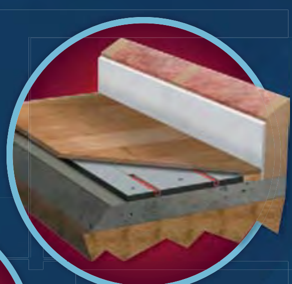
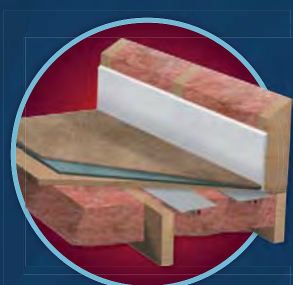
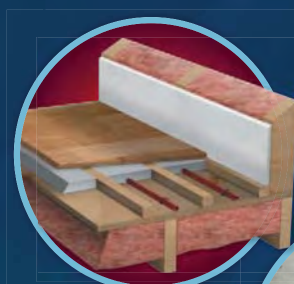
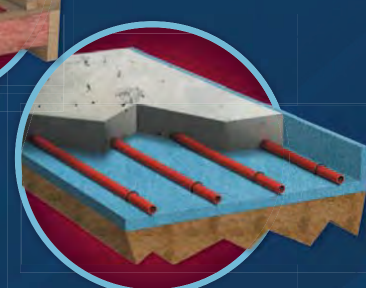
MrPEX® SYSTEMS

# Installation Guide

HEATING

**Heating Installation Guide**
published by

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MrPEX® Systems has used reasonable efforts in collecting, preparing, and providing quality information and material in this guide. However, system enhancements may result in modification of features of specifications without notice.

MrPEX® Systems is not liable for installation practices that deviate from this guide or are not acceptable practices within the mechanical trades.

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MrPEX® SYSTEMS

# INTRODUCTION TO MrPEX®

## ABOUT MrPEX® SYSTEMS

MrPEX® Systems is one of the leading North American system suppliers of residential and commercial radiant heating/cooling, snowmelt systems, and PEX-a domestic hot and cold water systems. With a very knowledgable and experienced team, our company is on the fast track for growth in the USA and Canadian market. We are the exclusive providers of a unique PEX-a pipe from LK PEX AB in Sweden. As our core product, the MrPEX® PEXa Tubing, is considerably more flexible, kink-resistant and able to hold more pressure than any other Pex Tubing on the market today, plus comes with an extensive 30 year warranty!

Combined with our highly technical knowledge and dedication to customer service, it's no wonder MrPEX® Systems is one of the fastest growing radiant system suppliers in North America.

## WHY MrPEX®?

MrPEX® Systems provides all components you need for a superior system, whether radiant heating/cooling, or snowmelt system. This includes tubing, fittings, manifolds, controls and accessories that are matched for high performance and reliability over many years of service. When used together, these components provide trouble free installation and long-term reliability. The MrPEX® tubing and fittings meet current national standards of performance and dimensional tolerances. The system package and product offering is growing continually with an emphasis on taking advantage of sustainable energy sources whenever possible. Additionally, we also offer IDC, the state-of-the-art PC based intelligent control systems that delivers optimized comfort and maximized efficiency by coordinating HVAC, Indoor Air Quality, and Hydronic Systems in one control. IDC is also capable of energy monitoring and remote access from anywhere in the world.

## WHO IS MrPEX®?

MrPEX®—Tomas Lenman—started at Wirsbo Bruks AB in Sweden as a development engineer in 1971, developing the very first PEX process ever invented. He developed many Standard Specifications for PEX Tubing in Europe and Australia. MrPEX® wrote the ASTM F 876/877 for PEX Tubing during 1982–84. In 1982 he co-authored the book "Water and Pipes". He founded and managed Wirsbo Company (USA) 1984 -1992 and continued consulting for this group until 1996. He authored the CSA B137.5 standard for PEX Tubing in 1989. MrPEX® managed the successful start-up of Roth Industries PEX Tubing Division 1997–2001 after which he started his own radiant floor heating company: MrPEX® Systems using PEX Tubing with exclusive distribution in North America for LK PEX AB in Sweden. The unique production process is invented by Mr. Lennart Aagren of Sweden, previously manager of Uponor Innovation AB for many years, and his second innovation of a PEX Tubing manufacturing process.

**No one has more knowledge and experience with PEX Tubing and Radiant Floor Heating Systems than MrPEX®.**

## ABOUT THIS GUIDE

The purpose of this guide is to assist the radiant panel heating professional by providing specific information regarding the MrPEX® Radiant Panel System. This installation guide is written with the understanding that an accurate heat-loss, design and creating material list has already been performed. Use MrPEX® LoopCAD Design Software to perform an accurate heat-loss, design and required materials. This guide will help you plan and perform a successful installation of the MrPEX® Systems components. This guide is derived from MrPEX® Systems information and a combination of sections from an industry consensus document** compiled and distributed by the Radiant Panel Association.

This guide constitutes the Manufacturer's Recommendations for the design and installation of a MrPEX® Systems radiant floor, ceiling or wall heating, or snowmelt system. For the purpose of clarity in communicating concepts, this guide is conceptual in nature, and may, therefore, omit certain components that are not necessary in communicating the concept at issue, but may be necessary or essential in the actual installation. The designer must rely on his knowledge of radiant panel systems, regional climate conditions, and the local administrative requirements to determine the suitability of any particular material or method described herein.

It is expected the installer has an adequate knowledge of accepted industry practices for the equipment and applications involved.

