPT removable end caps

Other Manifolds available:
- 1¼" Stainless Manifold Shut-Off/Balancing/Flow Meters
- 1¼" Stainless Manifold Valveless
- 1" Brass Manifold (when using the brass manifold, an accessory kit is needed for proper air elimination and purging)

Options:
- Powerheads
- Circuit temperature gauges (used with Stainless Shut-Off/Balancing/Flow Meters only)
- SVC circuit flow meters
- SVC circuit ball valves
- Reducers for direct station attachment (needed for stainless manifolds only)

It is important to use Teflon tape and thread sealant paste on all connections without gaskets.

5.2 Radiant Systems

The Basic Heating Control is selected to modulate system water temperature as the outdoor temperature fluctuates. Multiple zones may be incorporated by adding Thermostats and a Zone Control.

Material	Quantity	Stock Code
Mixing Station	1	12120 - 12125
Basic Heating Control	1	16015
Indoor Sensor	1	16016
Three Position Actuator for Station	1	18003
1¼" Stainless Manifold, # Outlets*	1	15900-910

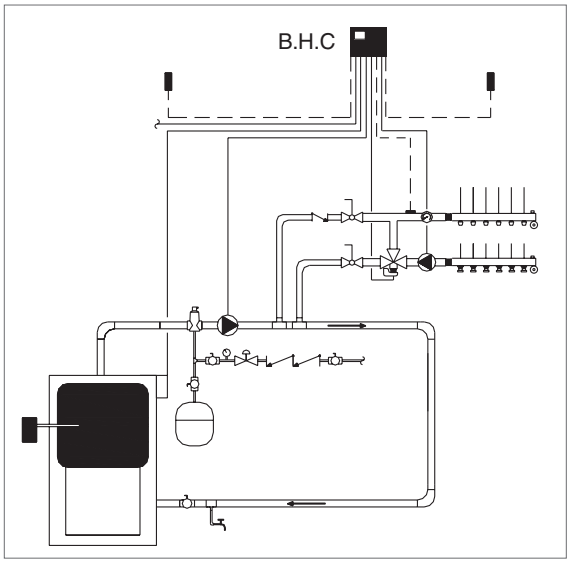
** Based on job requirements*

Table 5: Radiant System Materials

Primary Loop Sizing*		
Copper Pipe Size (in)	Flow Rate (GPM)	Heat Carrying Capacity (BTU/hr)
¾	4	40,000
1	8	80,000
1¼	14	140,000
1½	22	220,000
2	45	450,000

** Flow Rate and Heat Carrying Capacity calculation based on a 20°F temperature drop across the system.*

Table 6: Primary Loop Sizing



All schematics are conceptual. The designer must determine whether this application will work in the system and must ensure compliance with national and local code requirements. Boiler trim (expansion tank, fill valve, relays, etc.) supplied by others.

5.2.1 Single Temperature Radiant System with Boiler Modulation and Optional DHW Control

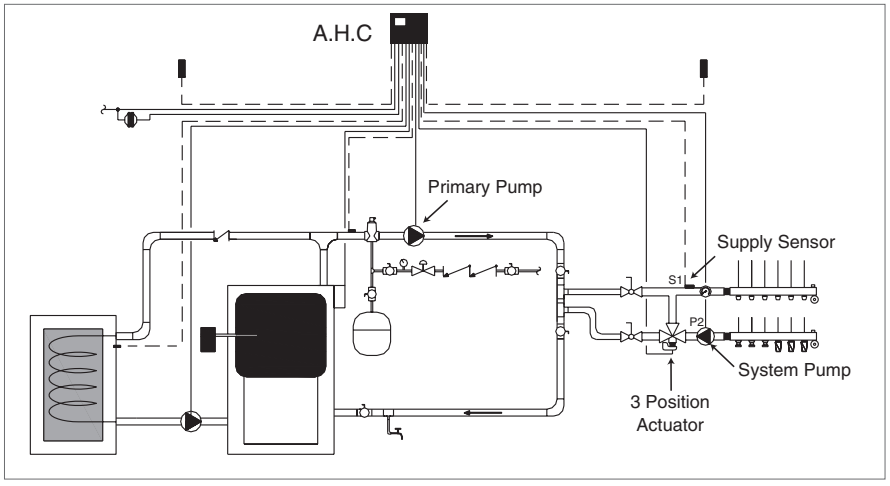
The Advanced Heating Control incorporates low temperature mixing, provides boiler modulation, and the option of domestic hot water control with priority.

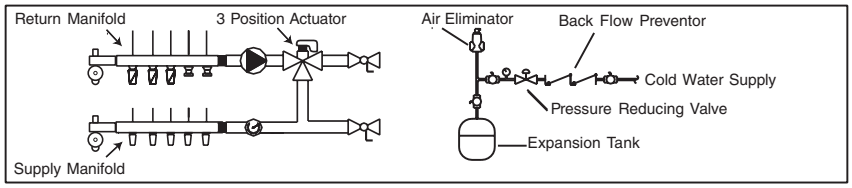
Optional DHW sensor may be in tank or on outlet piping. If boiler and DHW control are not needed, refer to Basic Heating Control diagrams.

Material	Quantity	Stock Code
Mixing Station	1	12120 - 12125
Advanced Heating Control	1	16014
Indoor Sensor	1	16016
Three Position Actuator for Station	1	18003
1-1/4" Stainless Manifold, # Outlets*	1	15700 - 15710
Thermostats	*	18002
Powerheads	3	15061
Optional DHW Sensor	1	16018
Transformer 24V	1	18008, 18020

** Based on job requirements*

Table 7: Single Temperature Radiant System Materials





5.2.2 Multiple Temperature Radiant System with Boiler Modulation and Optional DHW Control

If the heat loss and required water temperature varies throughout a building, a multiple water temperature system may be required. To add an additional temperature system, pipe in another Mixing Station with the necessary controls.

