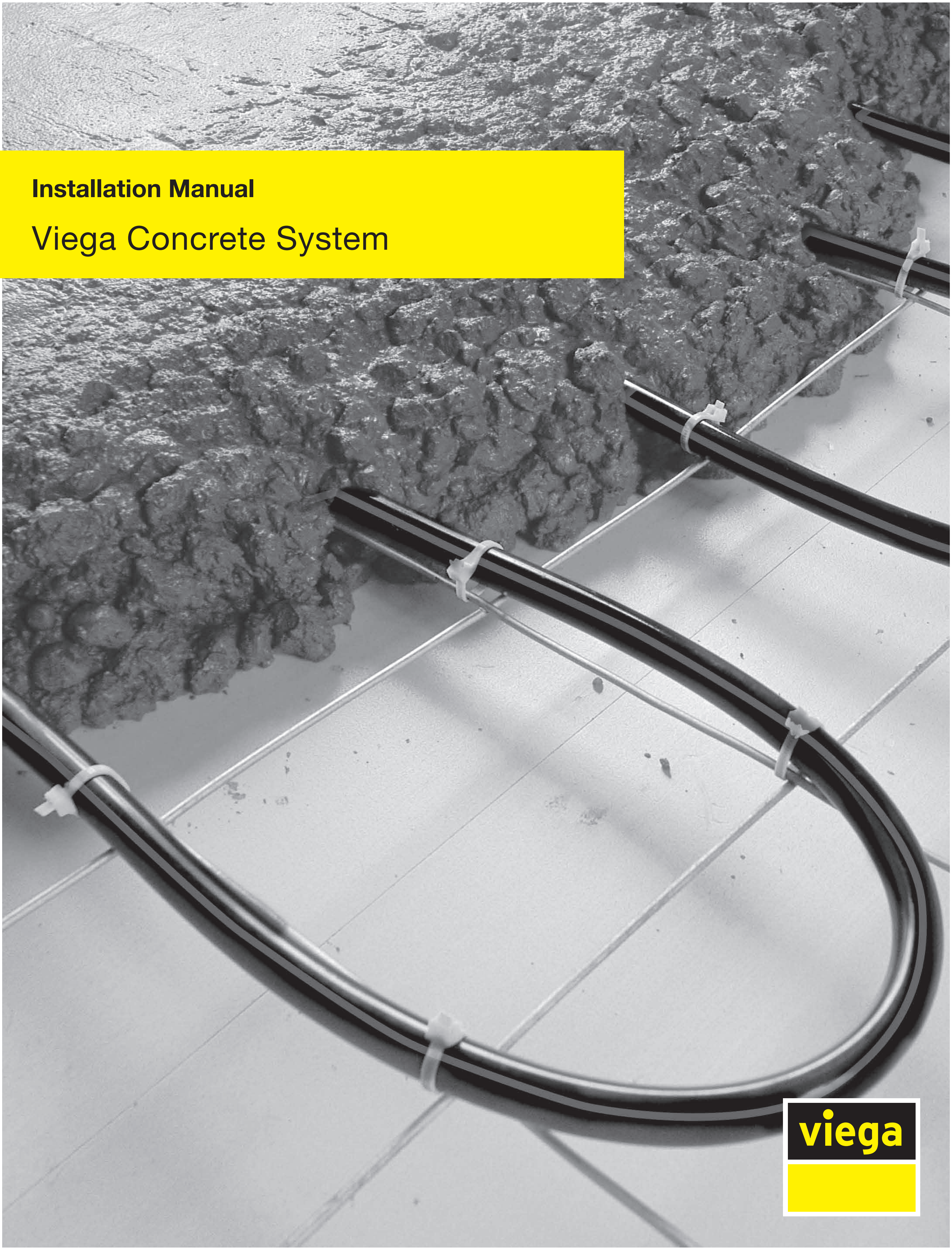
Installation Manual

Viega Concrete System



viega

Table of Contents

List of Tables

1 About this Document

1.1 Disclaimers

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

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

Disclaimer: 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.

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.

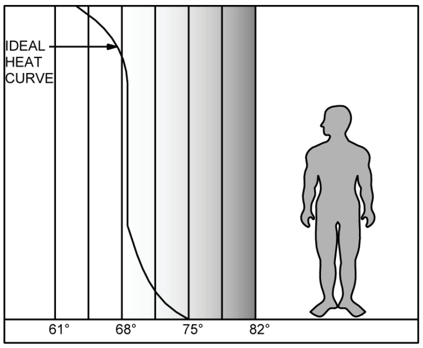
1.3 Technical Assistance

Consult Viega's Customer Success Division for additional information.

- Viega Technical Services Department: Techsupport@viega.us
- Engineering Services: For more information on radiant system design and plumbing design services: engineeringservices@viega.us

2 System Advantages

2.1 Why is Radiant so Comfortable?

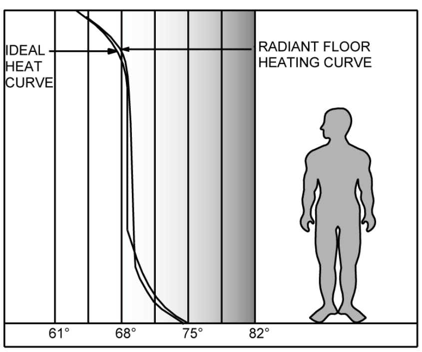


Even Heat Distribution
Ideal Heating Curve

For maximum comfort, the warmest temperature is at floor level and cooler temperatures are at head and ceiling levels. By comparing the four main heat distribution systems (see below) one can easily see that in forced air, radiators, and convective baseboard heating patterns, heat becomes trapped at the ceiling level, causing an inversion of the ideal heating pattern.

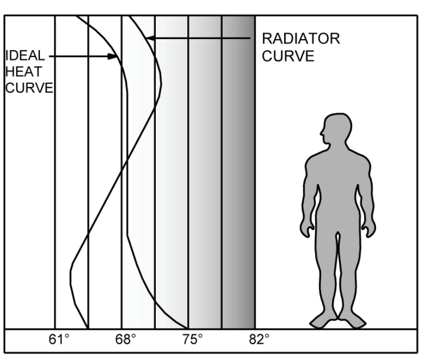
Q: Is there energy being wasted from certain heating systems?
A: Yes, the area between the ideal heating curve and each specific heating system curve represents wasted energy, which causes higher monthly fuel bills.

2.1.1 Radiant Floor



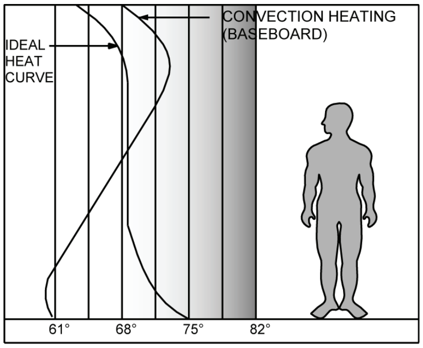
- Entire floor surface area is in effect a low temperature radiator.
- Warms other surfaces in that room and they, in turn, become heat emitters.
- Has superior energy efficiency.

2.1.2 Radiators



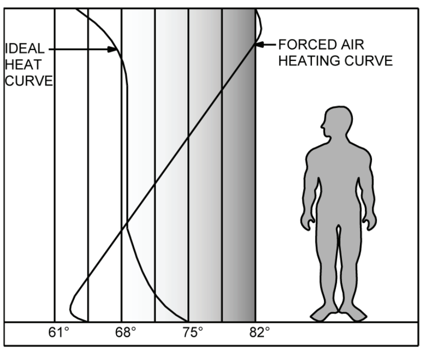
- Most of the heat is delivered by convection.
- Operates at high water temperatures.
- Creates convective warm air currents.

2.1.3 Baseboard (Natural Convection)



- Has minimal surface area.
- Operates at high water temperature.
- Tends to create uneven pools of warmth.

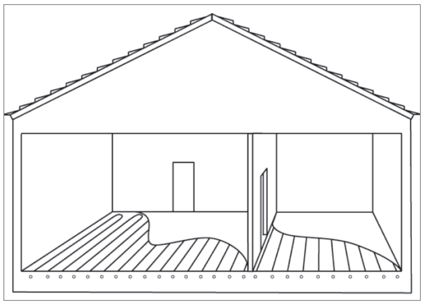
2.1.4 Forced Air



- Drafts may occur.
- High temperature air may be blown at occupants.
- Exact opposite of the ideal heat curve, i.e., cold feet and hot head.

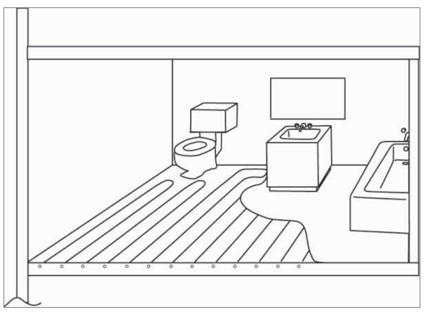
2.2 Radiant Application Benefits

2.2.1 Slab on Grade



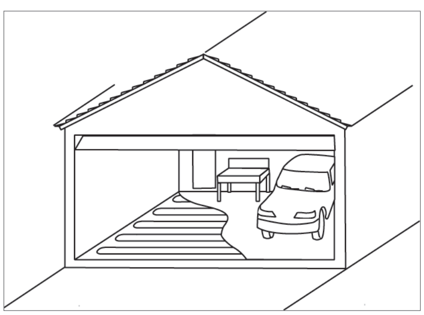
- Used in new single story slab houses.
- Typical tubing spacing 9" on center.

2.2.2 Bathrooms/Foyers



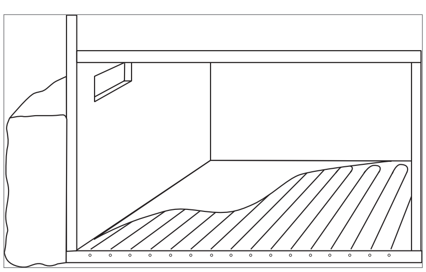
- A thin-slab (lightweight pour) is a good medium in some marble or ceramic tile finish floor applications.
- Thin-slabs may also be used over thick mud jobs.
- Typical tubing spacing 6" on center.

2.2.3 Garages/Workshops



- Ideal for heating garages. Makes working in the shop comfortable.
- Dries floors and cars in the wet winter weather. Helps prevent tracking unwanted snow and dirt inside in the winter.
- Typical tubing spacing 12" on center.

2.2.4 New Basements



- Radiant heating in the slab makes a more comfortable basement.
- It also decreases the downward heat loss through the first floor.
- Typical tubing spacing 12" on center.

3 System Design

3.1 Creating a Concrete System Material List

- Calculate the net heated area.
- Use the tables below to make an initial material list for the net area to be heated.

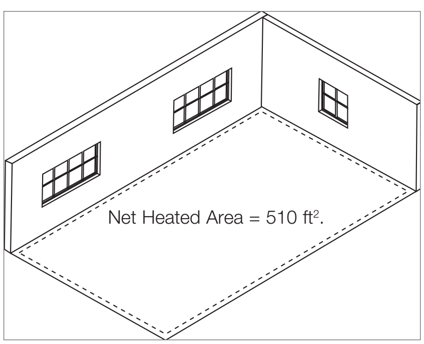
> This estimation does not include controls.

Viega Barrier PEX Tubing (sizes ½", ⅝", ¾)	**Net Heated Area (ft.)**	**Multiplier**	**Estimated Amount**
6" Spacing		2.2	
9" Spacing		1.6	
12" Spacing		1.1	

Table 1: How to Estimate Amount of Tubing

Fasteners (Various fasteners available)	**Net Heated Area (ft.)**	**Multiplier**	**Estimated Amount**
6" Spacing		1.1	
9" Spacing		.75	
12" Spacing		.55	

Table 2: How to Estimate Amount of Fasteners



Equation:
Net Heated Area x Multiplier = Estimated Amount

Use the room to the left accompanied with the tables on the next page to practice estimating.

Solutions:
Remember this table is only for estimating. The number of circuits in the area will be covered in section ""4.1 Layout Planning" on page 24. Installer’s preference determines choice of fasteners.

> Changing tubing size does not necessarily give you a higher heat output (remember the floor is the main heat emitter). The larger tubing allows for longer circuit lengths (refer to section "4.1 Layout Planning" on page 24 for maximum circuit lengths).

Viega Barrier PEX Tubing (sizes ½", ⅝", ¾)	**Net Heated Area**	**Multiplier**	**Estimated Amount**
6" Spacing	510 ft.^{2}	2.2	1,122 ft
9" Spacing	510 ft.^{2}	1.6	816 ft
12" Spacing	510 ft.^{2}	1.1	561 ft

Table 3: Estimated Amount of Tubing

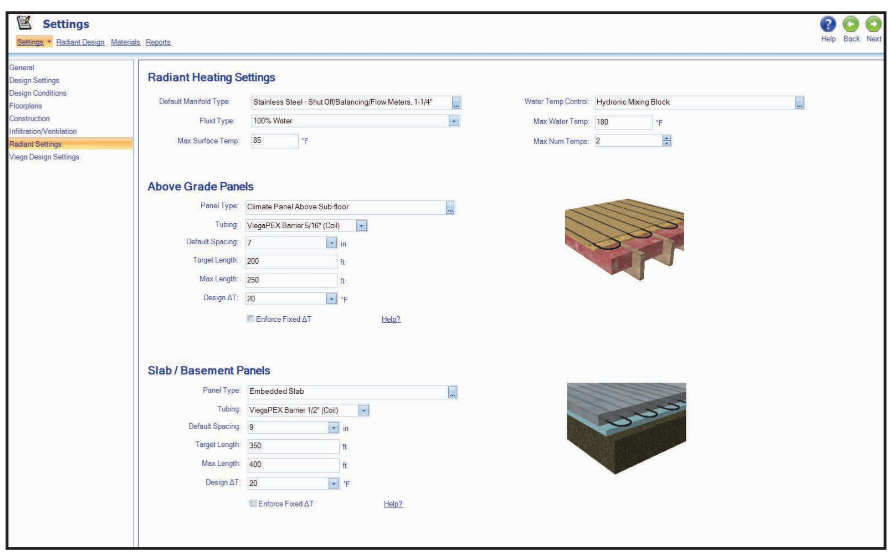
Fasteners (Various fasteners available)	**Net Heated Area**	**Multiplier**	**Estimated Amount**
6" Spacing	510 ft.^{2}	1.1	561 pc
9" Spacing	510 ft.^{2}	.75	383 pc
12" Spacing	510 ft.^{2}	.55	281 pc

Table 4: Estimated Amount of Fasteners

Tubing is sold in coils and fasteners in packages.

3.2 Heat Loss Calculations for Floor Heating Systems Using LoopCAD

Viega's easy to use LoopCAD® software will calculate the heat loss for any residential building. LoopCAD is based on ASHRAE fundamentals and is capable of providing a full design, while calculating a material list and quote. Customers can quickly and easily create professional drawings and quote Viega products. A free 30 day trial version is available for download at www.viega.us.