***(Standard Guidelines for Design and Installation of Radiant Panel Heating and Snow/Ice Melt Systems, 2007 edition)*

## AN INTRODUCTION TO RADIANT PANEL HEATING, AND SNOWMELTING:

Radiant Panel is a form of space heating using warm floors, ceilings, or walls to distribute the heat energy throughout a structure. Hydronic radiant panels use warm water (usually anti-freeze protected) circulated through tubing systems that are embedded in the floors, ceilings or walls. These types of systems provide superior comfort and efficiency when compared to other forms of heat distribution because they rely on radiation as the primary heat transfer process. The mild temperature surfaces emit invisible rays of energy that are absorbed by cooler objects in the rooms. As all of the surfaces reach room temperature, they begin to re-radiate any additional energy they receive. The combination of radiation, re-radiation and mild convection provide comfort to every reach of the entire structure. In case of snowmelting, instead of tubing being embedded indoors, the tubing is embedded in a driveway, sidewalk, emergency entrance etc. The tubing then will keep the surface above freezing eliminating potential ice or snow from accumulating, keeping the surface dry and safe.

## ADVANTAGES OF RADIANT PANEL HEATING:

The primary advantages of radiant panel heating are comfort, safety and efficiency. With radiant panel heating, the heat energy follows the path of the tubing embedded in the structure.

The designer is able to route the tubing precisely to the regions of the structure that require heat and, through various layout patterns, able to distribute the heat in a manner that directly addresses the particular heat loss features of the rooms. Each room behaves differently with regard to heat loss. Rooms with large windows may enjoy some solar gain during a sunny day, but present abnormally high heat losses when the sun goes down. Kitchens and baths enjoy significant internal gains during cooking and bathing but not when those activities are suspended. Rooms with high occupancy levels enjoy large internal heat gains from warm bodies. A major advantage of radiant panel heating systems is the ability to control each loop individually, thus placing the energy where it is needed and when it is needed. This is the essence of comfort and efficiency that must be designed into the radiant panel heating system in order to enjoy the fullest measure of its capability. Use MrPEX® LoopCAD Design Software to perform an accurate heat-loss, design and required materials.

***Oxygen Diffusion***

**MrPEX® tubing with barrier** is available with an external Oxygen Diffusion Barrier which meets the stringent requirements of the European DIN 4726 standard. This standard restricts the amount of oxygen that is allowed to permeate the pipe and affect corrodible cast iron or steel components within the system. The standard allows permeation of less than or equal to 0.10 g/ (m3 d) equivalent to 0.32 mg/ (m2 d). This is an amount that is consistent with approximately half a system refill with fresh water on an annual basis. The Oxygen Diffusion of MrPEX® Tubing with Barrier is exceeding the minimum requirement of DIN 4726/29 by more than 25 times according to our test report from a German Governmental Testing Institute.

**MrPEX® PEX-al-PEX tubing** has an aluminum core that is 100% gas/oxygen tight. This gives it the advantages of both metal and plastic pipe, but not the disadvantages.

## MrPEX® BARRIER PEX TUBING INFO

- Expansion: The tubing has an expansion coefficient of 1.1" per 10°F per 100 feet.
- Bending: The tubing can be exposed to a bending radius approximately 4 times the actual outside diameter without kinking.
- Uncoiling: The tubing coil has an inside diameter exceeding 15 inches, so that memory-effect of its coiling is minimal. Un-roll the tubing from its coil without twisting the tubing, this will make the installation easier. Use a MrPEX® tube uncoiler to aid the installation.

- Markings and Ratings: The tubing is marked with MrPEX®, size, SDR, pressure rating 100 psi at 180°F, ASTM standard reference, independent third party certifiers mark, production date, and running ft. length—every three feet. The running ft. markings start from 0 at the inside of each coil so that the installer will always know how much tubing is left in each coil.

- Cutting: The tubing needs to be cut using an appropriate tubing cutter, leaving a square clean cut, free from burrs.

## MrPEX® PEX-AL-PEX TUBING INFO

- Expansion: The tubing has an expansion coefficient almost 9 times less than regular PEX. Noise and movement after installation is virtually eliminated.

- Bending: The tubing will stay in place after bending due to its aluminum core. This allows for a clean and professional looking installation. The tubing can be exposed to a bending radius approximately 5 times the actual outside diameter without kinking.

- Uncoiling: Un-roll the tubing from its coil without twisting the tubing, this will make the installation easier. Use a MrPEX® tube uncoiler to aid the installation.

- Markings and Ratings: The tubing is marked with MrPEX®, size, pressure rating 160 psi at 200°F, ASTM standard reference, independent third party certifiers mark, production date, and running ft. length—every five feet. The running ft. markings start from 0 at the inside of each coil so that the installer will always know how much tubing is left in each coil.

- Cutting: The tubing needs to be cut using an appropriate tubing cutter, leaving a square clean cut, free from burrs. Use a reamer tool to chamfer and round the tubing prior to completing a fitting.

# BEFORE YOU BEGIN

## READ THIS PRIOR TO STARTING THE INSTALLATION

For the purpose of clarity in communicating concepts, this guide is conceptual in nature, and may, therefore, omit certain components that are not necessary in communicating the concept at issue, but may be necessary or essential in the actual installation. The designer must rely on his or her knowledge of radiant panel heating, regional climate conditions, and the local administrative requirements to determine the suitability of any particular material or method described herein.

## STORAGE AND HANDLING

MrPEX® tubing is delivered in cardboard boxes. Check boxes at delivery for any possible freight damage and report immediately. Store tubing indoors in original boxes, safe from, moisture, tampering and UV exposure.

### ULTRA VIOLET LIGHT

All hydrocarbon based plastic and rubber materials will eventually degrade if exposed to the harmful rays of Ultra Violet (UV) light. UV rays are present in direct sunlight or from fluorescent light at close proximity. It is important to protect the tubing from UV damage. Do not install tubing which has been exposed to direct sunlight for more than 30 days.

### THE DESIGN PROCESS

Radiant panel heating systems are integrated within the structure. They are embedded in floors, ceilings and walls in a manner that cannot effectively be changed at a later date. Therefore, it is extremely important, during the design process, to perform a thorough assessment of the building. Particular attention must be paid to the structural heat loss, potential use patterns, and thermodynamics of radiant panel performance in order to determine the suitability of the design. Radiant panel heating systems have very definite limits in terms of their maximum output capability, and their ability to meet a specific heating load. The designer must never allow the heating load to exceed these capabilities.