Material	Quantity	Stock Code
Mixing Station	2	12120 - 12125
Basic Heating Control	2	16015
Indoor Sensor	2	16016
Three Position Actuator for Station	2	18003
1¼" Stainless Manifold, # Outlets*	2	15012-022
Zone Control	2	18032
Thermostats	*	18029-031
Powerheads	*	15061
Optional DHW Sensor	1	16018
Transformer 24V	1	18008, 020

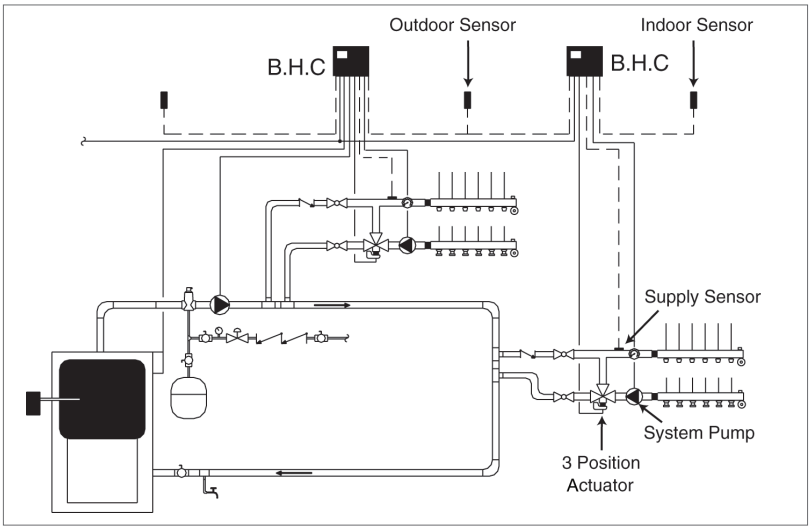
** Based on job requirements*

Table 8: Multiple Temperature Radiant System Materials

Primary Loop Sizing		
Copper Pipe Size (in)	Flow Rate* (GPM)	Heat Carrying Capacity (BTU/hr)
¾	4	40,000
1	8	80,000
1¼	14	140,000
1½	22	220,000
2	45	450,000

** Based on 6 FPS.*

Table 9: Primary Loop Sizing



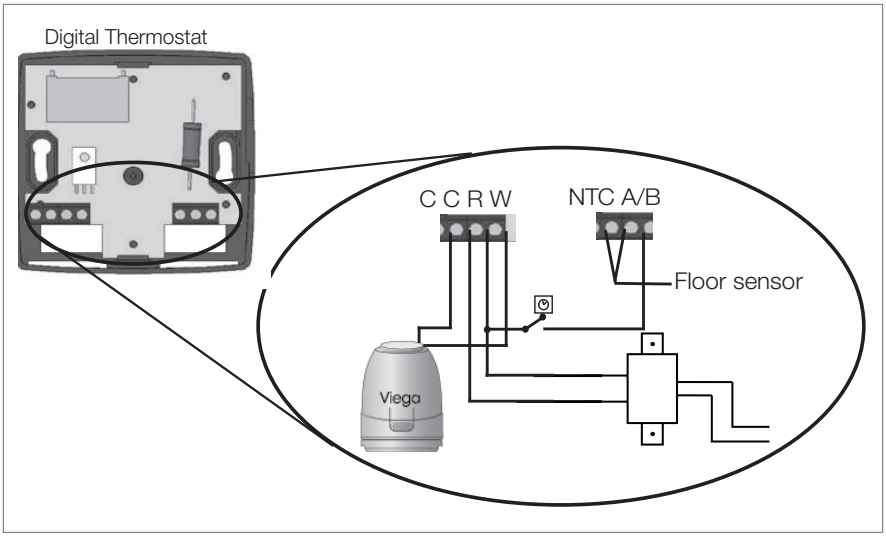
5.3 Zone Wiring

A manifold system allows any one or more of the circuits to be adapted for control by a thermostat. The following are typical zone wiring schematics.

Detailed wiring diagrams are provided with products.

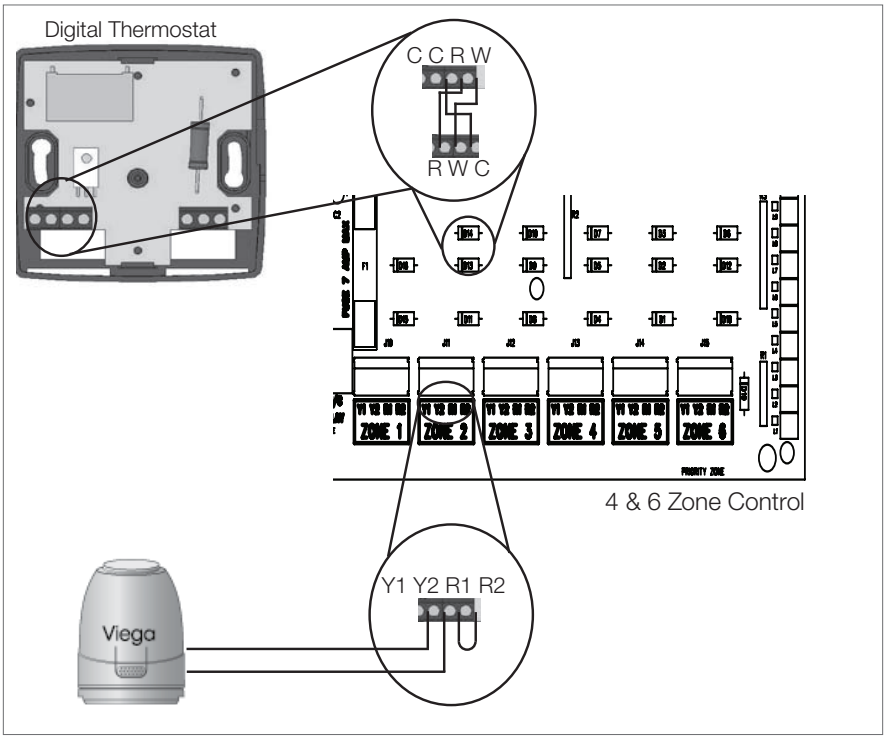
Installation by a licensed electrician is recommended. Installation and use of this equipment should be in accordance with provisions of the U.S. National Electric Code, applicable local code and pertinent industry standards.