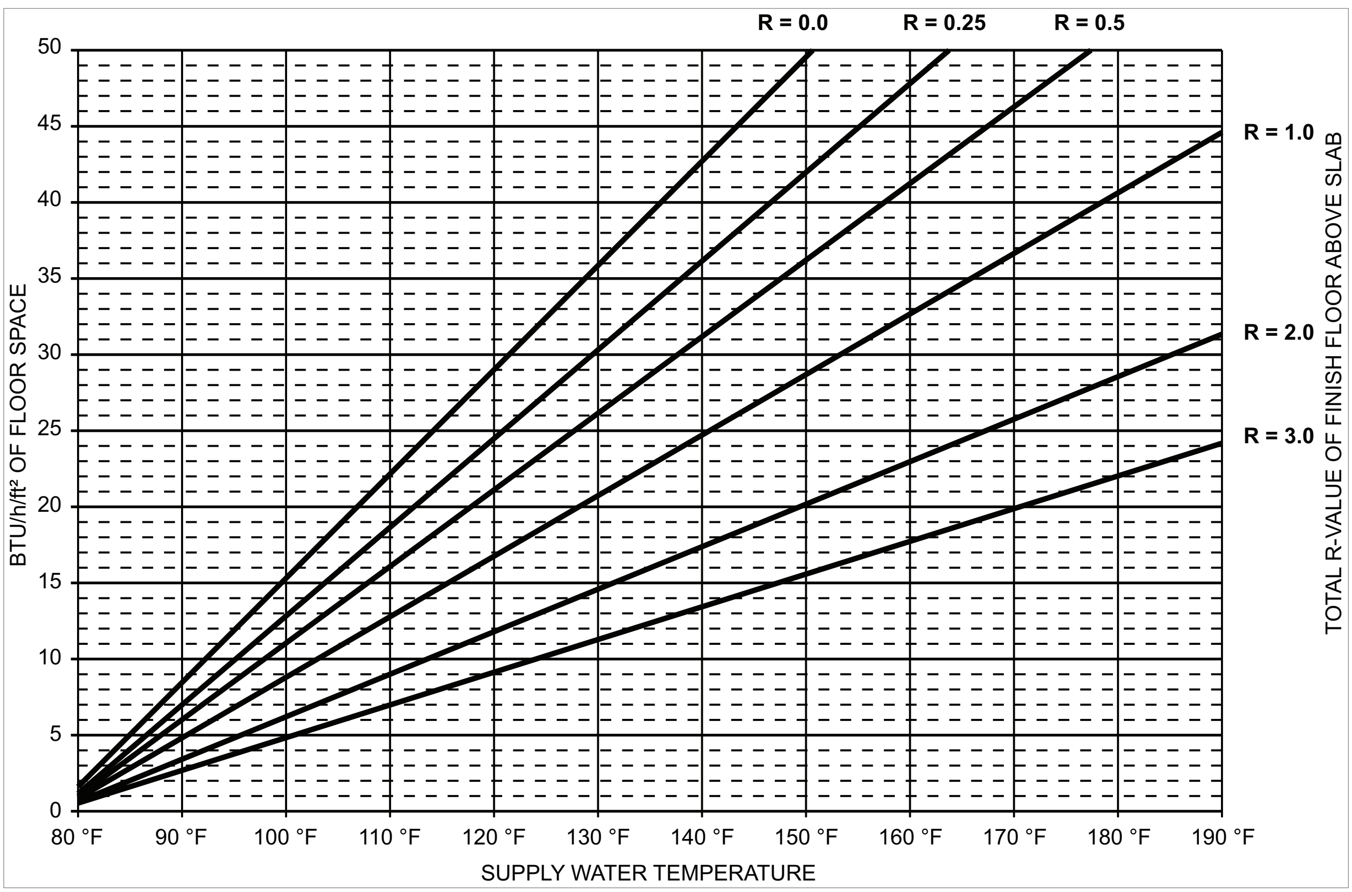
3.3 Calculating the Supply Water Temperature

For 4" slab on or below grade application and 9" tubing spacing.

Based on 68° F room temperature with ½" Viega Barrier PEX tubing and R-5 insulation below the slab.

Procedure:
1. Locate desired BTU output (from LoopCAD) 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.

Example:
Output needed: 20 BTU/h/ft.^{2}
Finish floor R-value: .25
Supply water temperature: 112° F



3.4 Calculating the Floor Surface Temperature

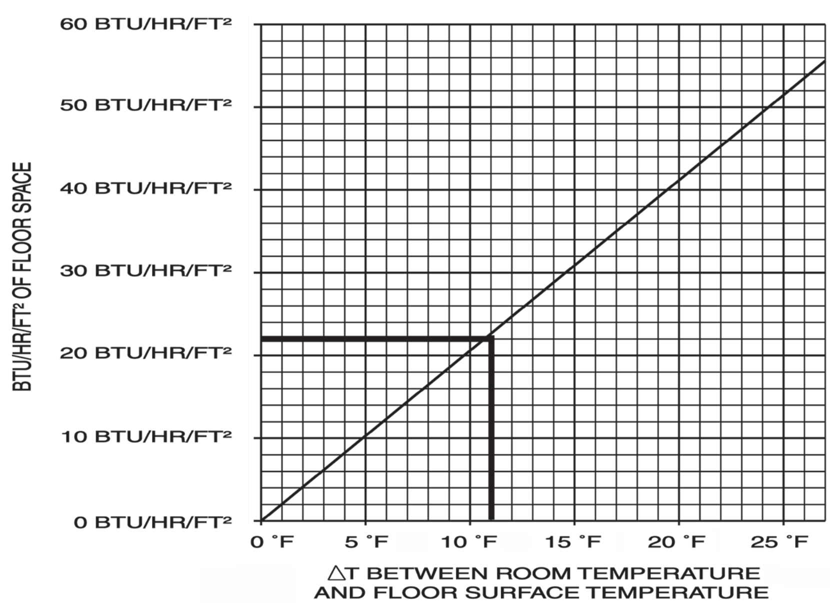
The chart below shows the relation between room temperature and floor surface temperature for floor heating systems.

Procedure:
1. Locate desired output (from LoopCAD 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.

Floor Surface Temperature Chart



3.5 Calculating the Pressure Drop

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

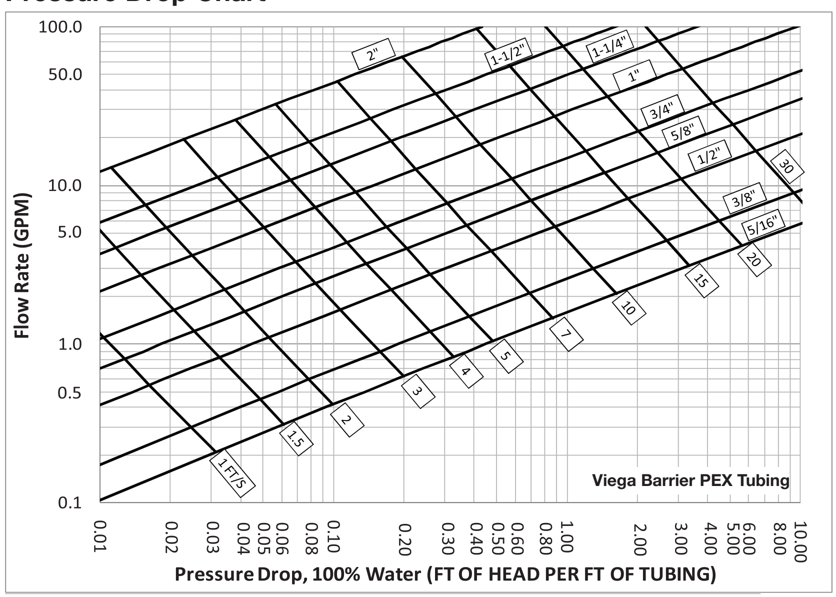
Procedure:

1. Use the Pressure Drop Chart below to locate desired flow rate for one circuit on the left vertical axis (receive circuit flow rate from the LoopCAD program).
2. Follow the chart below to find the selected tubing size.
3. Then, on the chart, 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

Pressure Drop Chart

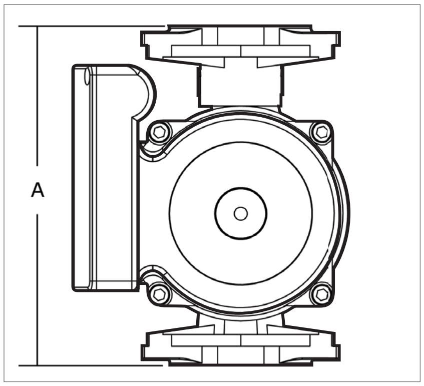


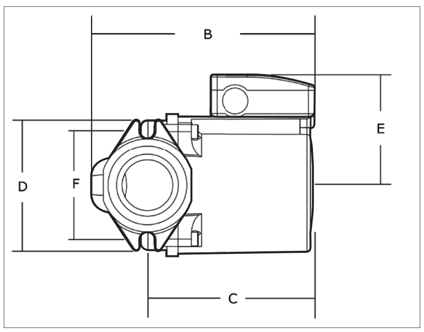
Viega Barrier PEX Tubing Data			
Nominal Size (in)	Outside Diameter (in)	Inside Diameter (in)	Water Content (in)
5⁄16*	0.430	0.292	0.004
⅜	0.500	0.350	0.005
½	0.625	0.475	0.009
⅝	0.750	0.574	0.014
¾	0.875	0.671	0.018
1	1.125	0.862	0.030
1¼	1.375	1.053	0.045
1½	1.625	1.243	0.063
2	2.125	1.629	.1083

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

Table 5: 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 factors when selecting a pump. Flow rates come from the LoopCAD program.

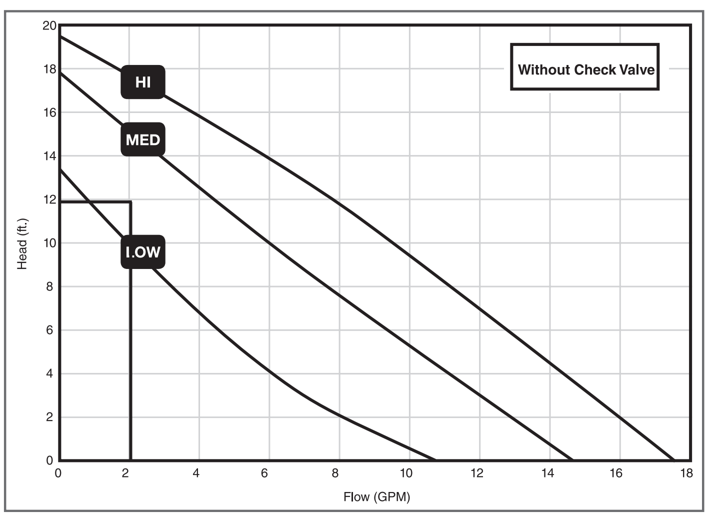
Refer to "3.5 Calculating the Pressure Drop" on page 16 to define the pressure drop or use the LoopCAD program. Remember when figuring pressure drop, use the highest pressure drop of all the circuits fed by their circulator. If the circulator can overcome that pressure drop, then it can overcome all 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

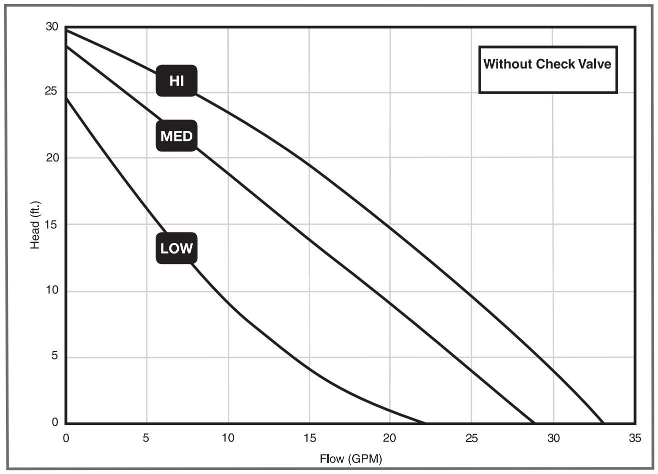
Part Number	A	B	C	D	E	F
12126	6½"	5¼"	4"	4 3⁄16"	3"	35⁄32"
12127	6½"	6"	4⅞"	3½"	37⁄16"	35⁄32"

Table 6: Pump Dimensions



Part Number	Speed	Amps	Watts	HP
12126	HI	0.75	87	1⁄25
	MED	0.66	80	1⁄25
	LOW	0.55	60	1⁄25

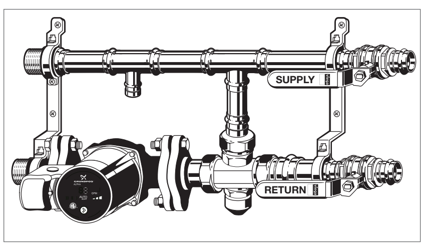
Table 7: Pump 12126



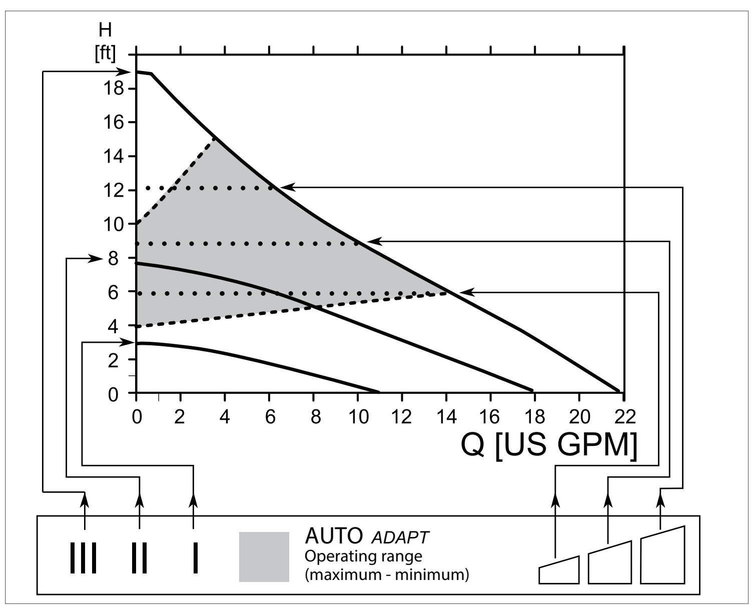
Part Number	Speed	Amps	Watts	HP
12127	HI	1.8	197	⅙
	MED	1.5	179	⅙
	LOW	1.3	150	⅙

Table 8: Pump 12127

3.7 Enhanced Mixing Station Pump Performance



Performance* and operation mode selection



**Hydraulic performance without check valve*

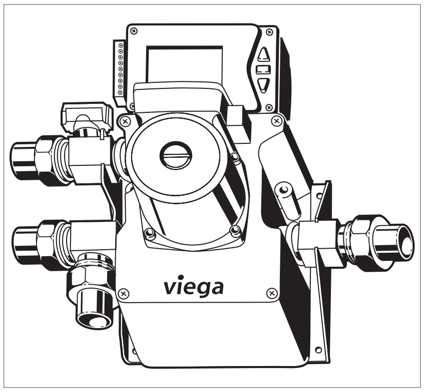
Speed Setting	Position	Minimum	Maximum
High fixed speed	III	39W	45W
Medium fixed speed	II	15W	30W
Low fixed speed	I	5W	8W
Constant pressure		8W	45W
Constant pressure		14W	45W
Constant pressure		22W	45W
AutoADAPT	AUTO ADAPT	5W	45W

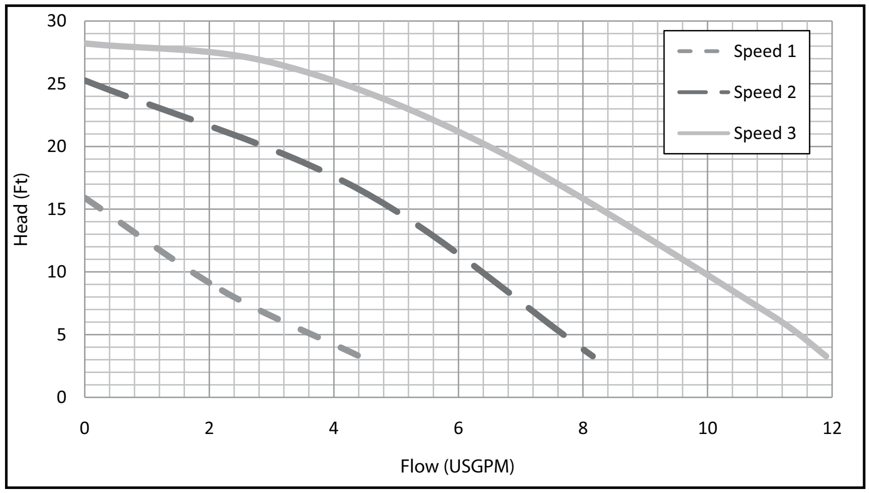
Table 9: Power Usage (Approximate)

Position	Description
	■ Push-button for selection of pump setting. ■ Every time the push-button is pressed, the circulator setting is changed.
III	**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.
II	**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.
I	**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.
AUTO ADAPT	**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.