### REVIEW YOUR DESIGN

Radiant floor heating systems rely on the tubing embedded in the structure to deliver adequate heat and to meet expected comfort needs of the customer. Therefore, it is essential that all design aspects, use patterns and customer expectations are taken in account and matched with the design prior to any tubing being installed. Once the tubing is installed, it can be costly if not impossible to change the layout or remove it.

*Please review this installation guide and compare with the design of your project. Once review is finalized and approved, you can proceed to "Starting the Installation" in this guide.*

## VERIFY ORDER QUANTITIES

Once on the job site, make sure that you have all required and correct parts to complete the current installation phase.

# TOOLS FOR THE JOB

The success and ease of your installation can be greatly contributed to having the correct tools available for your install. Below is a list of some of the most common tools needed.

- ☑ **Tube uncoiler** MrPEX® Part #8110720
- ☑ **Tube cutter** *(for plastic tubing)* MrPEX® Part #8120878 or 8120879
- ☑ **Tube reamer** *(for PEX-AL-PEX)* MrPEX® Part #8210872, 8210874, or 8220875
- ☑ **Tube fastening tools and clips/staples**
- ☑ **Wrenches or Press tools** *(with correct inserts to meet your fitting selection)*
- ☑ **Air compressor for pressure testing and Air Pressure Test Kit**
- ☑ **General tools such as cordless drill, screwdrivers, wire cutters etc..**

# SITE SURVEY

Before unloading all your parts and equipment, complete a full "site survey." Walk-through all of the areas where you are to install the system.

## CONSIDERATIONS BEFORE STARTING THE INSTALLATION

### Mechanical Room

Locate the area where the mechanical equipment is to be located. Make sure that it is large enough and that all required utilities are present such as a drain, gas, electricity etc.. If not, discuss with general contractor/builder to have a licensed contractor complete the installation. Verify distance and path for routing the supply and return mains to remote manifolds and compare to design. Any discrepancies need to be addressed prior to installation.

### Slab On Or Below Grade

Make sure the grade is evenly prepared to the correct depth, that vapor barrier is installed (if applicable), and take spot check measurements. This is to make sure that all the walls are still in the correct location. If insulation is to be installed by you, make sure the grade depth accommodates the thickness of the insulation. Review "Special Insulation Consideration" quick reference chart on page 10, to make sure adequate R-value is used. Also, follow local building codes or check with structural engineer for correct compressive strength (PSI) for your application.

### Suspended Floors

### Poured Underlayment

Make sure the subfloor is prepared as per underlayment contractor and to correct elevation and take spot check measurements. This is to make sure that all the walls are still in the correct location.

### Duo-Track, Omega heat emission plates and Joist Heating

Make sure joist cavities are clear and free from obstruction and take spot check measurements. This is to verify the correct number of joist cavities and locations. If there are sharp objects such as nails coming through from above, remove prior to starting the installation. It is also a good idea to mark subfloor above with a caution such as "CAUTION! Radiant tubing Beneath this floor." Every MrPEX® PEXa tubing box includes a template for this.

### RetroPanel

Make sure concrete floor is level and clean. Knock down or grind off any bumps or high spots that may interfere with the panels. If the floor is very uneven, skim-coat the floor with an approved self leveling product such as concrete or gypsum based underlayment. Consult with flooring specialist prior to application. Follow manufacturers recommendation.

# INSTALLING INSULATION

Insulation is a very important part of a well performing and efficient system. It is essential that you choose the correct type for your application. Heat transferred from the tubing will go the path of least resistance. Insulation is used to block heat transfer to areas where we don't want it to go, and to direct it to the areas where it is needed. The R-value and type of insulation depends on the application.

Heat transfer is a balancing act between warm and cool objects and their ability to transfer their stored heat/energy. Higher density objects such as concrete has a higher conductivity or ability to transfer heat than wood, which, due to its lower density does not transfer heat well and even works as an insulator. Nature seeks equilibrium, meaning, that if you have two masses next to each other, one at 50ºF and the other at 80ºF, if no other influences are present, given time, the cooler object would absorb heat from the warmer object and the warmer object would give up some of its heat until both objects reach the same temperature. What that temperature will be is dependent on which mass is greater. The speed at which the heat transfer will take place is subject to the objects ability to transfer its heat and what the temperature difference between the two objects actually is. The greater the differential temperature, the greater the heat transfer. But as the temperature differential gets smaller, so does the heat transfer.

Knowing this dynamic is essential when designing a radiant floor heating or snowmelt systems. Heat transfer will take the path of least resistance if given the opportunity. To make sure that the heat is not lost or directed in the wrong direction, we install insulation to eliminate the effects of colder masses that may interfere with our system. Floor covering will then also play an important role in that, the R-value of the floor covering will work against the insulation below, and it is important to make sure that the path of least resistance is up by having a greater R-value below. As you can imagine, a slab poured right on grade will have the mass of the earth beneath it to contend with. If there is no insulation underneath the slab and there is a floor covering on top of the slab, the path of least resistance is actually down! Of course there are different types of soils, some lower in conductivity than others. Dry soil such as sand is less of detriment than let's say clay that has a tendency to retain water that increases its conductivity.

- ▶ Install suitable insulation as per chart below.