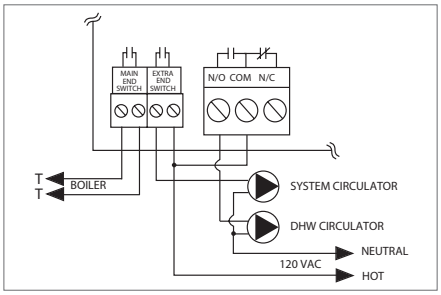
5.3.2.1 Wiring Schematic: One Zone Application



Digital Thermostats can control up to 4 powerheads.

5.3.2.2 Wiring Schematic: Multi-Zone Application





4 Zone Control (18060) can operate 8 powerheads.
6 Zone Control (18062) can operate 16 powerheads.

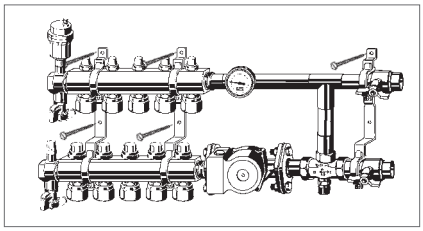
6 System Start-Up

6.1 Station and Actuator Installation

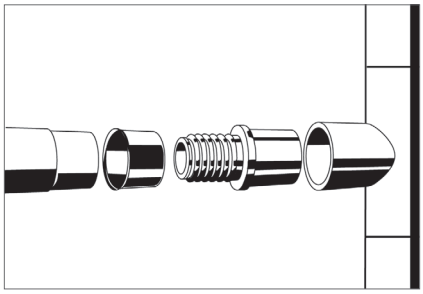
Material	Quantity
Mixing Station	1
Three Position Actuator	1
Manifold, # outlets*	1
Basic Heating Control	1
Indoor Sensor	1
Press Adapters	4
Compression PEX Adapters	*

** Based on job requirements*

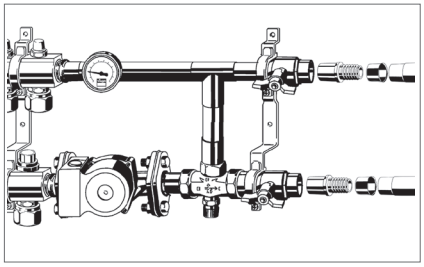
Table 10: Station and Actuator Materials



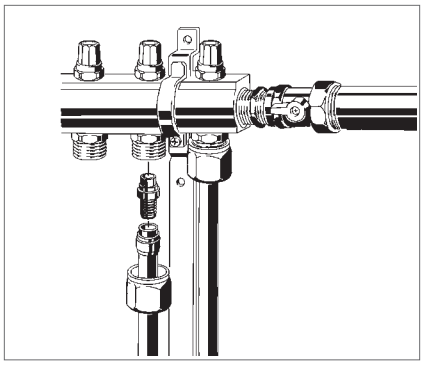
1. Mount the Mixing Station using the mounting brackets.



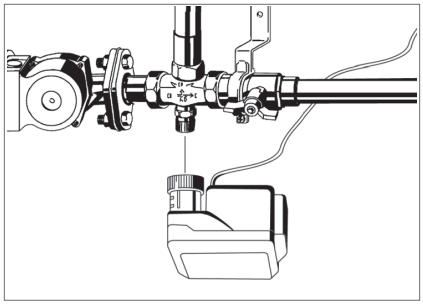
2. Make the press connection for the supply and return lines to the Mixing Station on the copper tee. Install tees as close as possible to keep pressure difference at a minimum.



3. Connect the supply and return lines by soldering on a Viega PEX Press adapter, then pressing on Viega Barrier PEX.



4. Use the SVC Compression or PEX Press Adapters to connect the Viega Barrier PEX lines to the manifold.



5. Remove the grey cap from the diverting valve on the Mixing Station and screw the actuator on hand tight.†

† Perform step 5 after the system has been filled and purged; refer to section 6.2 for procedure.

6.2 Purging and Pressure Testing the System

6.2.1 Purging

1. Attach drain hose to purge valve hose connection on return header and open valve.
2. Close all but one balancing valve on supply header (under red caps, turn with 5mm allen key). Close isolation ball valve on boiler return line. Remove plastic dust cap or temperature controller from diverting 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 actuator onto diverting valve.
5. Any remaining air pockets in the system will be eliminated through the automatic air vent after a few hours of constant circulation.

If the system must be purged again in the future for any reason, the high-limit kit must be reopened during purging for full flow.

6.2.2 Pressure Testing

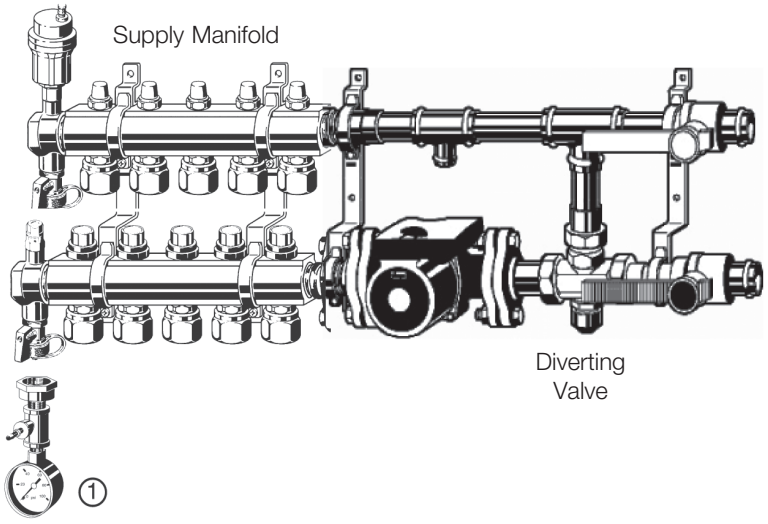
Before the finish floor is installed, the radiant system must be pressure tested. Air or water may be used as the medium.

The following procedure is recommended by Viega. Check the local building codes 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 80 psi to detect potential nail or screw penetrations.
4. The system should hold the 80 psi for a minimum of 24 hours.