Table 10: Position Descriptions

3.8 Pump Curve for Hydronic Mixing Block



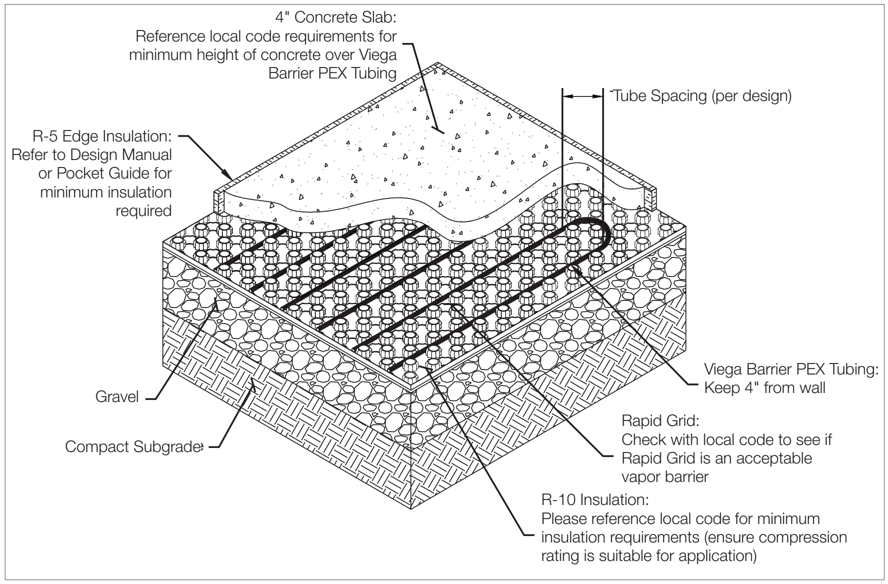


Part Number	Speed	Amps	Watts	HP
56160	3	1.12	130	1⁄25
	2	1.04	110	1⁄25
	1	0.78	80	1⁄25

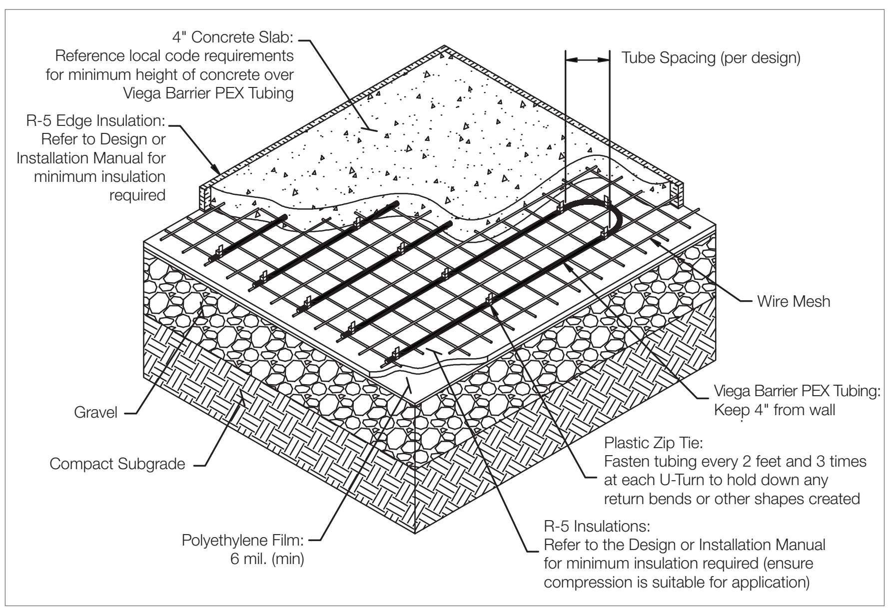
Table 11: Mixing Block 56160

3.9 Typical Cross Sections

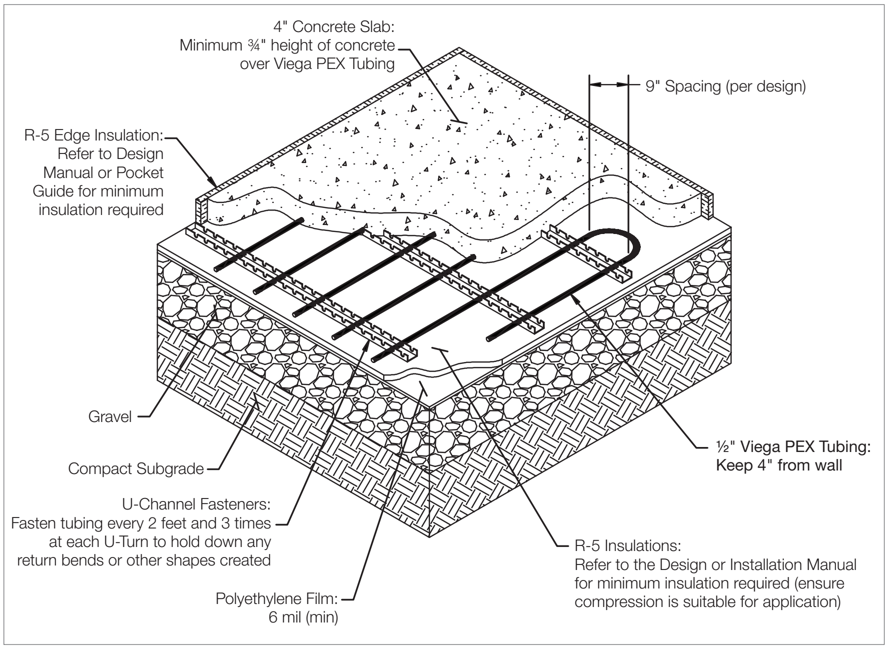
3.9.1 Section through Slab On or Below Grade Installation Using Rapid Grid



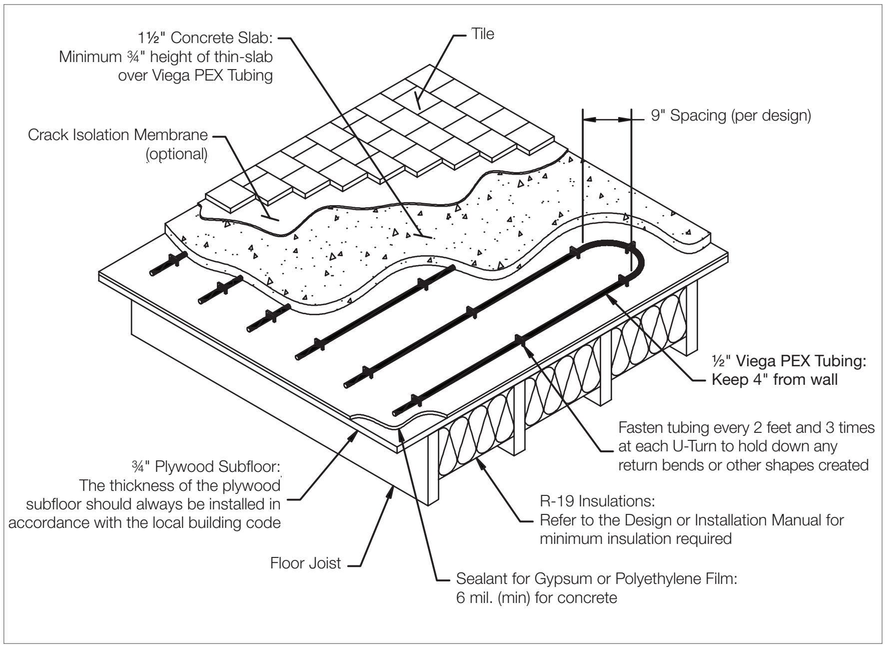
3.9.2 Section through Slab On or Below Grade Installation Using Plastic Zip Ties



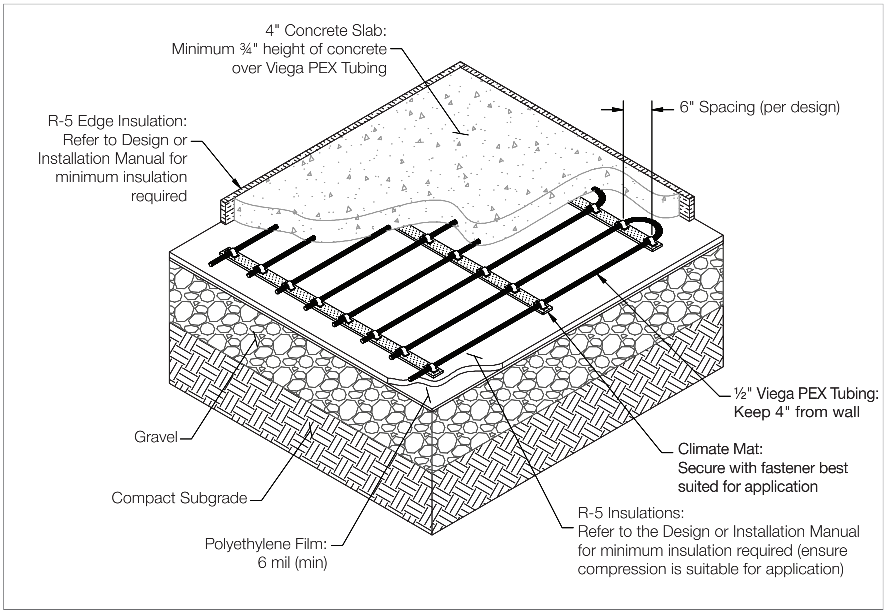
3.9.3 Section through Slab On or Below Grade Installation Using U-Channels – 9" Spacing



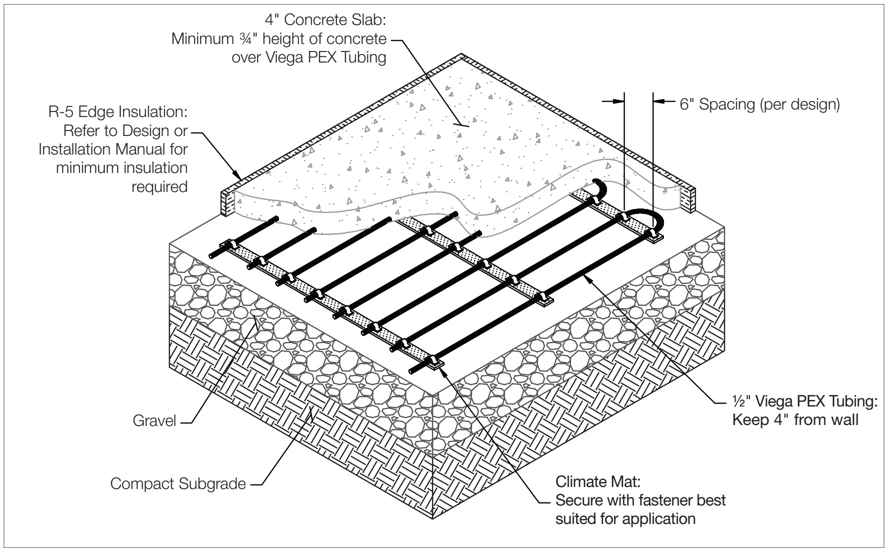
3.9.4 Section through Thin-Slab Installation Using Plywood Staples – 9" Spacing



3.9.5 Section through Slab On or Below Grade Installation Using U-Channels – 6" Spacing



3.9.6 Section through Thin-Slab Installation Using Plywood Staples – 6" Spacing



4 Concrete System Installation

4.1 Layout Planning

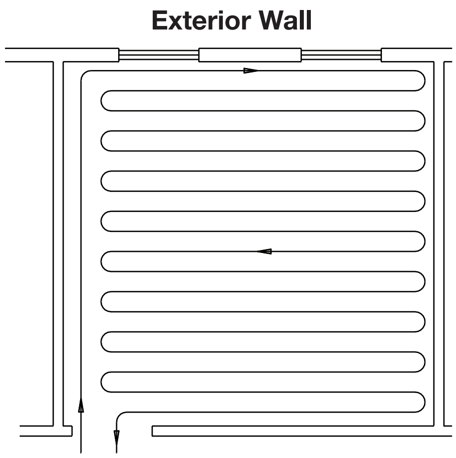
To avoid waste and to have equal circuit lengths, a carefully planned layout should be done.

First, determine where the manifold should be installed. Remember, the manifold must be accessible. When calculating number of circuits, always round up. Keep length of each circuit in the same room equal.