## SPECIAL INSULATION CONSIDERATIONS:

| QUICK REFERENCE | | | |
|---|---|---|---|
| APPLICATION | | MIN. R-VALUE | COVERAGE |
| SLAB ON GRADE | Alternate #1 | *(Ti-To) 0.125 | Perimeter To Below Frost Line |
| | Alternate #2 | R-10 | 4' Horizontal Or Vertical At Perimeter |
| | Alternate #3 | R-10 | Under Entire Slab Edge |
| | | | |
| SLAB BELOW GRADE | | **R-10 | |
| | | | |
| SUSPENDED FLOOR | | | |
| Over Heated Space | Hard Surface | R-5 | Under Entire Floor |
| | Carpeted Surface | R-11 | Under Entire Floor |
| Over Unheated Space | Hard Surface | R-13 | Under Entire Floor |
| | Carpeted Surface | R-19 | Under Entire Floor |
| | | | |
| WALLS WITH PANELS | Outside Wall | R-13 | Entire Wall |
| | Inside Wall | Optional | |
| | | | |
| CEILINGS PANELS | Inside Ceiling | R-11 | Entire Ceiling Above Panel |
| | Outside Ceiling | R-30 | Entire Ceiling Above Panel |

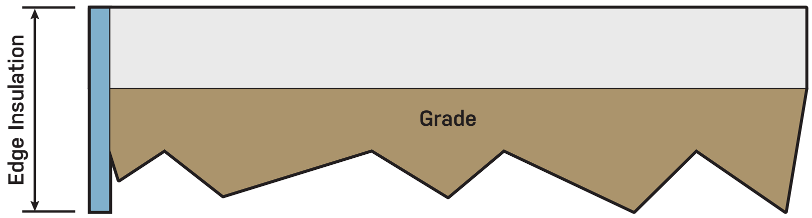
*R-value = Inside Temperature - Outdoor Temperature x 0.125 (temperatures in °F)
*(72°inside temp.- 10°outside temp.) 62 x 0.125= 7.75 of R-value needed
** For slab above frost line, slab edge

Disclaimer: It is the responsibility of the installer to verify the required structural integrity, compressive strength, and rvalue with project engineers and local building authorities prior to installation.

**There are three areas to consider for insulation;** Edge, Perimeter, and Under Slab. Depending on the specifics of the project such as use and construction method used, it may be important to use all three. Here's a brief description of these areas:

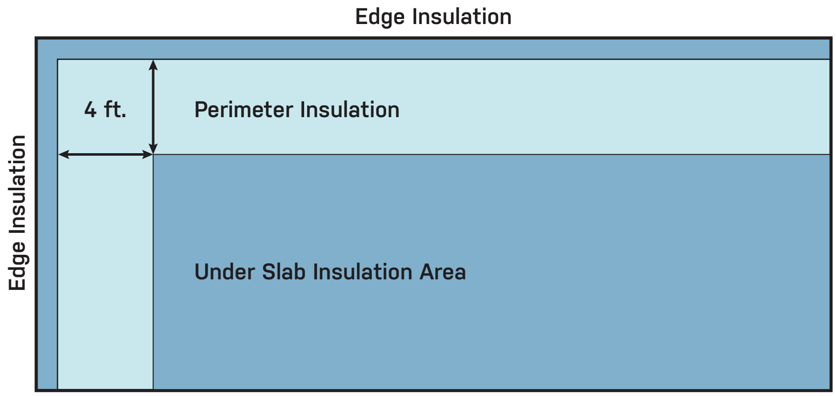
## EDGE INSULATION

Edge insulation refers to the vertical area of the slab and is there to eliminate side losses or to break conductivity between a block wall, foundation wall or footing. If only edge insulation is used, it is recommended to go vertically down past the frost-line as determined by local building code. Make sure the soil beneath the slab is dry and water table is not present. For thickness, refer to chart on previous page.



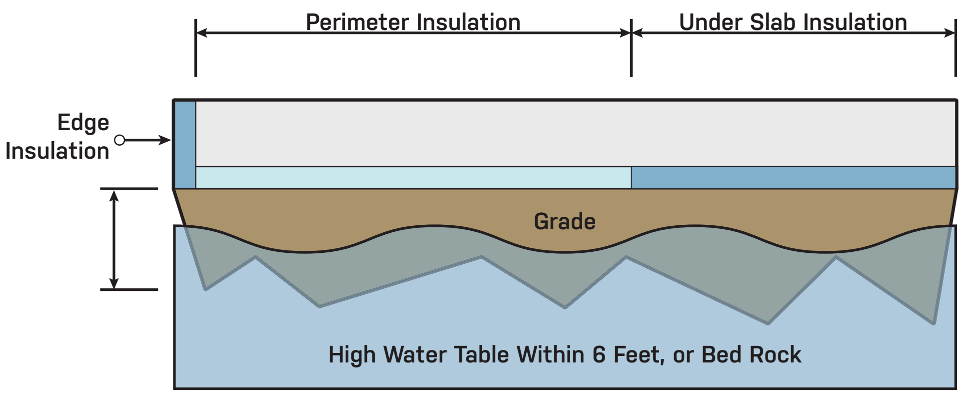

## PERIMETER INSULATION

Perimeter insulation is placed 4 feet in from the edge horizontally around the perimeter of the heated area to eliminate downward migration of heat to cooler soil directly adjacent to the heated slab. If only edge and perimeter insulation is used, make sure the soil beneath the un-insulated portion of the slab is dry and water table is not present. For thickness, refer to chart on previous page.




## UNDER SLAB

Under slab insulation is placed horizontally underneath the whole heated area. Installations that should consider Under Slab Insulation includes but not limited to; the need for fast response, high water table or highly conductive soil, bed rock, or thick floor covering. In areas where the soil underneath is dry and sandy, the under slab area can be left un-insulated to help build a heat sink that will maintain even temperatures. Do keep in mind that creating a heat sink requires a lot of energy in the startup phase to saturate the slab. For thickness, refer to chart on previous page.



# CHOOSING YOUR MANIFOLD & LOCATION

## THOUGHTS ON ZONING

The function of a manifold is to distribute the correct flow to each loop to meet its specific heating load. This is achieved by balancing each loop to meet the design flow requirement. Customized zoning can be achieved by adding actuators for the different loops controlled by thermostats. Each room would then be a zone, allowing the thermostat to open and close the valve to the room as required. For simpler one zone systems, it is possible to just control a zone valve or the pump. Zoning rooms with different loads or that are seldom occupied, allow you to keep those areas at a lower setting, saving energy without sacrificing comfort elsewhere. Heavily used spaces, such as bathrooms and kitchens, can be kept warmer than the rest of the house for the "barefoot comfort" homeowners often expect from a radiant system.