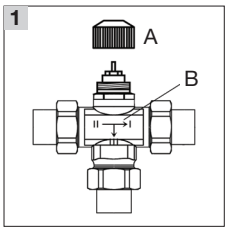
Contractor: Maintain pressure during the installation of the finish floor to simplify leak detection if tubing is damaged.

If the tubing is damaged, repair punctured section with a compression coupling.

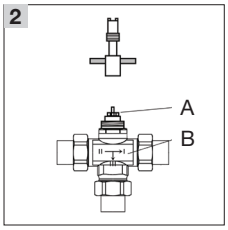


6.3 Adjusting the High Limit Kit

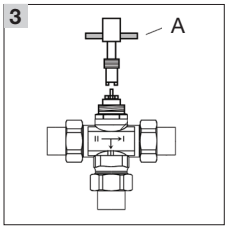
The Mixing Station is provided with a pre-installed temperature High Limit Kit. This kit is installed into the three-way valve to allow a maximum supply water temperature to be set. This kit must be unscrewed when purging the system, and should then be set according to the instructions below.



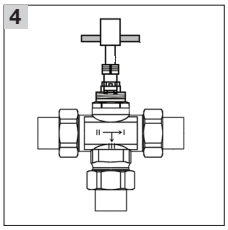
1 Remove (A) gray plastic cap from (B) valve body. (This cap can be used to adjust the water temperature manually.)



2 Loosen up (A) hex lock nut from the (B) valve body with brass key tool.

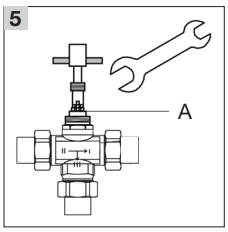


3 Use opposite side of (A) brass key tool and turn inner adjustment screw (slotted) clockwise until valve spring resistance is felt. To lower water temperature turn key clockwise; turn counterclockwise to raise it.



4 Turn adjustment screw further clockwise until desired supply water temperature is obtained and count quarter turns for reference. This has to be done carefully and slowly because each quarter turn of the adjustment screw will result in approximately 15 °F temperature reduction. Wait until desired water temperature stays consistent.

This calibration must be done with the boiler at its highest temperature, the circulator running and all zones open.



5 Tighten (A) hex lock nut with wrench. Do not overtighten. To secure high limit adjustment: hold slotted adjustment screw with brass key while tightening nut.

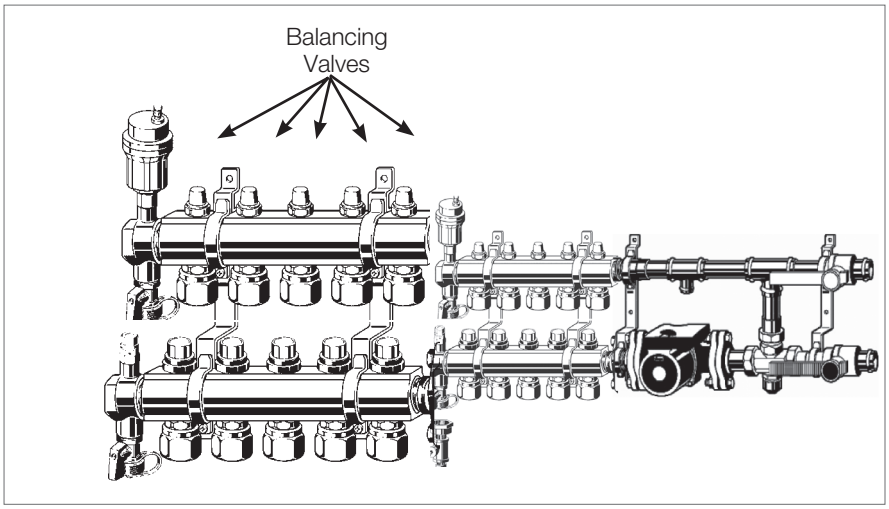
6.4 Initial Balancing

Many times it is not possible to design the system using equal circuit lengths, so the system must be balanced in order to ensure adequate flow to each circuit on a manifold.

(Refer to your Radiant Wizard design program for detailed balancing).

1. Start with all valves wide open.
2. To decrease flow, turn the balancing valve clockwise in small increments.

Remove red caps and turn balancing valves with included allen key. Valves are hidden to prevent tampering.



7 Finish Flooring

7.1 Choosing a Finished Floor

There are three common types of finished floors used in residential construction: wood floors, tile/vinyl, and carpet.

When picking a finished floor, the lower the R-value, the better radiant heat will work. When using tile, the R-value will be low and therefore will work very well with your radiant system (Appendix D on page 33 lists some common tiles and their R-values).

Vinyl flooring is another common choice for kitchens and baths and has a low R-value.

Using carpet over radiant heating requires careful planning. Viega's recommendation for a covering over a radiant system is to not exceed a total of a 2.5 R-value (the carpet pad plus the carpet itself).

Remember that the pad and the carpet are insulators and will restrict the heat from getting into the room, so keeping the R-value of the pad and the carpet low is a must in below subfloor application (Appendix D on page 33 lists some carpet and pad R-values). It may be necessary to add supplemental heat or install hydronic baseboards in rooms with heavy carpeting (see Viega's Combiflex system).

There are many questions regarding hardwood flooring over radiant heating. Armed with knowledge and a few precautions, hardwood floors and radiant heat will work well together. There are two important issues:

1. Floor surface temperatures
2. Moisture

7.1.1 Floor Surface Temperatures

For many builders, a reluctance to install hardwood floors over radiant heat stems from problems associated with incorrect control of the floor surface temperatures.

- Today, modern insulation and building techniques allow a radiant floor to stay cooler than the floor of the average sunroom.
- The floor surface temperature should not exceed 85°F (refer to section 3.4 to calculate the floor surface temperature).

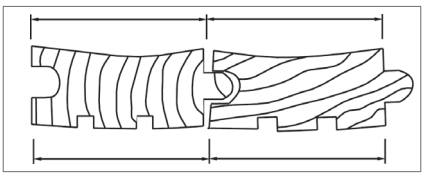
Also be careful when using multiple or high R-value area rugs over hardwood flooring. Your radiant heating system must be designed with this additional R-value taken into account in order to perform properly. If the system was designed for bare wood flooring, adding area rugs may lead to a situation where heat output is diminished.