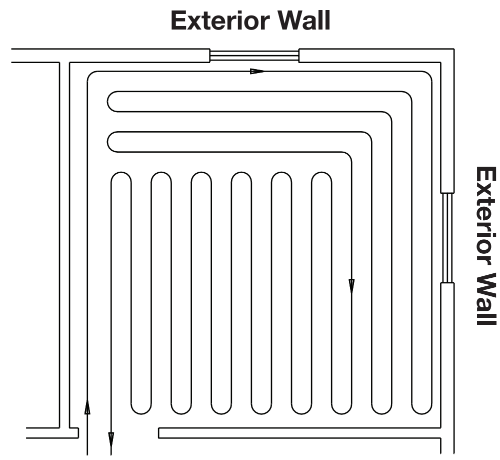
Tubing	Maximum Circuit Length	
	$\leq$ 25 BTUs/(h x ft.^{2})	$\geq$ 25 BTUs/(h x ft.^{2})
⅜	300 ft.	250 ft.
½	400 ft.	350 ft.
⅝	500 ft.	450 ft.
¾	600 ft.	750 ft.

Calculating number of circuits: Total amount of tubing ÷ Maximum circuit length = # of circuits
Table 12: Maximum Circuit Length

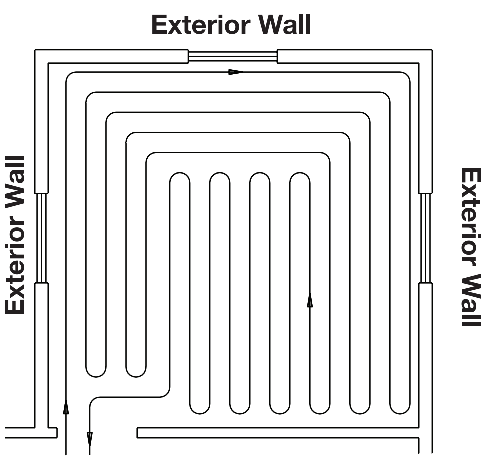
4.1.1 Circuit Layout Patterns for Hydronic Radiant Floor Heating



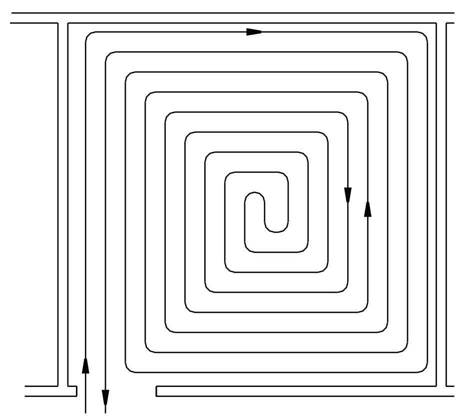
One Wall Serpentine
Room has one exterior wall



Two Wall Serpentine
Room has two exterior walls



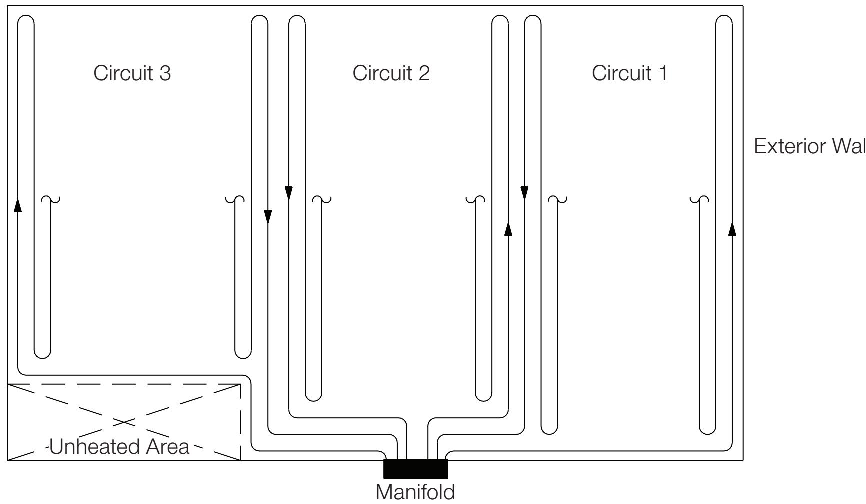
Three Wall Serpentine
Room has three exterior walls

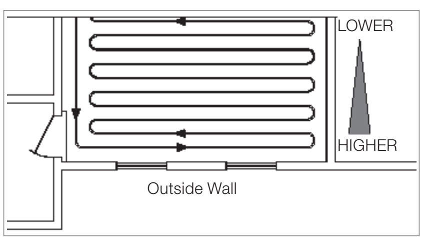


Counter Flow
Room has no exterior walls

Manifold is located in the wall with a manifold cabinet
(part number 15800, 15801,15802)

Continue serpentine pattern





Run supply tubing from red manifold valves into high heat loss areas first (i.e., closest to exterior walls, windows, sliders, etc.) and then into the interior of the room.

Higher water temperatures at the outside wall will provide more BTU output where it is needed.

Continue the circuits, laying them out in the same direction toward the interior of the room.

4.1.2 Tubing Layout Around Joints

Concrete has very little flexibility and will almost always crack. Jointing is one of the best ways to control the inevitable. Joint location, which influences the radiant heating piping design layout, is generally specified by the architect.

4.1.3 Tubing Joint Locations

- Edge of thermal mass
- Side length 18 ft.
- Sides less than 1:2 ratio
- Doorways
- Bays in L-shaped rooms

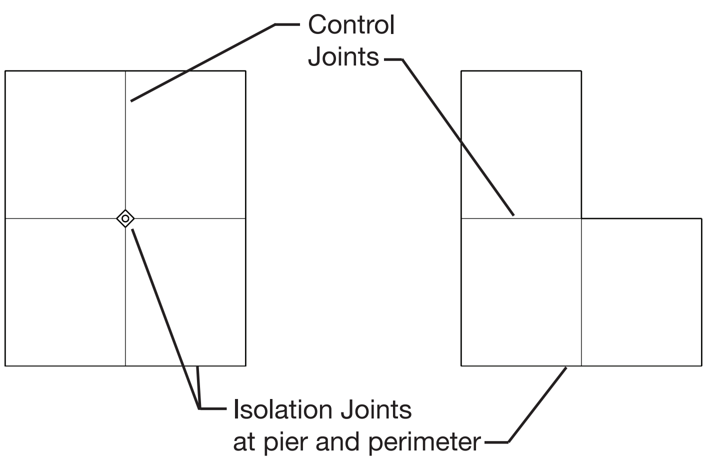
4.1.4 Isolation Joints

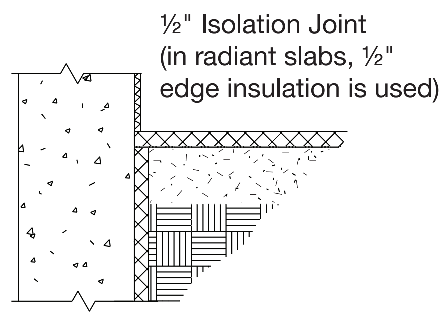
When installed against the concrete foundation at the perimeter of the slab, the joint material prevents the slab from bonding to the walls. It also allows the slab to expand without cracking during temperature fluctuations.

4.1.5 Control Joints

Control joints force cracks to follow the path of the joint. Without them, random cracks will ruin the appearance and sometimes the usefulness of the slab.

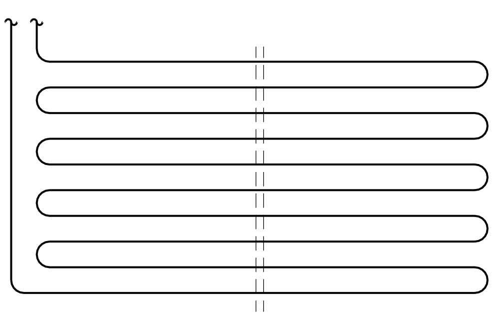
4.1.6 Slabs with Isolation and Control Joints



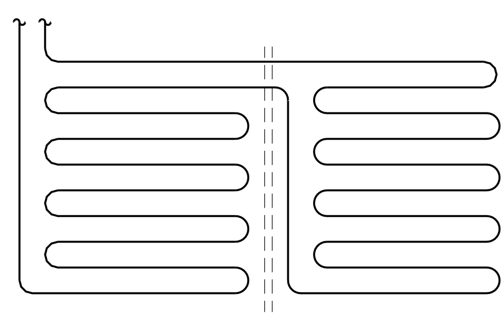


Note:
Building or masonry supply companies sell ½" thick isolation joint material that is precut to the thickness of the slab.

Minimize Penetration of Joints



Incorrect



Correct

4.2 Concrete System Installation

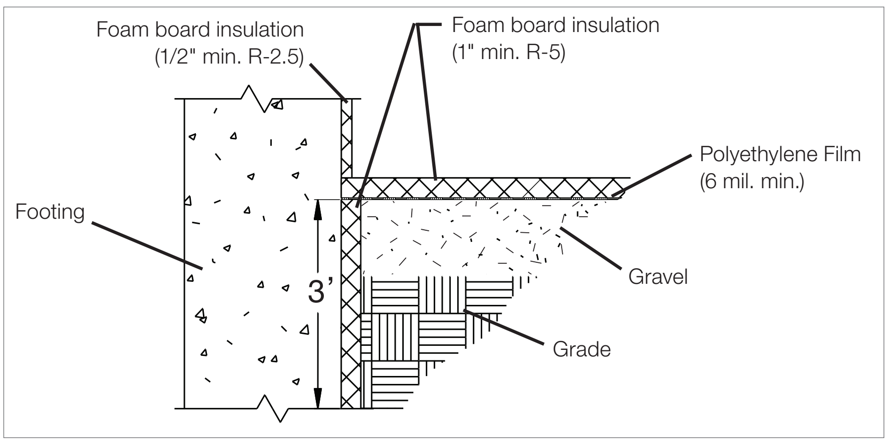
4.2.1 Step 1

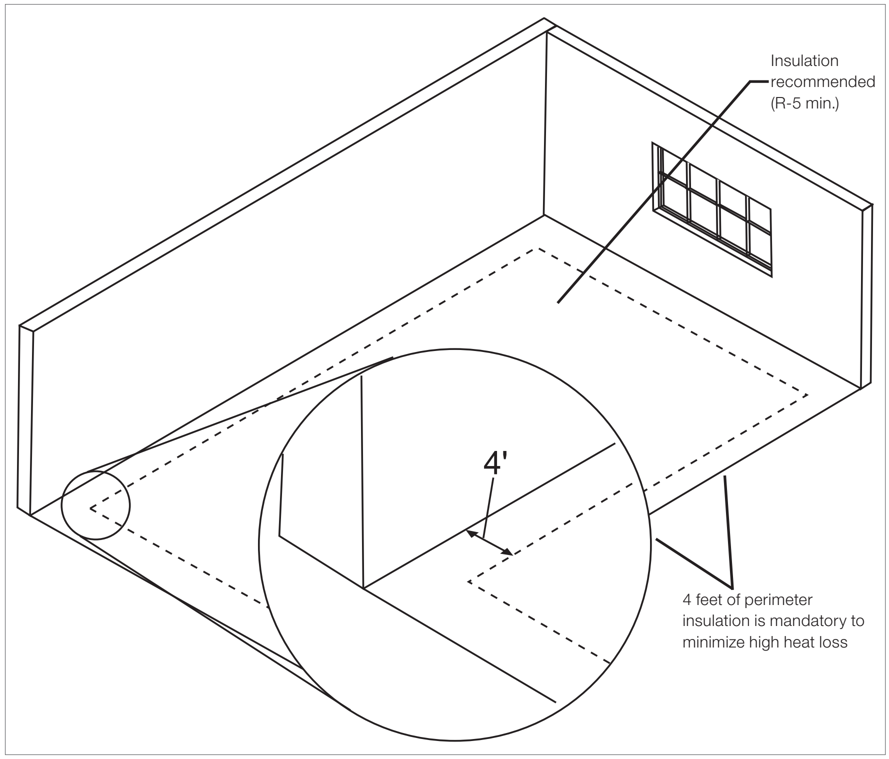
Installing the Insulation
- Final grade should be accurately leveled.
- Cover grade with a polyethylene film (6 mil. minimum).

Insulation Recommendations
- When high water table - required.
- Perimeter insulation - required.
- At the thermal break - required (between heated and unheated slabs).
- Edge insulation - required.
- In high heat loss conditions.
- For small residential slabs (<2000 ft).

Insulation Benefits
- Increased response time.
- Increased energy savings.
- Improved thermal conductivity.
- Decreased downward heat loss.

Weigh down the foam boards to prevent wind uplift. In some jobs this can be done by installing wire mesh as soon as foam boards are placed.



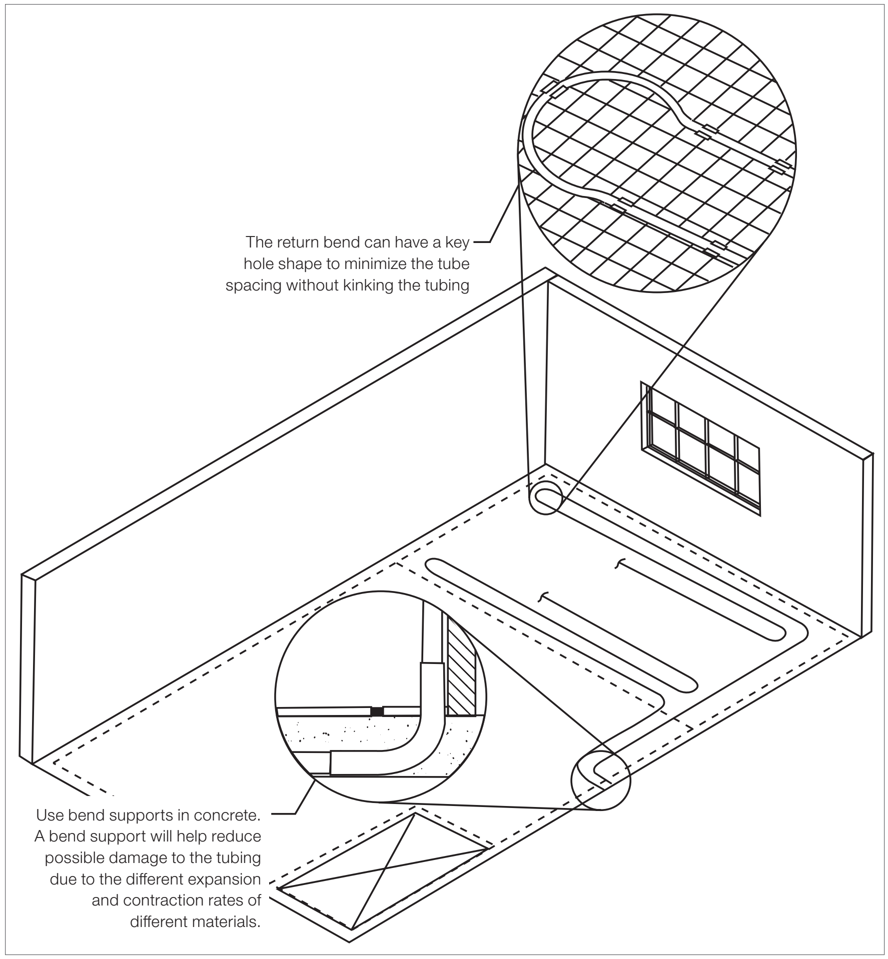


Check with local codes for requirements related to insulation.