### MANIFOLD LOCATIONS

The number of manifolds and their location will depend on the size of the structure. Most manifolds are installed in the mechanical room. Sometimes, the distance from the mechanical room to the farthest room served will exceed the allowed maximum loop length. In those cases, a manifold will have to be located closer to the served room/zone. It is good practice when designing a system to identify potential trouble spots early and to find manifold locations that meet the system needs. Look for clusters of rooms with similar, exposure, use-patterns, floor construction etc. that may have a common location to feed the loops from, such as a closet or similar. Find planned locations for the manifold(s). Take spot check measurements to verify that the location and distance to all rooms served by the manifold are as planned.

### MANIFOLD CONSIDERATION

MrPEX® offers 1 ¼" and 1 ½" stainless steel manifolds, as well as 1 ¼" and 1 ½" brass manifolds. The selection between stainless steel and brass is strictly matter of preference. The selection of the size is has more to do with the design requirements, but as a rule of thumb the 1 ¼" manifolds are used for residential applications, and the 1 ½" manifolds are mostly used for commercial or larger projects due to the typically higher flow requirements.

Following pages will give you more detailed information about each of the manifolds we offer.

# MANIFOLDS

## 1 1/4" STAINLESS STEEL MANIFOLDS FOR UP TO 5/8" PEX AND PEX-AL-PEX TUBING, 2–10 LOOPS

MrPEX® 1 1/4" Stainless Steel manifolds achieves the highest level of long term corrosion resistance by using a bright annealed high-grade, Type 304, stainless steel with high nickel content creating a stable material structure with low levels of ferrite and magnetism. To eliminate the possibility of contact corrosion. The manifolds are fully assembled, ready for mounting, The supply side feature adjustable flow-meters for flows up to 1.45 gpm per loop, and the return side has balancing on/off valves, in accordance with DIN EN 1264-4. The adjustable flow-meter allows for a positive shut-off and the manual plastic cap on the return valve can be removed to accommodate a valve actuator #5120700 or #5120701. The return balancing valve disc is designed to enable exact adjustments of small flows while still being able to handle large flow with minimal resistance. The branch Cv value is 1.38 and the manifold body accommodates flows up to 14 gpm. The supply and return manifold bodies both have wells to accomodate optional thermometers, and a multi-function swivel End Cap allowing for Fill/Drain or Vent. Each inlet of the manifold has a G 1" thread (BSP straight metric thread) allowing for easy connections of the supply and return mains. Use only "MrPEX® Manifold Option" adapters for appropriate connection. The branches have Eurokonus (EK20) connections, and all MrPEX® EK20 compression fitting assemblies (PEX to EK20 or PEX-AL-PEX to EK20) can be used to connect tubing to the manifold.

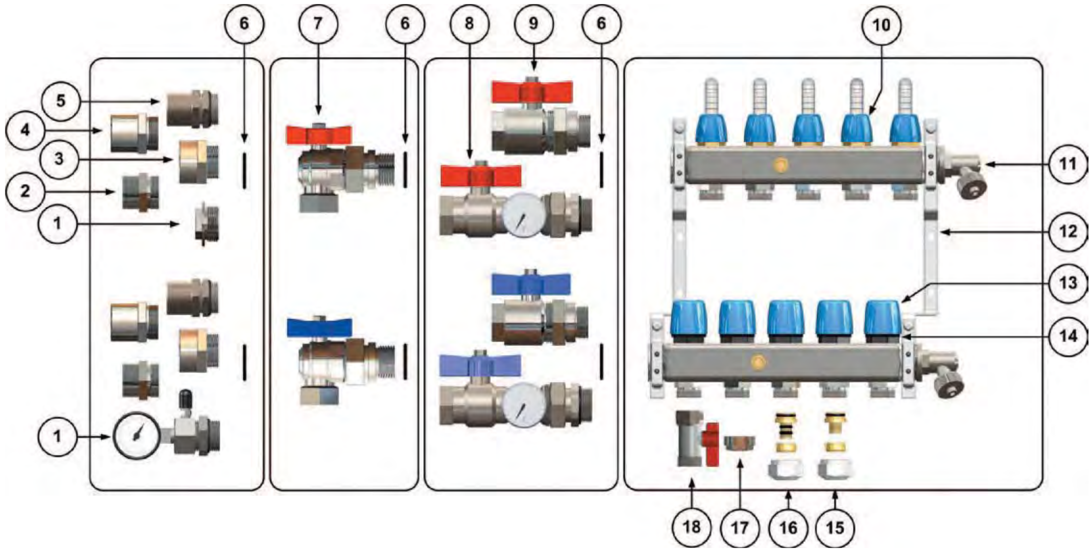

* Shipped as shown

### MrPEX® 1 1/4" Stainless Steel Manifold

| PART# | TYPE | UNIT |
|---|---|---|
| 3230200 | 2 Branches | Each |
| 3230300 | 3 Branches | Each |
| 3230400 | 4 Branches | Each |
| 3230500 | 5 Branches | Each |
| 3230600 | 6 Branches | Each |
| 3230700 | 7 Branches | Each |
| 3230800 | 8 Branches | Each |
| 3230900 | 9 Branches | Each |
| 3231000 | 10 Branches | Each |