7.1.2 Moisture

Allow the radiant system to run for at least a week before installing the hardwood. This will ensure that the subfloor is dry. Wood flooring should be acclimated to the job site before installation. When checking the moisture content of the subfloor and wood flooring with a moisture meter, aim for a reading of 6% to 8%. Moisture will affect the hardwood floor with or without a radiant system.

- Moisture absorption causes wood to swell.
- Moisture loss causes wood to shrink.

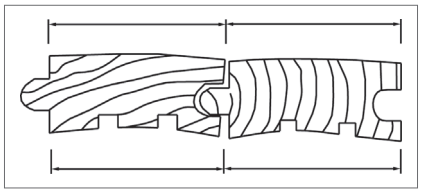
7.1.2.1 Dry Shrinkage



If the moisture content of the wood is relatively high near the bottom of the plank, cupping upward will occur exaggerating cracks.

If the moisture content is relatively high near the top surface of the plank, it will crown downward on the edges.

7.1.2.2 Wet Expansion



Sources from below:

- Inadequate moisture barrier
- Ground water wicking through the slab
- Unsealed subfloor

Sources from above:

- High relative humidity

Both solid plank flooring and engineered wood floors are acceptable choices over radiant heating.

Choosing narrower planks and harder woods minimizes dimensional change in the wood. Engineered wood flooring usually has less expansion and contraction and can be a good choice to minimize gaps between planks.

Note: Follow the flooring manufacturer’s installation manual or NOFMA’s (National Oak Flooring Manufacturers Association) manual.

8 Appendix A: Making a Press Connection

See PureFlow Press Fittings Product Instructions at www.viega.us for information on how to make a PureFlow press connection.

9 Appendix B: SVC Compression Coupling ⅜" to ⅝"

See SVC Compression Couplings Product Instructions at www.viega.us for information on how to make an SVC Compression Couplings connection.

10 Appendix C: Recommended Tools for Installation

10.1 Installation (Power Tools)

1. Staple gun with swivel connected hose (staples: 7/16" to ½" crown by ¾" to 1").
2. Compressor (1.5 to 2 hp).
3. Radial arm chop saw for cutting Traks.
4. Right angle drill with bit kit (1¼" for drilling joists.
5. Palm hammer (medium plastic hammer tip).
6. Screw gun (¾" to 1" tech screws).
7. Nail grinder (4½").

10.2 Installation (Hand Tools)

1. Tape measure (recommended 1 per person).
2. Heavy-duty nail cutter for cleaning joists.
3. Rubber mallet for snapping tubing into Climate Traks.
4. Decoiler.
5. Hammer for bending nails, miscellaneous.
6. Chalk line for chalking joists for hole or plate placement.
7. Wrench for manifold connections.
8. Tubing cutter.
9. Utility knives for deburring and opening boxes.
10. Caulking gun (only with heat transfer plates).

10.3 Miscellaneous

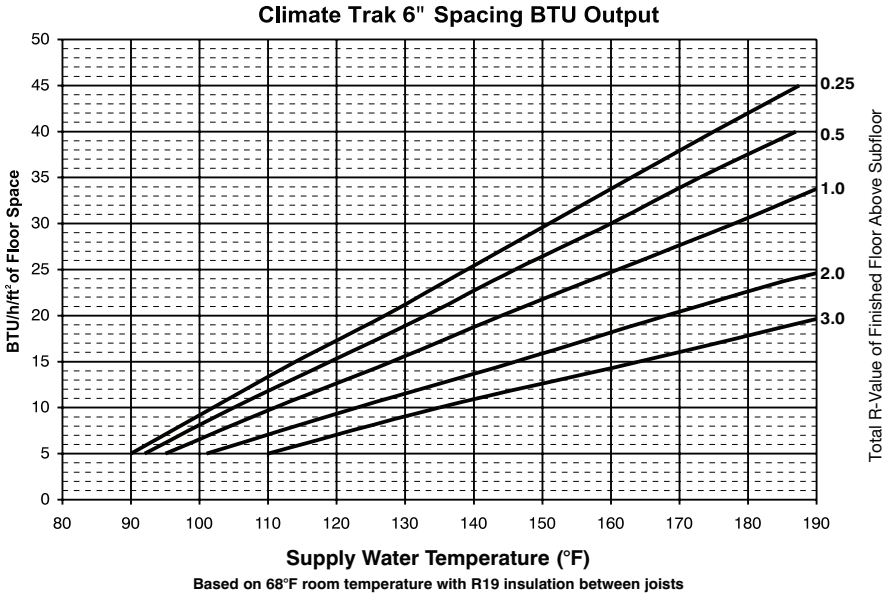
1. Safety glasses (highly recommended).
2. Earplugs.
3. Rolling scaffolding or sheet-rocker stilts or ladders.
4. Lights (especially in basement applications).
5. Broom.