4.2.2 Step 2

Installing the Tubing

- Fasten tubing every two feet and three times at each U-Turn to hold down any return bends or other shapes created.
- It's helpful to mark out portions of each circuit directly on the insulation using spray paint.



4.2.3 Step 3

Pressurizing the Tubing

- Pressurize tubing to 80 psi 24 hours before pour and leave pressurized until slab is cured.
- Re-tighten any tubing couplings located in the slab area after at least 12 hours of system pressurization.

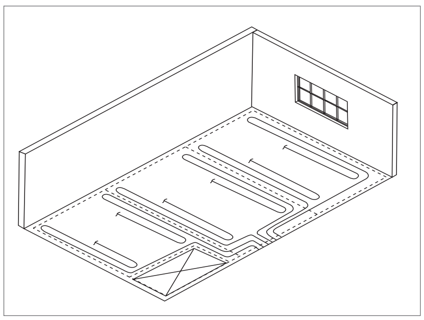
4.2.4 Step 4

Warming Up the Slab

It is best to warm the thermal mass up slowly during start-up to help prevent possible shock to the slab. In accordance with DIN 4725 section 4, Viega recommends:

- Start warm up after concrete has reached its final set (curing complete).
- Set supply water temperature to 77° F for the first three days.
- Increase supply water temperature to the set point in gradual increments for the next four days (maximum of a 50° F increase in a period of 24 hours).
- Slab warm up should follow the concrete manufacturer’s recommendations.

4.2.5 Step 5



Testing the Concrete for Excessive Moisture

- The polyethylene film test:
  - Tape a one foot square of 6 mil. clear polyethylene film to slab, sealing all edges with plastic moisture resistant tape.
  - If, after 48 hours, there is no “clouding” or drops of moisture on the underside of the film, the slab can be considered dry enough for finish floor applications.
- Drying times vary considerably with location, season, interior temperature/humidity, etc. Follow the finish flooring manufacturer’s recommendations.

Concrete Thin-Slabs

- The following may be added to the mixture for flowability and reduced shrinkage to minimize cracking:
  - Super plasticizer
  - Water reducing agent
  - Fiberglass reinforcing

Gypsum Thin-Slabs

Gypsum Thin-Slabs are usually installed after the walls have been closed in with drywall or other finish materials. The highly flowable Gypsum mix fills in any gaps between the dry wall and the subflooring, reducing air leakage and sound transmission under walls.

> Some installation methods call for the Thin-Slab to be constructed before any exterior walls or interior partitions are erected.
>
> To prevent bonding, all edges of the base plates that will be in contact with the concrete slab should be coated with a suitable release agent compatible with PEX tubing.
>
> Use a minimum of R-19 insulation under the plywood subfloor (refer to section "3.9 Typical Cross Sections" on page 21).

> All tubing must be pressure tested prior to and during pour (refer to section "6.2.1 Pressure Testing" on page 45).

5 Piping and Controls

5.1 Mixing Equipment and Manifolds

Hydronic mixing block includes:
- Connection fittings
- Mixing device with reset control
- 3-speed circulator (low head)
- Air vent
- Pressure temperature sensor
- Mounting bracket
- Outdoor sensor

Enhanced mixing station includes:
- Ball valves
- Circulator pump (low head)
- Diverting valve with temperature high limit
- Mounting brackets
- ECM motor technology, reduces power consumption by up to 50%
- 7 different settings
- 3 boiler connection types

Base mixing station includes:
- Ball valves
- 3-speed circulator pump (high head)
- Diverting valve with temperature high limit
- Mounting brackets
- 3 boiler connection types

1¼" Stainless manifold includes:
- 2 stainless manifold configurations
- Shut-off/balancing/flow meter
- Shut-off/balancing
- 2 - 6⅝" spacing brackets (for compact remote mounting)
- 2 to 12 outlets per manifold
- 2 to 12 flow meters / balancing valves on supply header for flow adjustment from 0-2 GPM
- 2 to 12 shut-off valves on return manifold designed to receive powerheads (part number 15061 and 15070 for 2 wire powerhead and part number 15064 and 15069 for 4 wire powerhead)
- Built-in purge valves and air bleeders
- 1¼" NPT union connections
- 1" NPT removable end caps

5.2 Single Temperature Radiant System

To modulate system fluid temperature as the outdoor temperature changes (outdoor reset) Viega has a couple of options:

- The hydronic mixing block may be selected to incorporate mixing, control and outdoor reset in one easy to install package.
- The basic heating control may be used in conjunction with a mixing station to modulate system fluid temperature based on outdoor temperature.

Single or multiple zones can be used by adding thermostats, zone controls, zone valves, and/or powerheads as necessary.

Part Number	Material	Quantity
12121 - 12123 - 12125	Mixing Station	1
12151 - 12152 - 12153	Enhanced Mixing Station	1
56160	Hydronic Mixing Block	1
16015	Basic Heating Control	1
16016	Indoor Sensor	1
18003	Three Position Actuator for Station	1
15900-15910 15700-15710	1¼" Stainless Manifold, # Outlets*	1

**Based on job requirements*

Table 13: Single Temperature Radiant System Materials

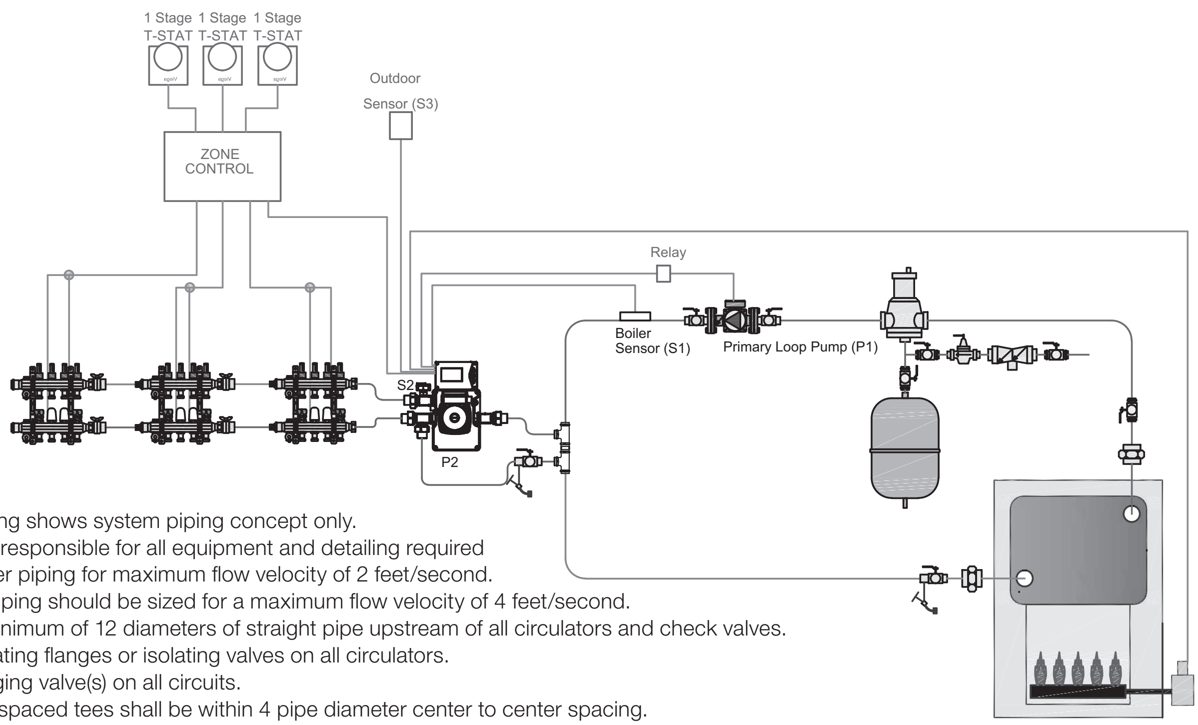
Primary Loop Sizing*		
Copper Pipe Size (in)	Flow Rate (GPM)	Heat Carrying Capacity (BTU/h)
¾	4	40,000
1	8	80,000
1¼	14	140,000
1½	22	220,000
2	45	450,000

**Based on job requirements*

Table 14: Primary Loop Sizing

5.2.1 Single Temperature: Hydronic Mixing Block

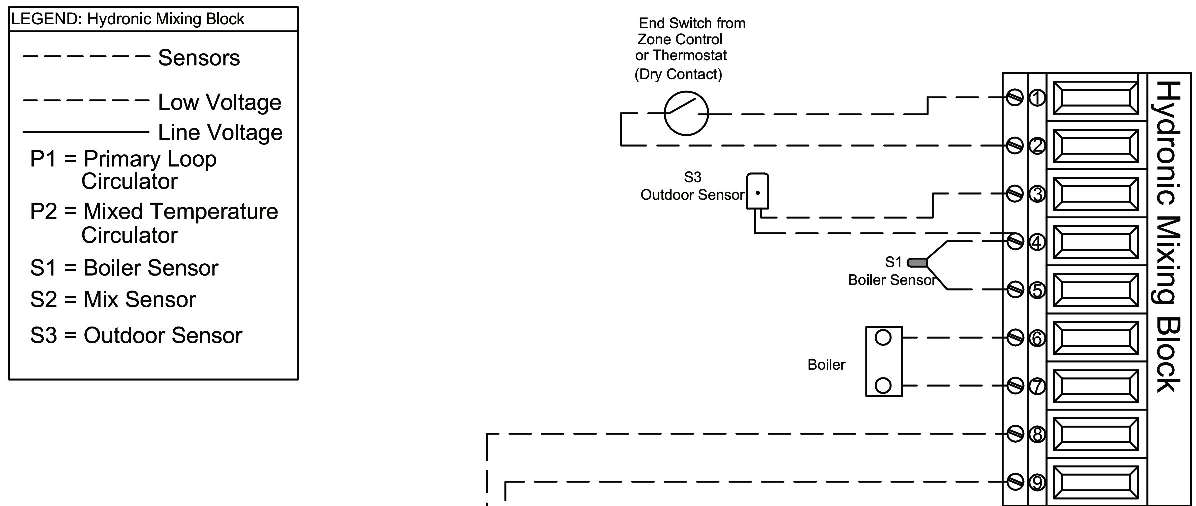
5.2.1.1 Mechanical Schematic

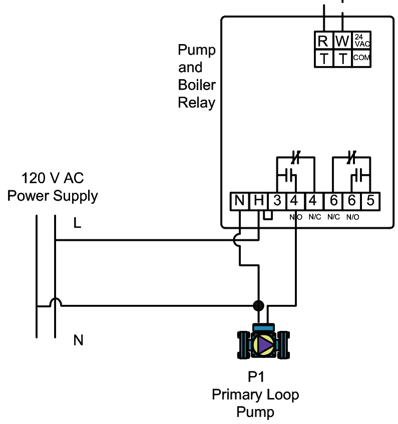


Piping

1. This drawing shows system piping concept only.
   Installer is responsible for all equipment and detailing required
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).

5.2.1.2 Electrical Schematic



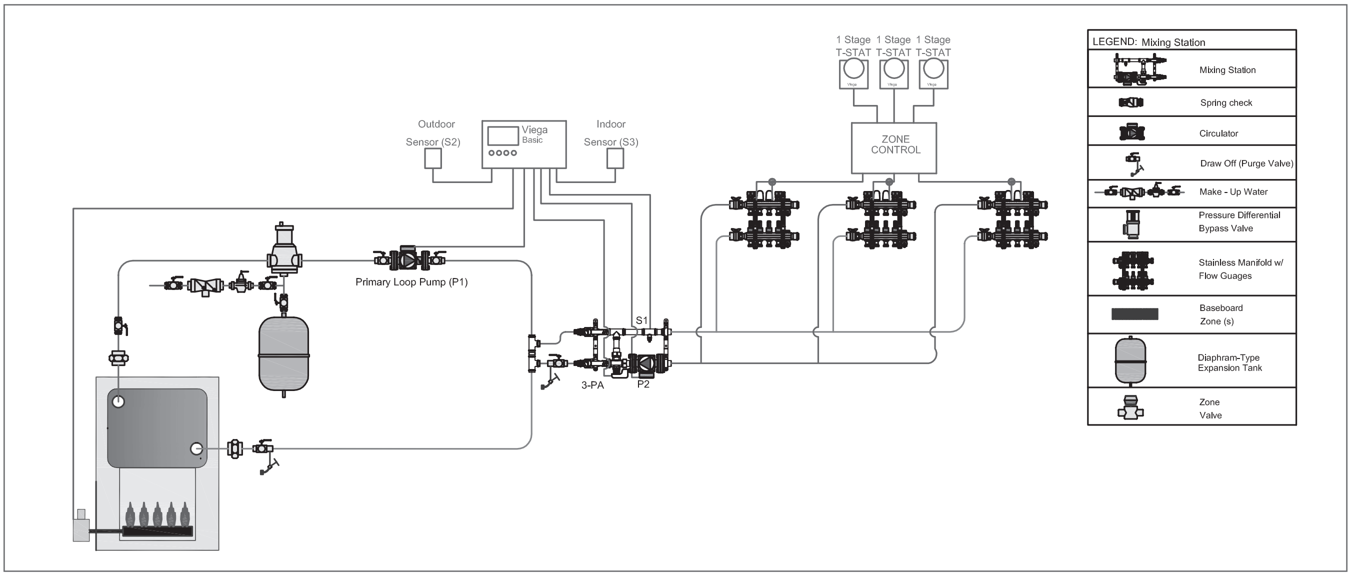


Wiring

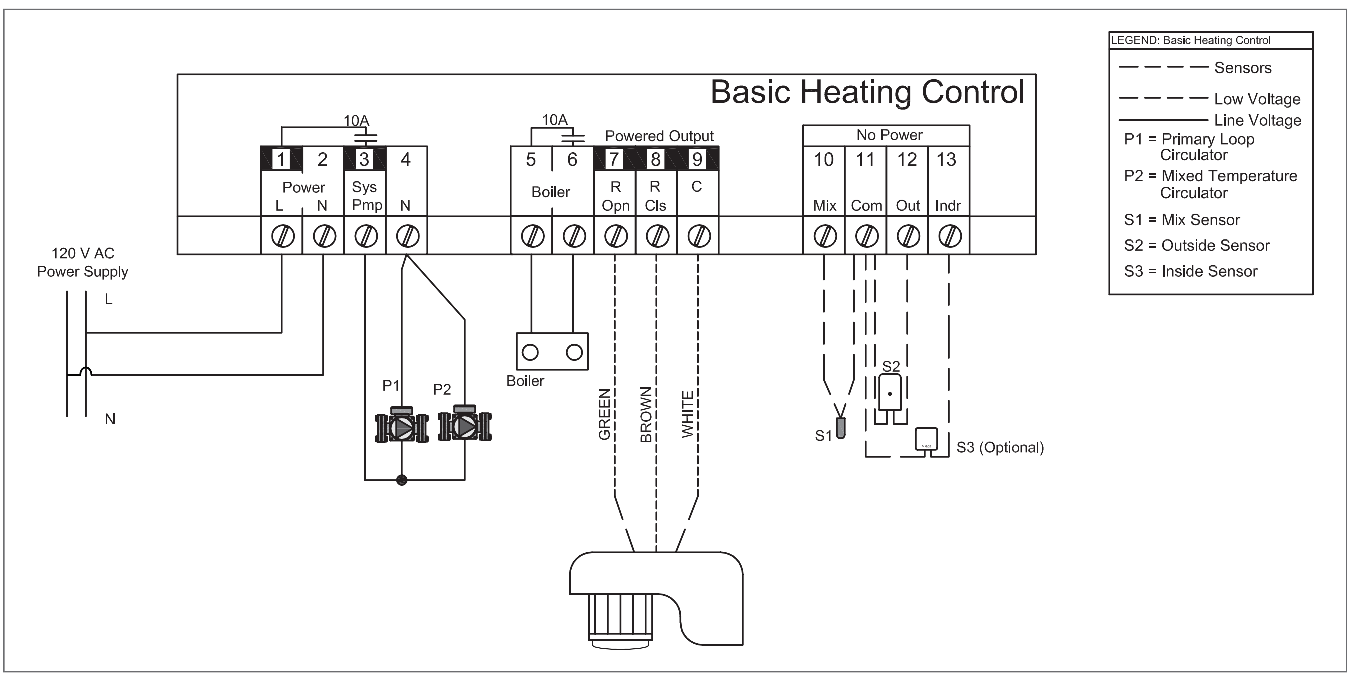
1. This drawing shows system wiring concept only. Installer is responsible for all equipment and detailing required by local codes.
2. All wiring shall be in conformance with the latest edition of the National Electrical Code.
3. Maximum current rating of hydronic mixing block relay is 1 amps, basic and advance snow melting control relay is 5 amps, maximum current rating zone control relay is 5 amps, if circulator draw exceeds this use pilot relay with 120V AC 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 cable. 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.