### MrPEX® Manifold Thermometer

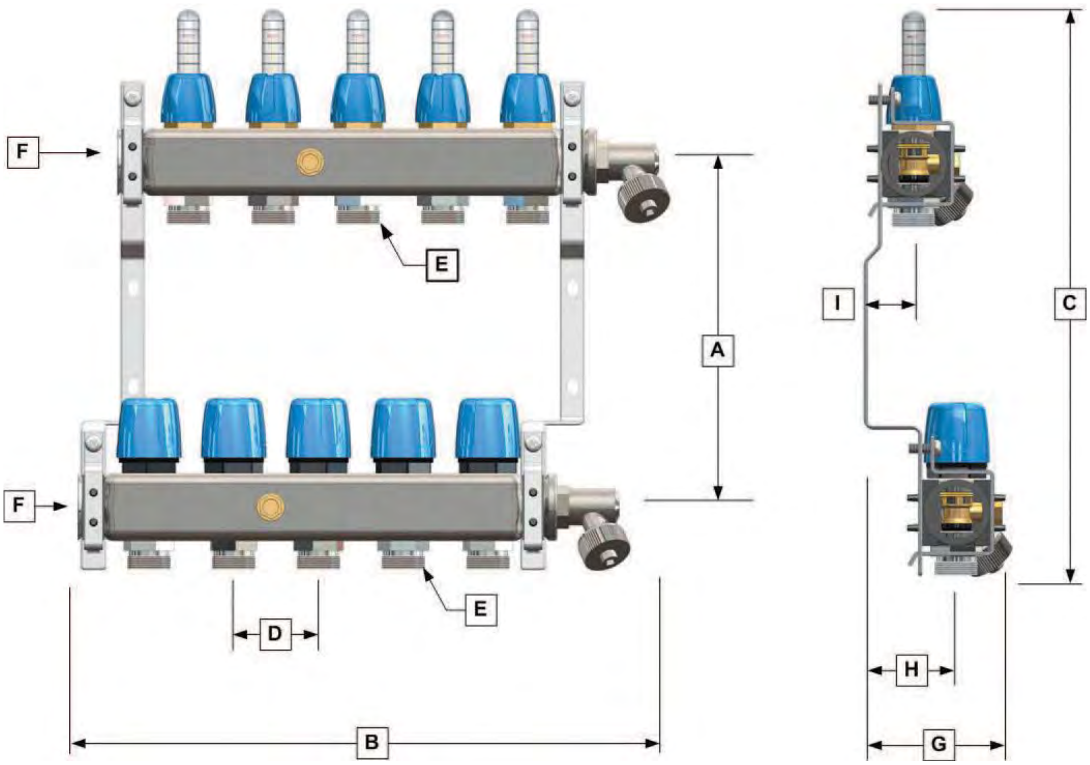
| PART# | TYPE | UNIT |
|---|---|---|
| 3230001 | 32F to 175F | Set of 2 |




## Manifold Options

| # | PART# | DESCRIPTION | TYPE |
|---|---|---|---|
| 1 | 3620002 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 3/4" NPT |
| 1 | 3620003 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" NPT |
| 1 | 3620006* | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to EK 25 |
| 1 | 3620007* | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to EK 32 |
| 1 | 4372510* | NPT Transition | 1" NPT to EK 25 |
| 1 | 4373210* | NPT Transition | 1" NPT to EK 32 |
| 2 | 3620004 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" FIP |
| 3 | 3620001 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" and 1 1/4" CU |
| 4 | 3620010 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" and 1 1/4" CU w/ union lock nut |
| 5 | 3711390 | O-rings, spare part for 1" BSP Manifold transitions | for 1 1/4" Brass Manifold |
| 6 | 3620009 | Manifold Transition Ball Valve for 1 ¼" Manifolds | 1" BSP Angle Isolation Union Ball Valve |
| 6 | 3620021 | Manifold Transition Ball Valve for 1 ¼" Manifolds | 1" BSP Angle Isolation Union to 1" Female NPT |
| 7 | 3620018 | Manifold Transition Ball Valve for 1 ¼" Manifolds | 1" BSP Union to 1" Female NPT w/ Thermometer |
| 8 | 3620008 | Manifold Transition Ball Valve for 1 ¼" Manifolds | 1" BSP Isolation Union Ball Valve straight |
| 8 | 3620019 | Manifold Transition Ball Valve for 1 ¼" Manifolds | 1" BSP Union to 1" Female NPT |
| 9 | | MrPEX® 1 1/4" Stainless Steel Manifold 2 loop - 10 loop | |
| 10 | 3721172 | Flowmeter Valve, spare part | for 1 1/4" Stainless Steel Manifold |
| 11 | 3610001 | End Cap with Swivel Fill/Drain Valve | for 1 1/4" Brass or Stainless Steel Manifold |
| 12 | 3721171 | Mounting Bracket | for 1 1/4" Stainless Steel Manifold |
| 13 | 3721173 | Manual Plastic Knob, spare part | for 1 1/4" Stainless Steel Manifold |
| 14 | 3721174 | On/Off Valve Assembly, spare part | for 1 1/4" Stainless Steel Manifold |
| 15 | ** | PEX Fitting Assembly | |
| 16 | ** | PEX-AL-PEX Fitting Assembly | |
| 17 | 3721175 | Manifold Thermometer | for 1 1/4" Stainless Steel Manifold |
| 18 | 3610003 | Loop End Cap | EK 20 |
| 19 | 3610006 | Loop Branch Ball Valve | EK 20 x EK 20 |
| 20 | 3610005 | Pressure Test Kit, (100psi gauge, Air valve & Basic End Cap) | for 1 1/4" Brass and Stainless Steel Manifolds |

** = Requires EK Compression fitting, see compression fitting section in MrPEX® Price List*
*** = see compression fitting section in MrPEX® Price List*

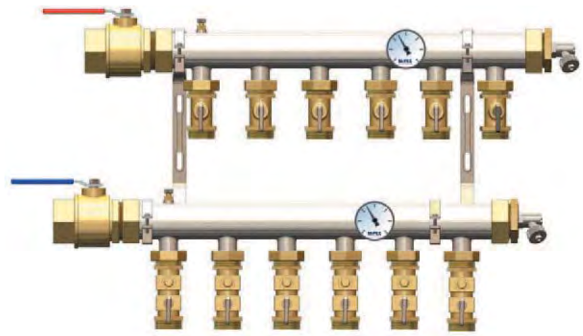



## Manifold Options

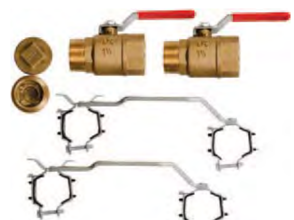
| PART# | TYPE | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| 3230200 | 2 Branches | 8.4" | 8.5" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230300 | 3 Branches | 8.4" | 10.4" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230400 | 4 Branches | 8.4" | 12.4" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230500 | 5 Branches | 8.4" | 14.4" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230600 | 6 Branches | 8.4" | 16.3" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230700 | 7 Branches | 8.4" | 18.3" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230800 | 8 Branches | 8.4" | 20.3" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3230900 | 9 Branches | 8.4" | 22.2" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |
| 3231000 | 10 Branches | 8.4" | 24.3" | 13.75" | 2" | EK20 | 1" BSP | 3.5" |