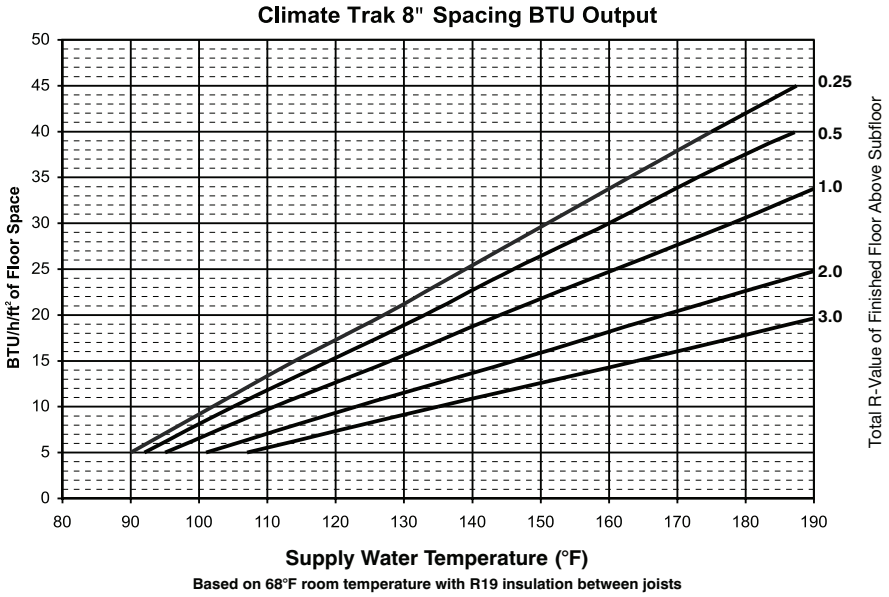
11 Appendix D: R-Value Floor Coverings

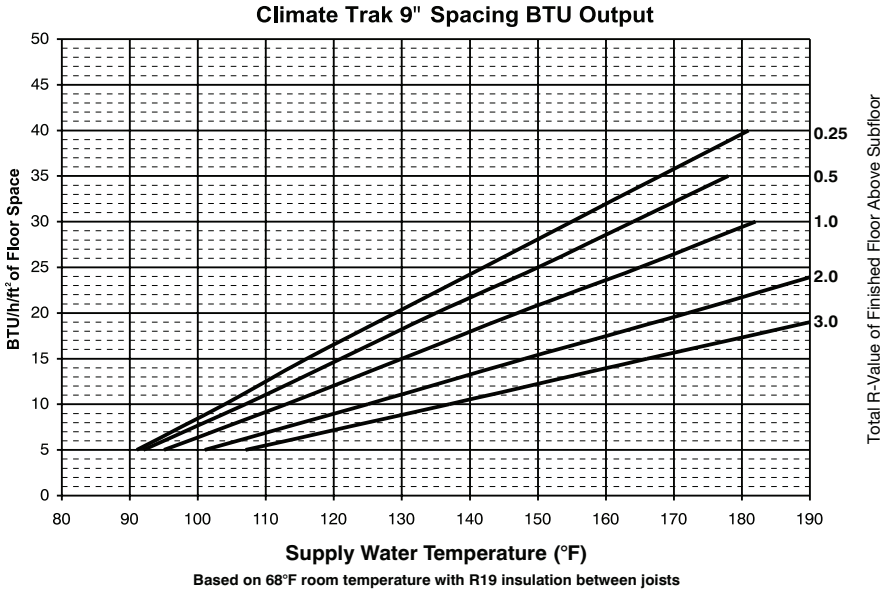
Material	⅛"	¼"	⅜"	½"	⅝"	¾"	⅞"	1"
Building Board								
Gypsum or Plaster Board	0.11	0.23	0.32	0.45	0.56	0.68	0.79	0.90
Plywood	0.16	0.31	0.47	0.62	0.77	0.93	1.09	1.24
Particleboard, low density	0.18	0.35	0.53	0.71	0.88	1.06	1.23	1.41
Particleboard, medium density	0.13	0.27	0.40	0.53	0.66	0.80	0.93	1.06
Particleboard, high density	0.11	0.21	0.32	0.43	0.53	0.64	0.74	0.85
Waferboard	0.20	0.40	0.60	0.80	0.99	1.19	1.39	1.59
Wood Subfloor	0.16	0.31	0.47	0.62	0.78	0.93	1.09	1.24
Cement board	0.03	0.06	0.09	0.12	0.15	0.18	0.21	0.24
Tile								
Ceramic Tile	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.13
Marble	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.05
Granite	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08
Slate	0.01	0.03	0.04	0.05	0.06	0.08	0.09	0.10
Linoleum or Vinyl	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40
Rubber, hard	0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96
Cork Tile	0.28	0.56	0.84	1.12	1.40	1.68	1.96	2.24
Carpet Pad								
Waffled Sponge Rubber	0.20	0.41	0.61	0.81	1.01	1.22	1.42	1.62
Synthetic Jute	0.43	0.86	1.28	1.71	2.14	2.57	2.99	3.42
Bonded Urethane, 4 lb Density	0.52	1.05	1.57	2.09	2.61	3.14	3.66	4.18
Bonded Urethane, 8 lb Density	0.55	1.10	1.65	2.20	2.75	3.30	3.85	4.40
Prime Urethane, 2.2 lb Density	0.54	1.08	1.61	2.15	2.69	3.23	3.76	4.30
Carpet								
Acrylic Level Loop	0.52	1.04	1.56	2.08	2.60	3.12	3.64	4.16
Acrylic Level Loop w/ Foam Back	0.51	1.02	1.53	2.04	2.55	3.06	3.57	4.08
Acrylic Plush	0.43	0.86	1.29	1.72	2.15	2.58	3.01	3.44
Polyester Plush	0.48	0.96	1.44	1.92	2.40	2.88	3.36	3.84
Nylon Level Loop	0.68	1.36	2.04	2.72	3.40	4.08	4.76	5.44
Nylon Plush	0.26	0.52	0.78	1.04	1.30	1.56	1.82	2.08
Nylon Shag	0.27	0.54	0.81	1.08	1.35	1.62	1.89	2.16
Nylon Saxony	0.44	0.88	1.32	1.76	2.20	2.64	3.08	3.52
Wool Plush	0.55	1.10	1.65	2.20	2.75	3.30	3.85	4.40
Hardwood								
Ash	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20
Beech	0.12	0.24	0.36	0.48	0.60	0.72	0.84	0.96
Cherry	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20
Elm	0.14	0.28	0.42	0.56	0.70	0.84	0.98	1.12
Maple	0.13	0.26	0.39	0.52	0.65	0.78	0.91	1.04
Oak	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20
Cedar	0.23	0.46	0.69	0.92	1.15	1.38	1.61	1.84
Fir	0.15	0.30	0.45	0.60	0.75	0.90	1.05	1.20
Hemlock	0.18	0.36	0.54	0.72	0.90	1.08	1.26	1.44
Pine	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60
Redwood	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60
Spruce	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60
Engineered Flooring								
Laminated Parquet Flooring	0.11	0.23	0.34	0.45	0.57	0.68	0.79	0.91