5.2.2 Single Temperature: Basic Heating Control

5.2.2.1 Mechanical Schematic



5.2.2.2 Electrical Schematic



5.3 Multiple Temperature Radiant System

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 hydronic mixing block or mixing station with the necessary controls.

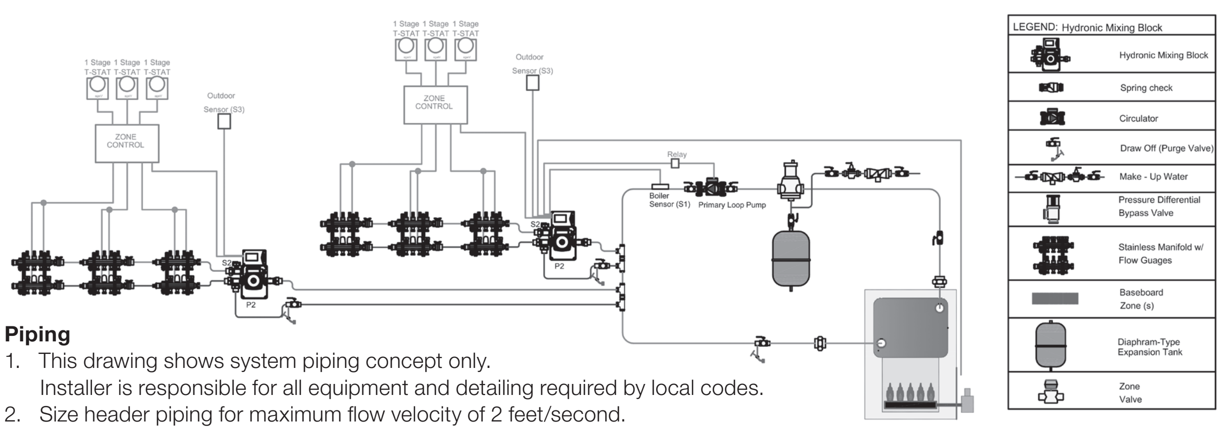
Part Number	Material	Quantity
12121 - 12123 - 12125	Mixing Station	2
12151 - 12152 - 12153	Enhanced Mixing Station	2
56160	Hydronic Mixing Block	2
16015	Basic Heating Control	2
16016	Indoor Sensor	2
18003	Three Position Actuator for Station	2
15900-15910 15700-15710	1¼" Stainless Manifold, # Outlets*	2
18060 - 18062	Zone Control	2
18050 - 15116 - 15117 - 15118	Thermostats	*
15061 - 15064 - 15069 - 15070	Powerheads	*

**Based on job requirements*

Table 15: Multiple Temperature Radiant System Materials

5.3.1 Multiple Temperature: Hydronic Mixing Block

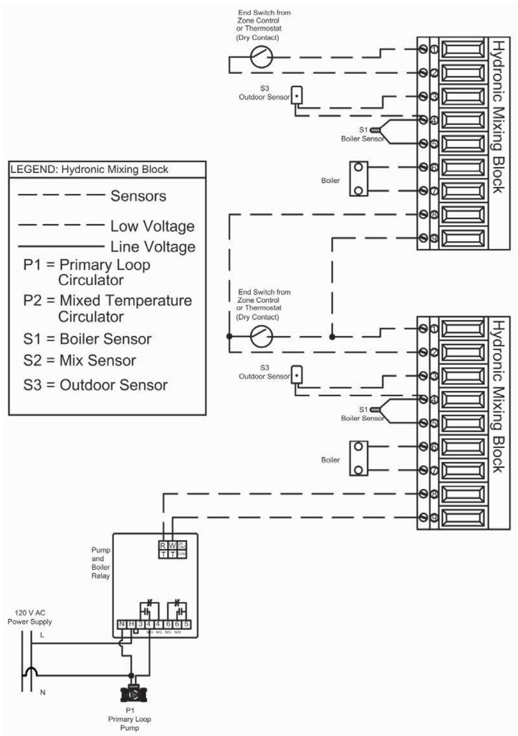
5.3.1.1 Mechanical Schematic



Piping

1. This drawing shows system piping concept only.
   Installer is responsible for all equipment and 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).

5.3.1.2 Electrical Schematic

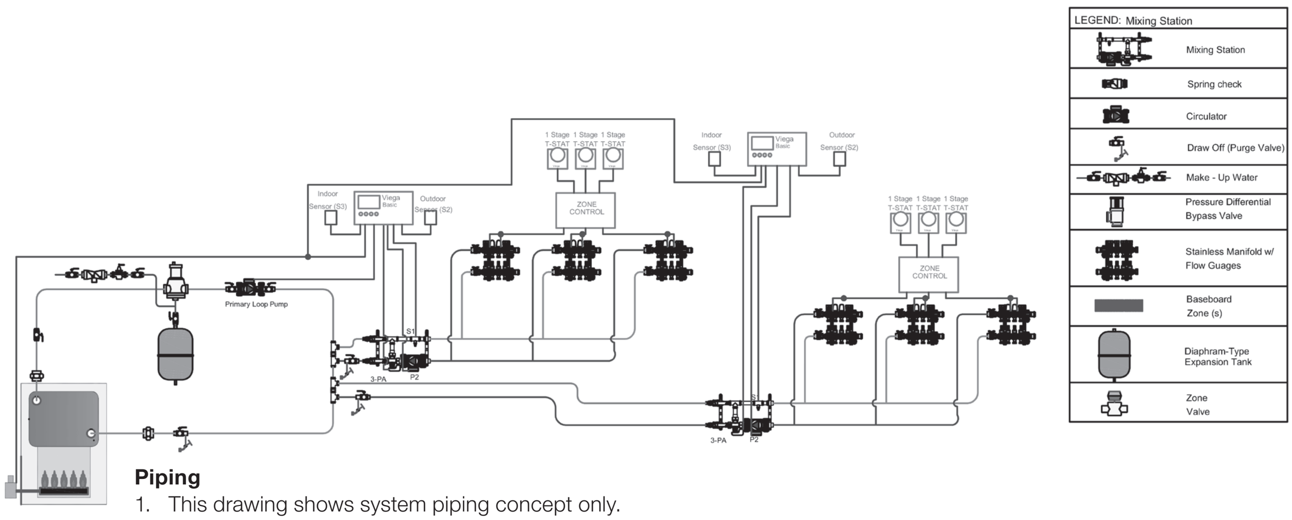


Wiring

1. This drawing shows system wiring concept only. Installer is responsible for all equipment and 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 zone control relay is 5 amps, if circulator draw exceeds this use pilot relay with 120V AC 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 cable. 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.

5.3.2 Multiple Temperature: Basic Heating Control

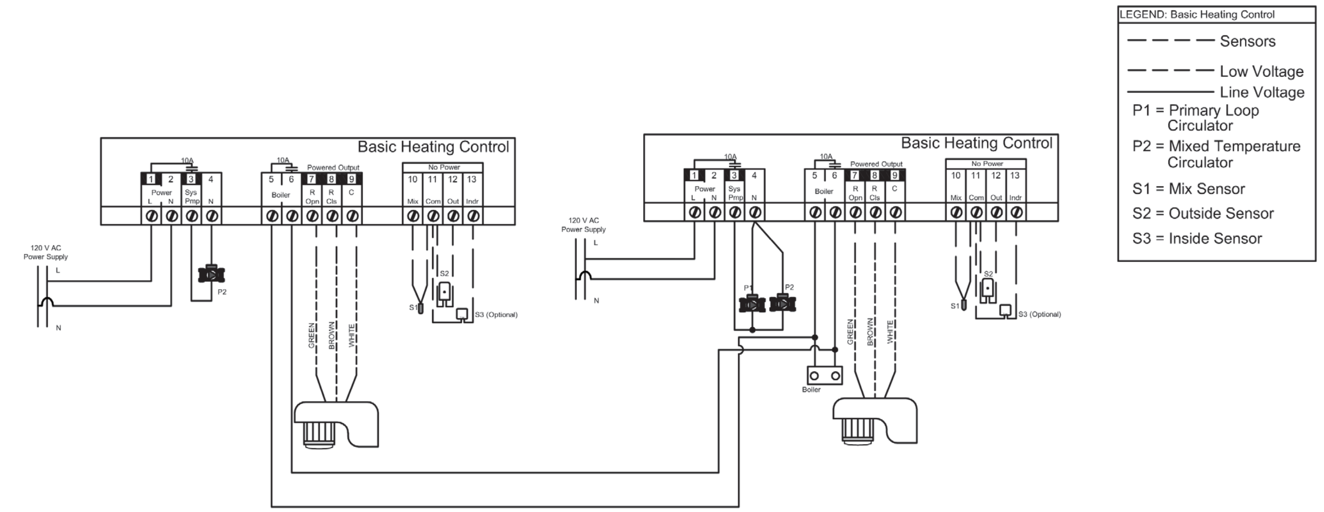
5.3.2.1 Mechanical Schematic



Piping

1. This drawing shows system piping concept only.
   Installer is responsible for all equipment and 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).

5.3.2.2 Electrical Schematic



Wiring

1. This drawing shows system wiring concept only. Installer is responsible for all equipment and 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 zone control relay 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 cable. 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.

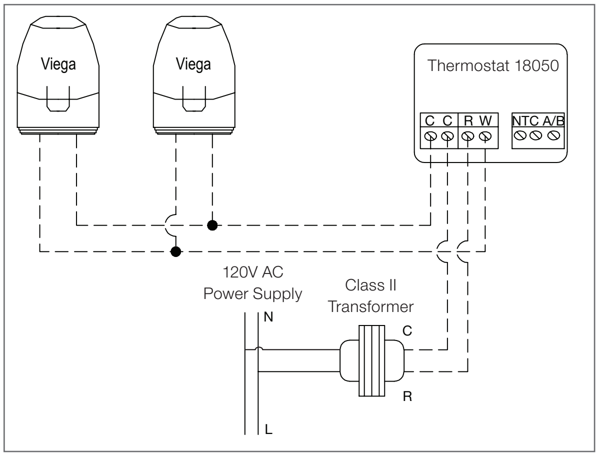
5.4 Zone wiring

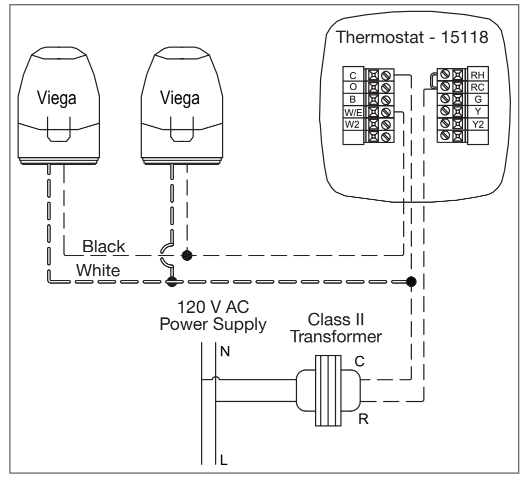
A manifold system allows any one or more of the circuits to be adapted for control by a thermostat. The following are typical zone wiring schematics.