# 1 1/2" LARGE STAINLESS STEEL MANIFOLDS FOR 5/8" AND 3/4" PEX AND PEX-AL-PEX TUBING

MrPEX® 1 1/2" Large Stainless Steel Manifolds are made from high-quality Type 304 stainless steel and offered in 3–10 loop sections. The manifold body comes with G 1 1/2" flat gasket unions for connection of inlet ball valve G 1 1/2" x 1 1/2" Female NPT and end caps. The branches comes with G 1" flat gasket unions to accomodate the on/off and balancing branch valves G 1" x EK 25 for easy connection with MrPEX® EK 25 fitting assemblies (PEX to EK25 or PEX-AL-PEX to EK25) to connect tubing to the manifold. The branch Cv value is 6 and the manifold body accommodates flows up to 25 gpm. The manifold Base Kit comes with two brackets, two 1 1/2" female NPT ball-valves and two End Caps with fill/drain.



## Base Kit for 1 1/2" Stainless Manifold, Ball-Valves, Bracket and End Caps with Fill/Drain Valve



| PART# | TYPE | UNIT |
|---|---|---|
| 3240001 | 1 1/2" FIP Connection | Each |

## On/Off Loop Valve for 1 1/2" Stainless Steel Manifolds

| PART# | TYPE | UNIT |
|---|---|---|
| 3240002 | G 1" x EK25 | Box of 10 |

## On/Off Loop Valve with Balancing for 1 1/2" Stainless Steel Manifolds

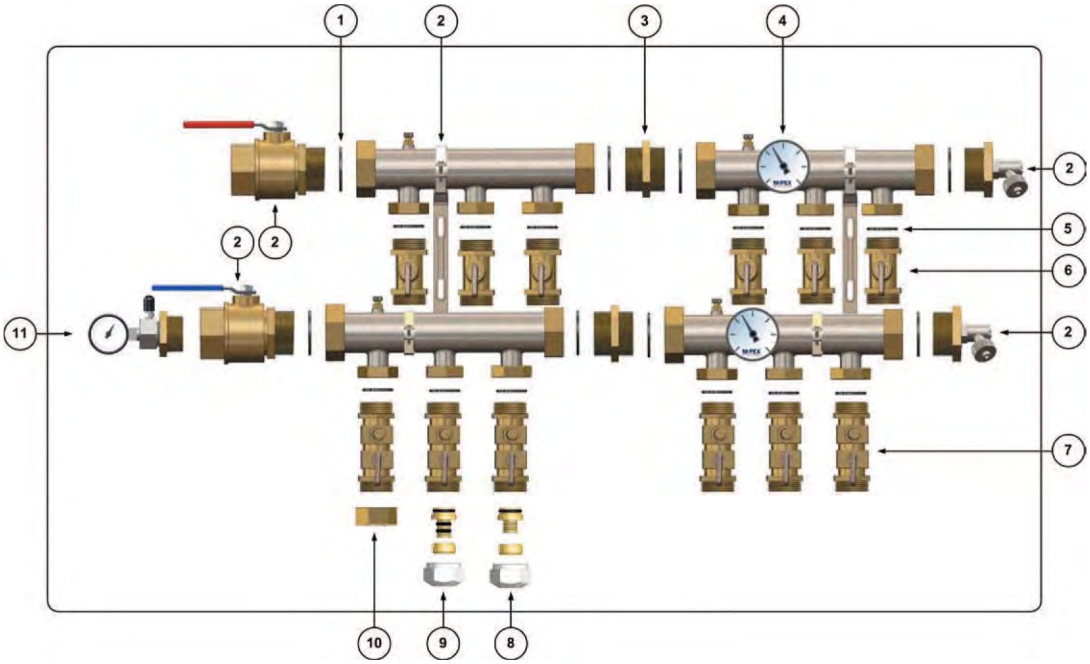
| PART# | TYPE | UNIT |
|---|---|---|
| 3240003 | G 1" x EK25 | Box of 10 |

## Manifold Union for 1 1/2" Stainless Steel Manifold

| PART# | TYPE | UNIT |
|---|---|---|
| 3240004 | G 1 1/4" x G 1 1/4" | Set of 2 |