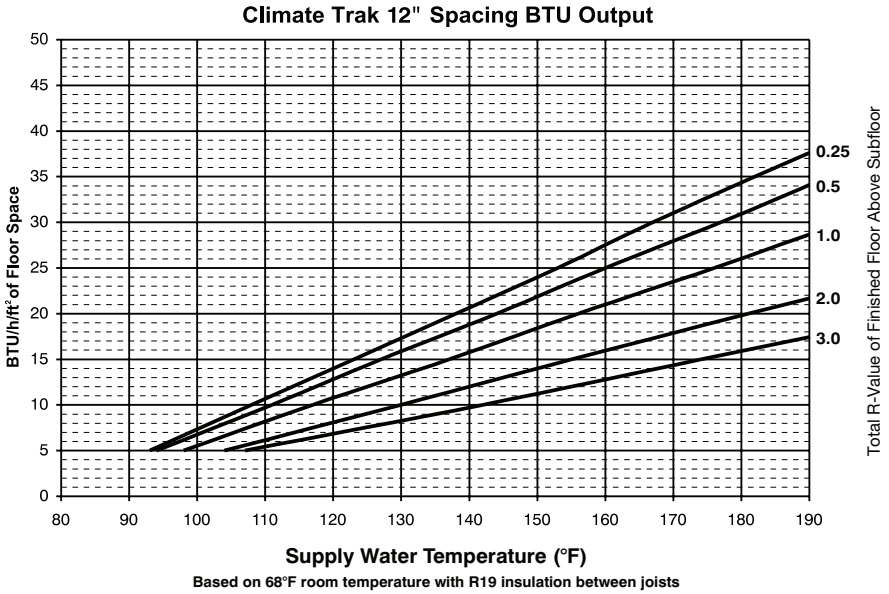
Table 11: R-Value Floor Coverings

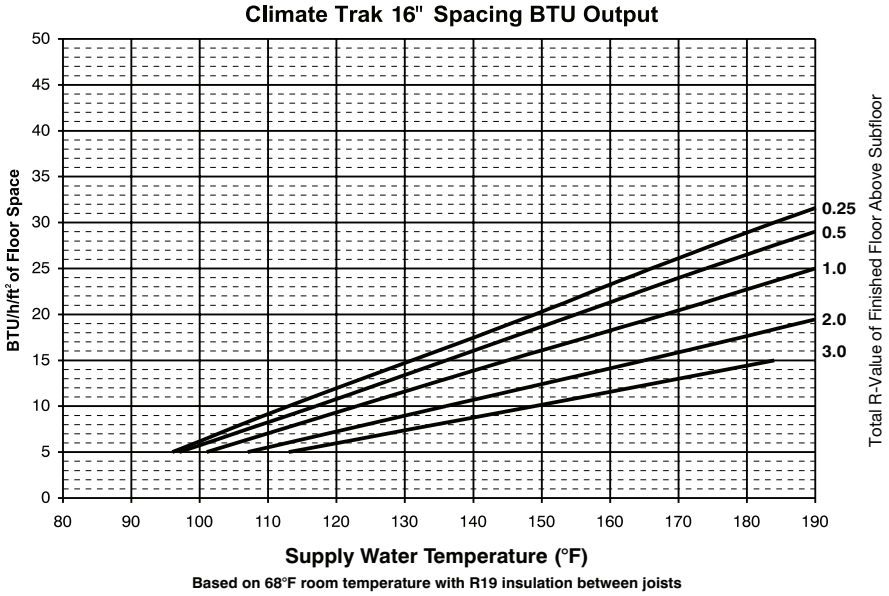
12 Appendix E: Supply Water Temperature/BTU Output Charts

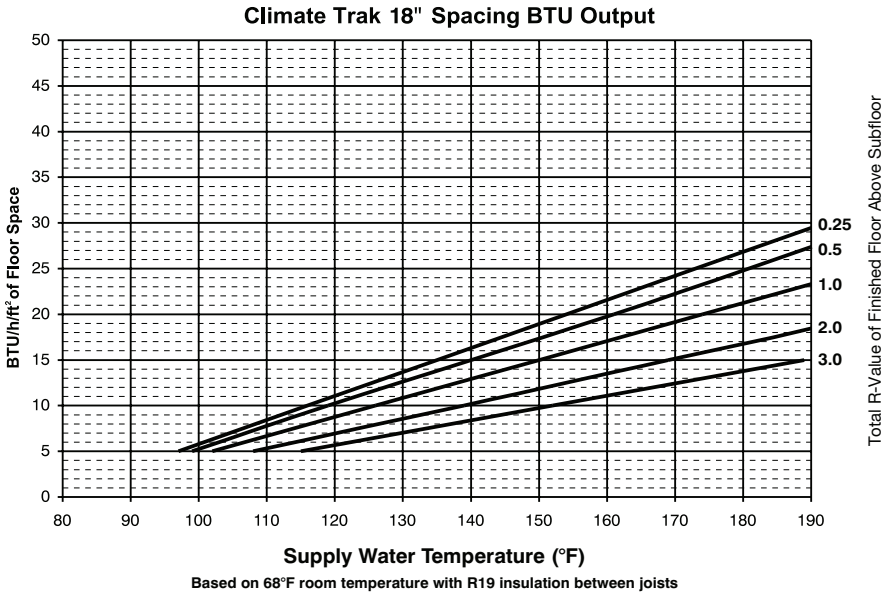





Climate Trak 9" Spacing BTU Output
BTU/h/ft² of Floor Space
50
45
40
35
30
25
20
15
10
5
0
80
90
100
110
120
130
140
150
160
170
180
190
0.25
0.5
1.0
2.0
3.0
Total R-Value of Finished Floor Above Subfloor
Supply Water Temperature (°F)
Based on 68°F room temperature with R19 insulation between joists


Climate Trak 12" Spacing BTU Output
BTU/h/ft² of Floor Space
50
45
40
35
30
25
20
15
10
5
0
80
90
100
110
120
130
140
150
160
170
180
190
0.25
0.5
1.0
2.0
3.0
Total R-Value of Finished Floor Above Subfloor
Supply Water Temperature (°F)
Based on 68°F room temperature with R19 insulation between joists