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

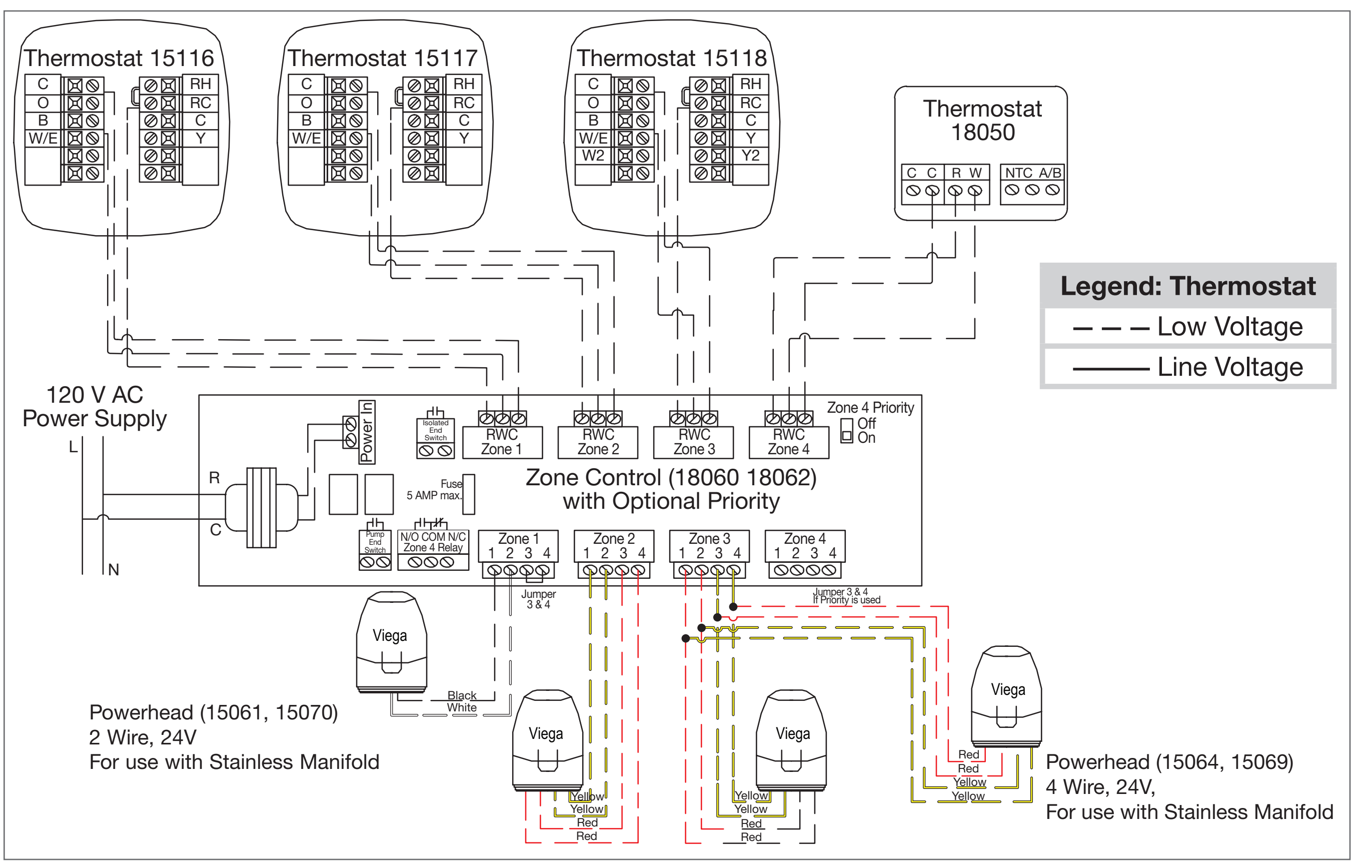
5.5 Wiring Schematic: One-Zone Application



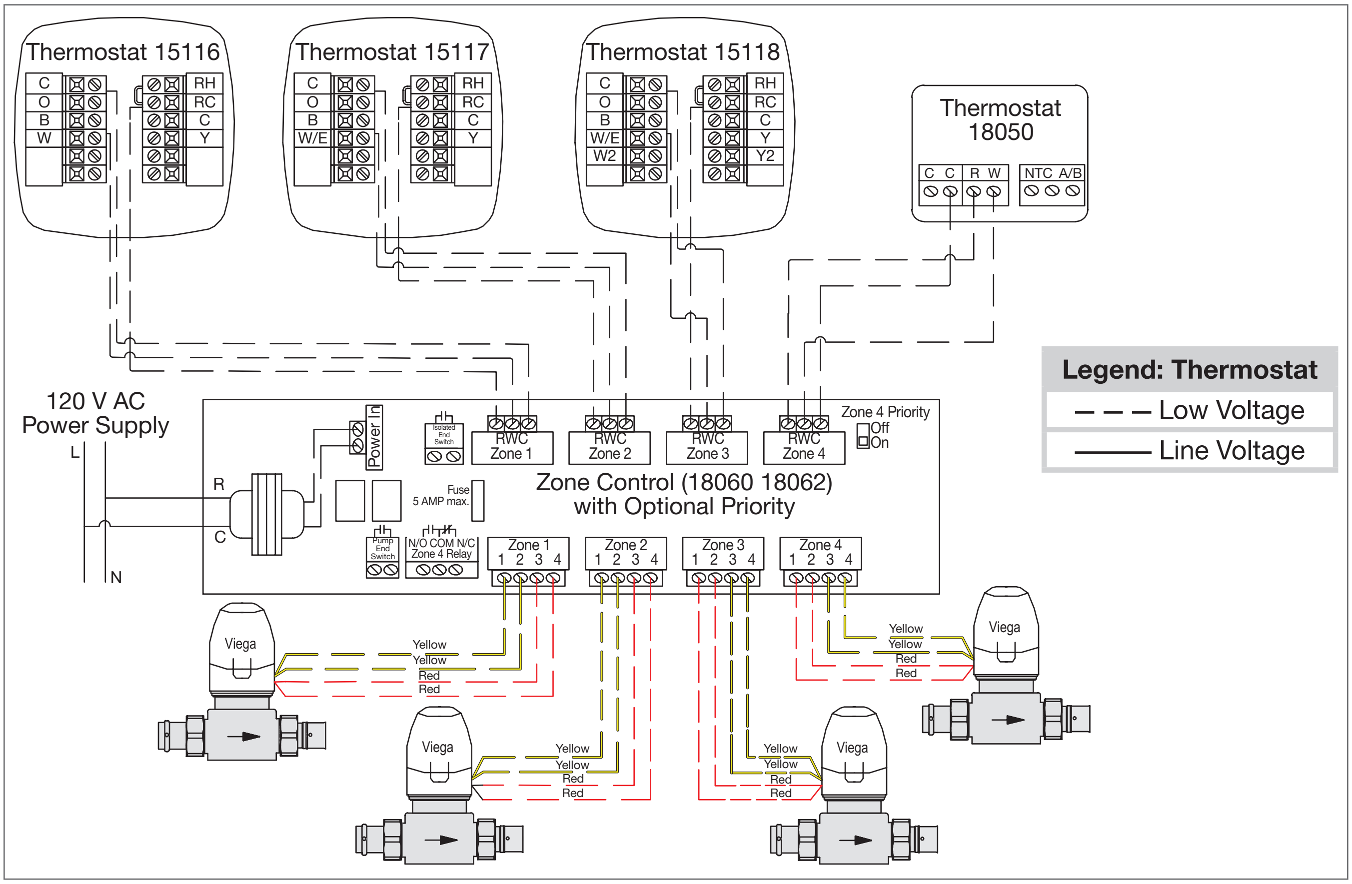


Digital Thermostats can control up to 4 powerheads.

5.6 Wiring Schematic: Multi-Zone Application using Viega Powerheads

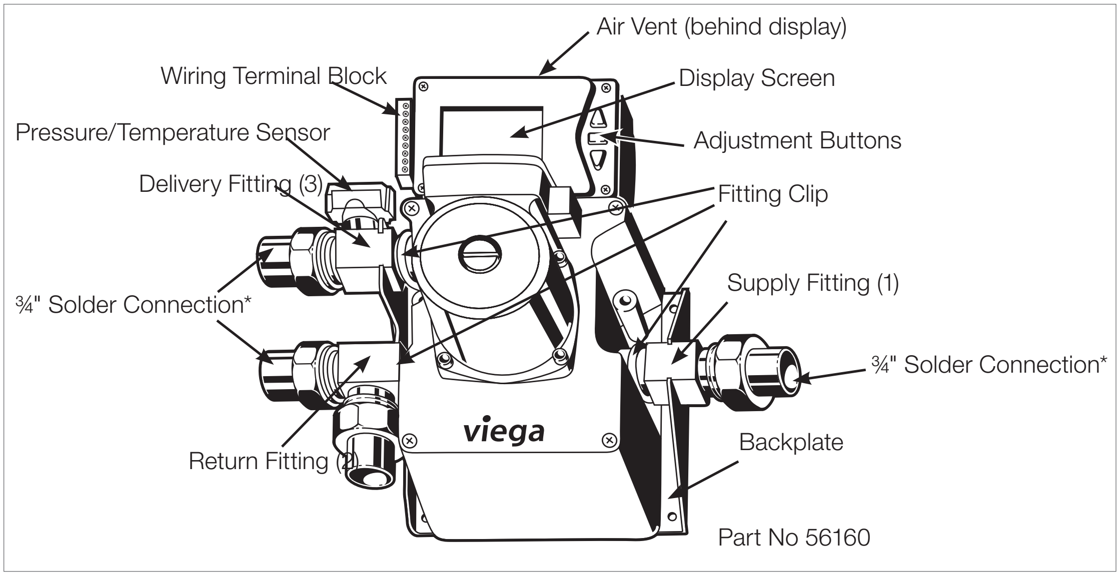


5.7 Wiring Schematic: Multi-Zone Application using Viega Zone Valves



6 System Start-Up

6.1 System Start-Up for Hydronic Mixing Block



6.1.1 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.
4. Inspect all piping and fitting joints for leaks.

6.1.2 Filling and Purging

When testing is complete, purge the hydronic mixing block.

1. Shut the power off to the boiler.
2. Purge with only cool water, if the boiler is hot it should be cooled down prior to purging, this is done to protect the floor coverings from surface temperatures above 85° F.
3. Plug in the Hydronic Mixing Block, allow it to run through its initial setup and bring you to the STATUS screen.
4. From the STATUS screen push the middle rectangular button.

DEFAULTS/PURGE

1. Select PURGE
2. Select ACTIVATE
   - Selecting ACTIVATE will cause the screen to turn purple, at which time the internal valve will open, once the valve is open the screen will blink purple and start a 30 minute timer to allow for purging.
   - If more time is needed, ACTIVATE may be selected as many times necessary to complete system purging.
   - If less time is needed purge can be cancelled by selecting CANCEL.
3. Allow the Hydronic Mixing Block to be filled with fluid from the supply side piping.
4. Close the valve on the return piping to the boiler.
5. Open the purge valve to allow trapped air to be eliminated.
6. Continue to allow fluid to run into the block and out the purge valve until all air is removed from the system.
7. Once purging is complete, return all valves to normal operating position.
8. Open the air vent cap to allow air to escape under normal operation.
9. Once the Hydronic Mixing Block, boiler and piping has been purged and properly pressurized, restart the boiler.

6.2 System Start Up for Mixing Stations

6.2.1 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 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.

6.2.2 Filling and Purging

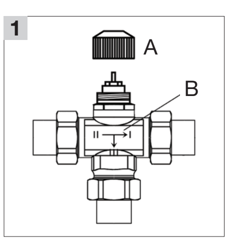
1. Attach drain hose to purge valve hose connection on return header and open valve.
2. Close all but one circuit. Close isolation ball valve on boiler return line. Remove plastic dust cap or temperature controller from 3-way valve, and make sure that high limit kit is fully open.
3. Open boiler fast 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.

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.

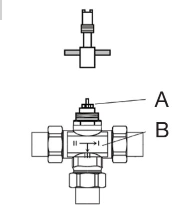
6.3 Adjusting the High-Limit Kit (Mixing Station)

6.3.1 Operation

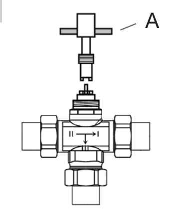
The mixing station is provided with a pre-installed temperature high-limit kit. This kit is installed into the three-way valve to allow a maximum supply water temperature to be set. This kit must be unscrewed when purging the system and should then be set according to the following instructions.



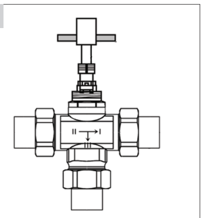
1. Remove (A) gray plastic cap from (B) valve body. (This cap can be used to adjust the water temperature manually.)

2


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

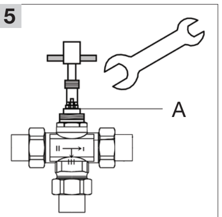
3


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


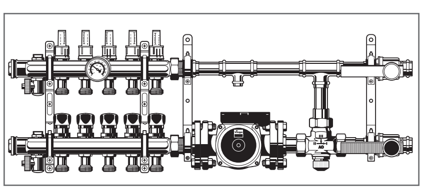
4. Turn adjustment screw further clockwise until desired supply water temperature is obtained and count quarter turns for reference. This has to be done carefully and slowly because each quarter turn of the adjustment screw will result in approximately 15°F temperature reduction. Wait until desired water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

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

5


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.

Procedure:
1. Start with all valves wide open.
2. Turn the flow meter/balancing valve clockwise, decreasing the flow until the design flow is met.

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 (section"8 Appendix A: R-Value Table Floor Coverings" on page 49 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 (section "8 Appendix A: R-Value Table Floor Coverings" on page 49 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.
- The floor surface temperature should not exceed 85° F (refer to "3.4 Calculating the Floor Surface Temperature" on page 15).

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.

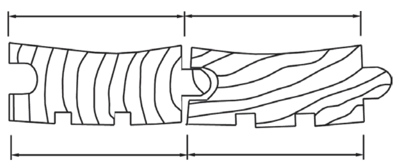
7.1.2 Moisture

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.

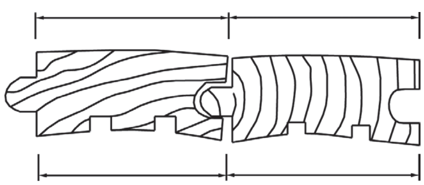
If the moisture content of the wood is relatively high near the bottom of the plank, cupping upward will occur exaggerating cracks.

7.1.2.1 Dry Shrinkage



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.

> Follow the flooring manufacturer's installation manual or NOFMA's (National Oak Flooring Manufacturers Association) manual.

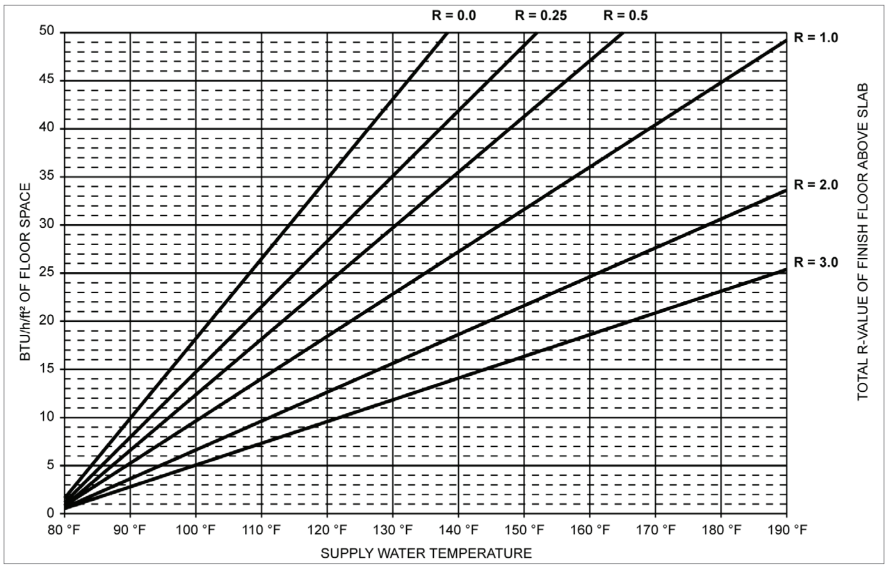
8 Appendix A: R-Value Table Floor Coverings

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

9 Appendix B: Supply Water Temperature/BTU Output Charts

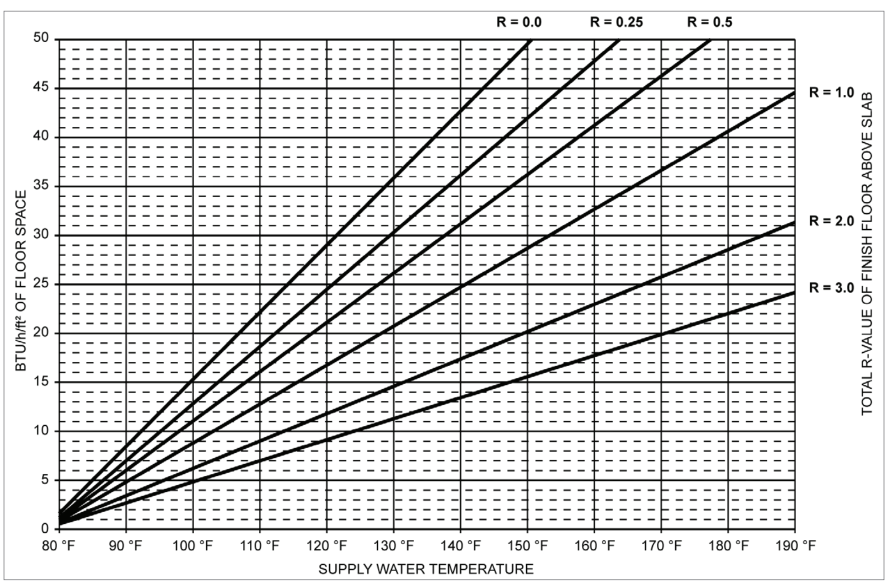
9.1 4" Slab On or Below Grade Application with 6" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-5 insulation below the slab.