Climate Trak 16" Spacing BTU Output
BTU/h/ft² of Floor Space
50
45
40
35
30
25
20
15
10
5
0
80
90
100
110
120
130
140
150
160
170
180
190
0.25
0.5
1.0
2.0
3.0
Total R-Value of Finished Floor Above Subfloor
Supply Water Temperature (°F)
Based on 68°F room temperature with R19 insulation between joists


Climate Trak 18" Spacing BTU Output
BTU/h/ft² of Floor Space
50
45
40
35
30
25
20
15
10
5
0
80
90
100
110
120
130
140
150
160
170
180
190
0.25
0.5
1.0
2.0
3.0
Total R-Value of Finished Floor Above Subfloor
Supply Water Temperature (°F)
Based on 68°F room temperature with R19 insulation between joists

13 Appendix F: Making a Material List

13.1 Climate Trak Material Worksheets

8 ft. Climate Traks	Net Heated Area	Multiplier	Estimated Amount
6" Spacing		.23	
8" Spacing		.18	
9" Spacing		.16	
12" Spacing		.12	
16" Spacing		.09	
18" Spacing		.08	

4 ft. Climate Traks	Net Heated Area	Multiplier	Estimated Amount
6" Spacing		.47	
8" Spacing		.35	
9" Spacing		.31	
12" Spacing		.23	
16" Spacing		.18	
18" Spacing		.16	

Tubing ⅜" to ½"	Net Heated Area	Multiplier	Estimated Amount
6" Spacing		2.2	
8" Spacing		1.7	
9" Spacing		1.5	
12" Spacing		1.1	
16" Spacing		.85	
18" Spacing		.75	

Material List	
Products	**Quantity**
Mixing Station	
Advanced Heating Control	
Basic Heating Control	
Actuator	
1-1/4" Stainless Manifold, # outlets	
1" Brass Manifolds, # outlets	
Manifold Accessory Set (Used With Brass Only)	
Zone Control	
Thermostats	
Powerheads for Stainless	
Powerheads for Brass	
Manifold PEX Press Adapters	
Manifold Compression PEX Adapters	

These charts are intended for conceptual purposes only; there may be variations in each job.

Table 12: Climat Trak Material Worksheets

14 Limited Warranty

14.1 Limited Warranty for Viega Heating and Cooling Solutions

Hydronic Radiant Heating/Cooling and Snow Melt

Subject to the conditions and limitations in this Limited Warranty, Viega LLC (Viega) warrants to property owners in the United States with hydronic radiant heating/cooling and/or snow melt systems (the systems) properly installed by Viega trained contractors that its Viega Barrier PEX tubing, under normal conditions of use and properly maintained, will be free from failure caused by manufacturing defect for a period of thirty (30) years from date of installation.

In addition, Viega warrants that Viega PEX press metal and polymer fittings properly installed in the systems with the above listed tubing, to include protected PEX press metal and polymer fittings used in slab, will be free from failure caused by manufacturing defect for a period of thirty (30) years from date of initial installation; warrants that any accessible metal compression or metal/polyalloy crimp fittings, manifolds and panels sold by Viega and used in the systems will be free from failure caused by manufacturing defect for a period of five (5) years, and warrants that any controls, mixing stations, or electrical components sold by Viega and used in the systems will be free from failure caused by manufacturing defect for a period of two (2) years from date of initial installation.

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

Under this limited warranty, you only have a right to reimbursement if the failure or leak resulted from a manufacturing defect in the products covered by this warranty and the failure or leak occurred during the warranty period. You do not have a remedy or right of reimbursement under this warranty and the warranty does not apply if the failure or any resulting damage is caused by (1) components in the systems other than those manufactured or sold by Viega or components not recommended for use in the systems (2) not installing, inspecting, or testing the products covered by this warranty in accordance with Viega's installation instructions at the time of the installation, applicable code requirements and accepted industry practices (for example, guidelines of the Radiant Professionals Alliance); (3) improper design, including determining proper heat-load of the system, or improper maintenance of the system; (4) exposure to unauthorized solvents or chemicals, antifreeze, rust inhibitor or other treatment fluids; freezing; or by failure to appropriately limit recommended water temperature levels or other misuse or abuse of the tubing in the handling of the tubing prior to or during installation or by other construction activity on the property; (5) acts of nature such as earthquakes, fire, flood, wind, or lightning.

In the event of a leak or other failure in the system, it is the responsibility of the property owner to obtain and pay for the repairs. Only if the warranty applies will Viega be responsible for reimbursement under this warranty. The part or parts which you claim failed should be kept and Viega contacted by writing to the address below or telephoning 1-800-976-9819 within thirty (30) days after the leak or other failure and identifying yourself as having a warranty claim. You should be prepared to ship, at your expense, the product which you claim failed due to a manufacturing defect, document the date of installation, and the amount of any claimed bills for which you claim reimbursement. Within a reasonable time after notification, Viega will investigate the reasons for the failure, which includes the right to inspect the product at Viega and reasonable access to the site of the damage in order to determine whether the warranty applies. Viega will notify you in writing of the results of its review.

In the event that Viega determines that the failure or leak and any resulting damages were the result of a manufacturing defect in the products covered by this warranty and occurred during the first ten years of the time period covered by this warranty, Viega will reimburse the property owner for reasonable repair or replacement charges resulting from the failure or leak and, additionally will reimburse damages to personal property resulting from the failure or leak. After the first ten years of the time period covered by this warranty, the EXCLUSIVE and ONLY remedy will be reimbursement for repair and replacement of the product covered by this warranty. VIEGA SHALL NOT BE LIABLE FOR CONSEQUENTIAL ECONOMIC LOSS DAMAGES UNDER ANY LEGAL THEORY AND WHETHER ASSERTED BY DIRECT ACTION, FOR CONTRIBUTION OR INDEMNITY OR OTHERWISE.

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

In the event that the tubing or fittings covered by this warranty are used in potable water plumbing systems, the Viega Limited Warranty for Viega PEX Water Systems will apply.

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

Viega LLC
585 Interlocken Blvd.
Broomfield, CO 80021

Phone (800) 976-9819
www.viega.us

IM-HC 530590 0621 Climate Trak (EN)