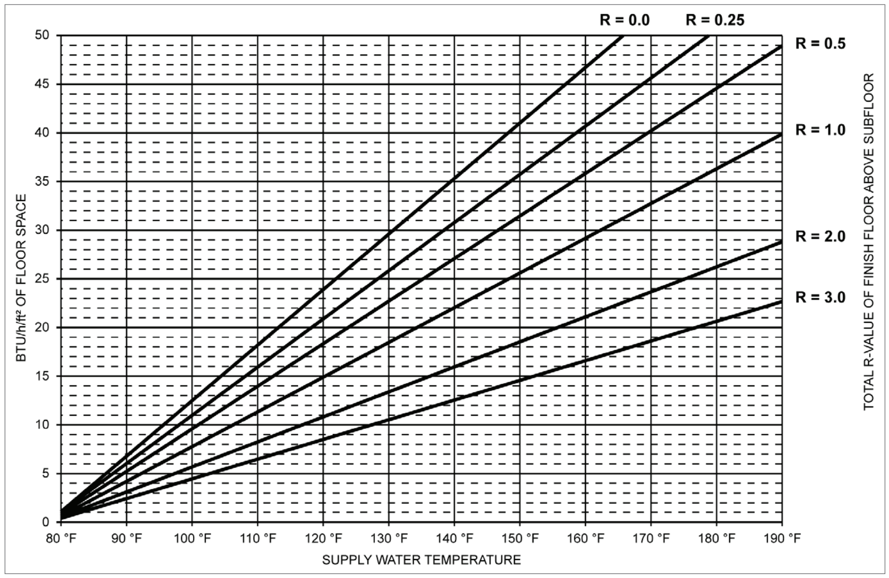
9.2 4" Slab On or Below Grade Application with 9" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-5 insulation below the slab.



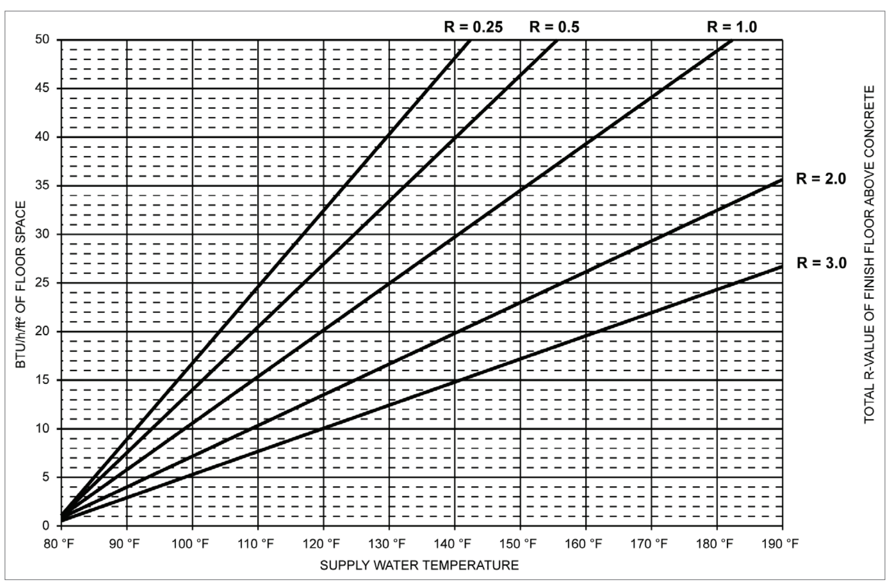
9.3 4" Slab On or Below Grade Application with 12" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-5 insulation below the slab.



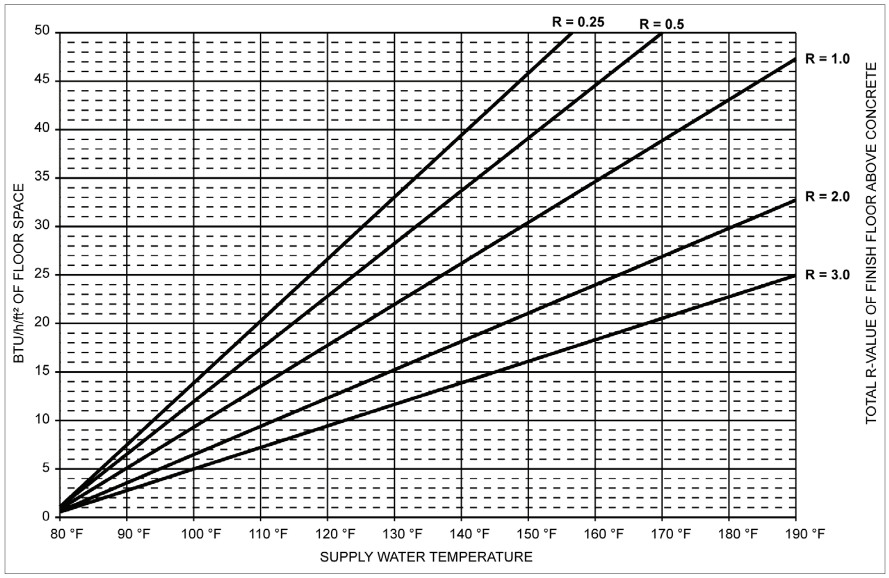
9.4 1½" Thin-Slab with 6" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-19 insulation below the subfloor.



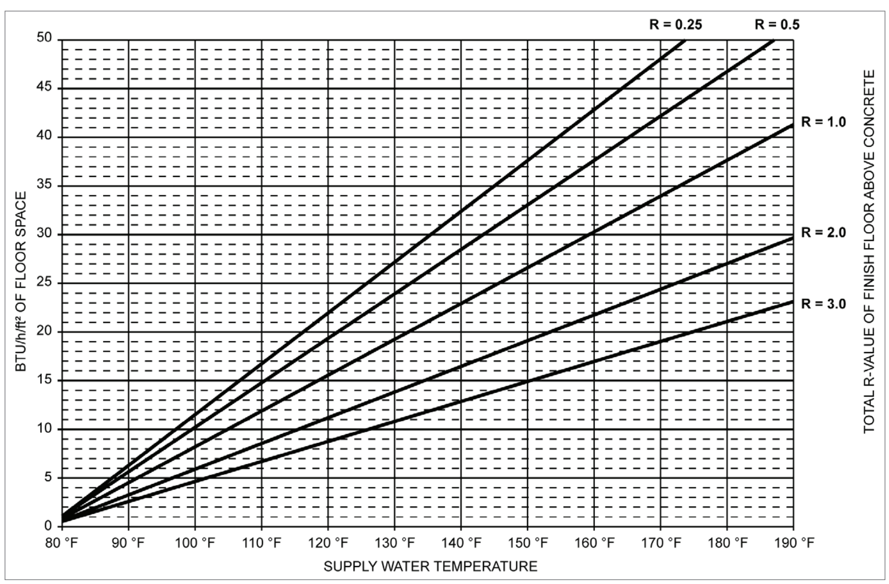
9.5 1½" Thin-Slab with 9" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-19 insulation below the subfloor.



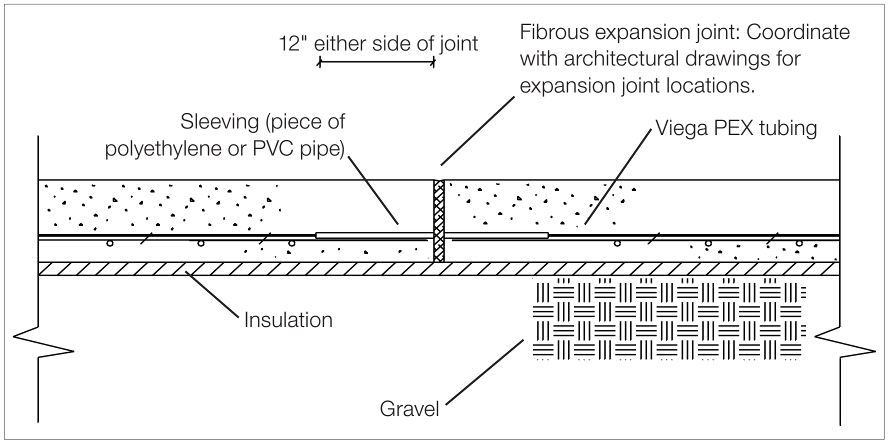
9.6 1½" Thin-Slab with 12" Tubing Spacing

Based on 68° F room temperature with ½" Viega Barrier PEX tubing with R-19 insulation below the subfloor.

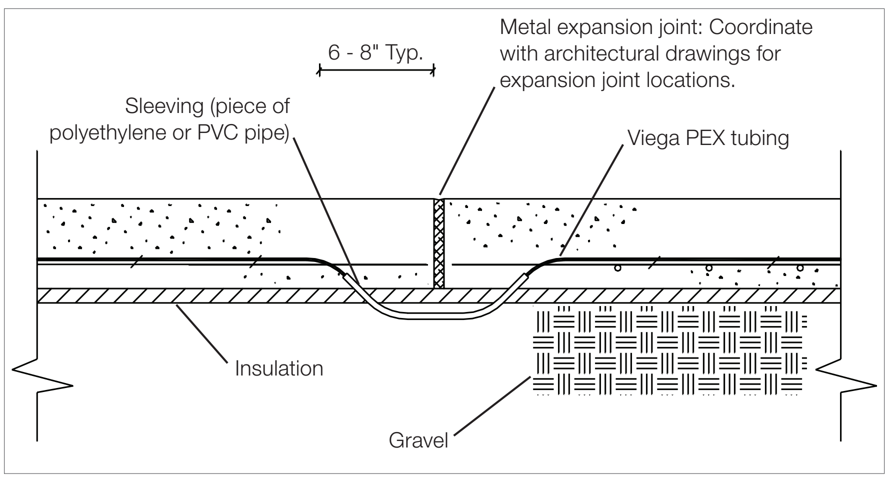


10 Appendix C: Section through Joint

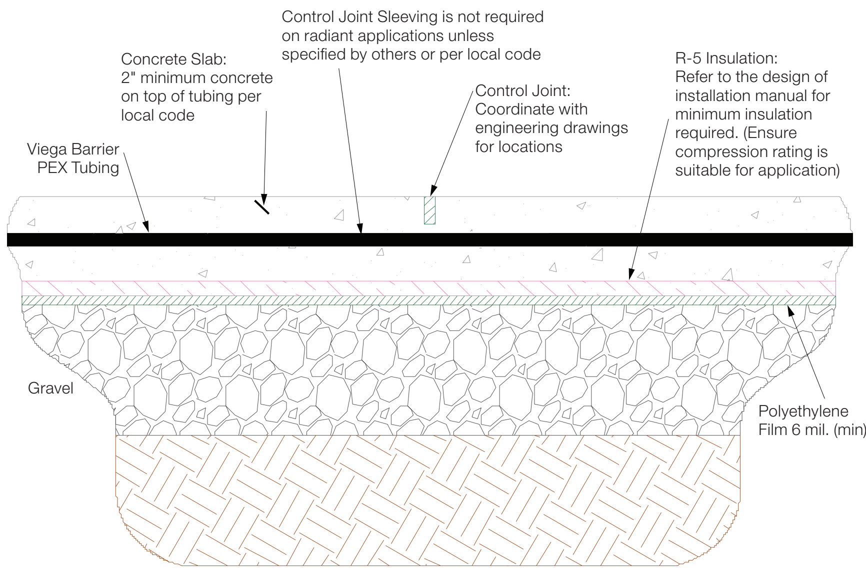
10.1 Section through Fibrous Expansion Joint (Typical)



10.2 Section through Metal Expansion Joint (Typical)



10.3 Section through Control Joint (Typical)



11 Appendix D: Making a Material List

11.1 Concrete System Material Worksheet

Use the first worksheet to select the material for the installation of the concrete system. Then, select the appropriate worksheet to create a piping and control material list. These tables are intended for conceptual purposes; there may be variations in each job.

Material	Net Heated Area (ft)	Multiplier	Estimated Amount
Rapid Grid		0.125	
Point Fasteners			
6" spacing		1.1	
9" spacing		0.75	
12" spacing		0.47	
Tubing			
6" spacing		2.2	
9" spacing		1.5	
12" spacing		1.1	

Table 16: Concrete System Material Worksheet

11.2 Piping and Controls Material Worksheet

11.2.1 One-Room Application Material Worksheet

Product	Quantity
Hydronic Mixing Block	
Enhanced Mixing Station	
Mixing Station	
Actuator	
1¼" Stainless Manifold, # Outlets	
Basic Heating Control	
Indoor Sensor	
ViegaPEX Barrier Tubing	
Zone Control	
Thermostat	
Powerhead	
PEX Press Adapters	
Compression PEX Adapters	
Repair Couplings	
Repair Coupling Wrap	

Table 17: One-Room Application Material Worksheet

11.2.2 Multiple-Room Application Material Worksheet

Product	Quantity
Hydronic Mixing Block	
Enhanced Mixing Station	
Mixing Station	
Actuator	
1¼" Stainless Manifold, # Outlets	
Basic Heating Control	
Viega Barrier PEX Tubing	
Zone Control	
Thermostat	
Powerhead	
PEX Press Adapters	
Compression PEX Adapters	
Zone Valve	
Repair Couplings	
Repair Coupling Wrap	

Table 18: Multiple-Room Application Material Worksheet

12 Appendix E: Additional References

12.1 Making a Press Connection

To make a fitting connection with Viega Barrier PEX tubing, see the PureFlow Press Fittings Product Instructions on the Viega website.

12.2 Making a Compression Connection

To make a compression connection, see Compression Coupling 5⁄16 Inch Product Instructions on the Viega website.

12.3 SVC Press Adapter

To make an SVC press adapter connection to a manifold or fitting, see SVC Press Adapter Product Instructions on the Viega website.

12.4 SVC Compression Adapter

To make an SVC compression adapter connection, see SVC Compression PEX Adapter Product Instructions on the Viega website.

13 Limited Warranty

13.1 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 530663 0124 Concrete System (EN)