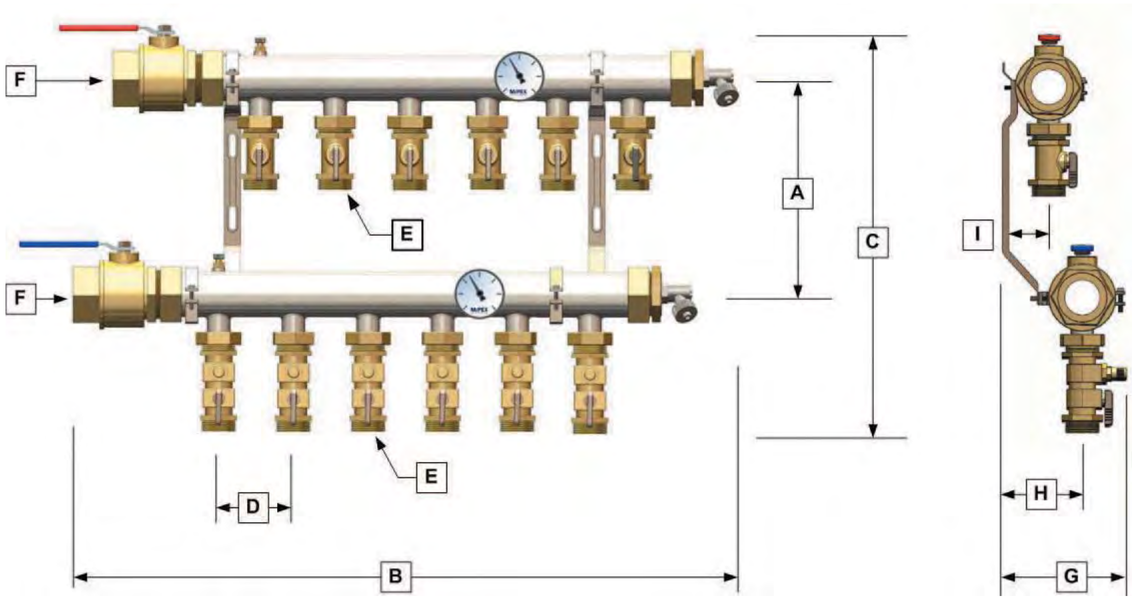
## 1 1/2" Stainless Steel Manifold, Supply & Return Body, G 1" Branch Union, 3" O.C.

| PART# | TYPE | UNIT |
|---|---|---|
| 3240300 | 3 Branches | Set of 2 |
| 3240400 | 4 Branches | Set of 2 |
| 3240500 | 5 Branches | Set of 2 |
| 3240600 | 6 Branches | Set of 2 |
| 3240700 | 7 Branches | Set of 2 |
| 3240800 | 8 Branches | Set of 2 |
| 3240900 | 9 Branches | Set of 2 |
| 3241000 | 10 Branches | Set of 2 |




## Manifold Options

| # | PART# | DESCRIPTION | TYPE |
|---|---|---|---|
| 1 | 3750002 | EPDM Flat Gasket for G 1 1/4" Body Union | |
| 2 | 3240001 | Base Kit For 1 1/2" Stainless Steel Manifold, Ball Valves, Bracket, & End Caps with Fill/drain Valve | 1 1/2" FIP |
| 3 | 3240004 | Manifold Union Nipple | G 1 1/4" x G 1 1/4" |
| 4 | 5240748 | Strap On Pipe Thermometer, 70 F - 200° F | For Pipes 1/2" - 4" |
| 5 | 3750001 | EPDM Flat Gasket for G 1" Branch Union | |
| 6 | 3240002 | On/Off Loop Valve for 1 1/2" Stainless Steel Manifolds | G 1" x EK 25 |
| 7 | 3240003 | On/Off Loop Valve with Balancing for 1 1/2" Stainless Steel Manifolds | G 1" x EK 25 |
| 8 | 4320625 | PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 5/8" PEX x EK 25 |
| 8 | 4320750 | PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 3/4" PEX x EK 25 |
| 9 | 2430750 | PEX-AL-PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 3/4" PAP x EK 25 |
| 10 | 3610004 | Loop End Cap | EK 25 |
| 11 | 3700184 | Pressure Test Kit for 1 1/2" Brass & Stainless Steel Manifolds | 1 1/2" & 1 1/4" NPT |




## Manifold Options

| PART# | TYPE | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| 3230300 | 3 Branches | 8.4" | 16.4" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230400 | 4 Branches | 8.4" | 19.2" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230500 | 5 Branches | 8.4" | 21.9" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230600 | 6 Branches | 8.4" | 24.7" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230700 | 7 Branches | 8.4" | 27.4" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230800 | 8 Branches | 8.4" | 30.2" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3230900 | 9 Branches | 8.4" | 32.9" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |
| 3231000 | 10 Branches | 8.4" | 35.7" | 16.4" | 2.75" | EK25 | 1 1/2" FIP | 4" | 3" | 2" |

# 1 1/4" BRASS MANIFOLDS FOR UP TO 5/8" PEX AND PEX-AL-PEX TUBING

MrPEX® 1 ¼" Brass Manifolds are made from high-quality extruded brass and offered in 2–6 loop modular sections. These sections are available in three different types; valved, valveless and balancing with flowmeter. For supply, use either the balancing section with adjustable flow-meters for flows up to 1.6 gpm per loop, or the valveless section. For the return, use the valved section with on/off valves. The manual plastic cap on the return valve can be removed to accommodate a valve actuator #5120700 or #5120701. Actuator valve adapter 5700010 (VA-10) needs to be purchased separately with the actuator 5120700 or 5120701.. The return balancing valve disc is designed to enable exact adjustments of small flows while still being able to handle large flow with minimal resistance. The branch Cv value is 1.2 and the manifold body accommodates flows up to 14 gpm. Manifold sections come with brackets for mounting. Manifold body has a G 1" thread (BSP straight metric thread) to accommodate the "MrPEX® Manifold Option" end caps, couplings or adapters for appropriate application. The branches have EK 20 (Eurokonus) connections, and all MrPEX® EK20 fitting assemblies (PEX to EK20 or PEX-AL-PEX to EK20) can be used to connect tubing to the manifold.

Includes one manifold bracket.

### 1 1/4" Basic Manifold Section without Valves, 2–6 Loops

| PART# | TYPE | UNIT |
|---|---|---|
| 3110200 | 2 Branches | Each |
| 3110300 | 3 Branches | Each |
| 3110400 | 4 Branches | Each |
| 3110500 | 5 Branches | Each |
| 3110600 | 6 Branches | Each |

Includes one manifold bracket.

### 1 1/4" Supply Manifold Section with Balancing Valve and Flow Meter, 2–6 Loops

| PART# | TYPE | UNIT |
|---|---|---|
| 3120200 | 2 Branches | Each |
| 3120300 | 3 Branches | Each |
| 3120400 | 4 Branches | Each |
| 3120500 | 5 Branches | Each |
| 3120600 | 6 Branches | Each |

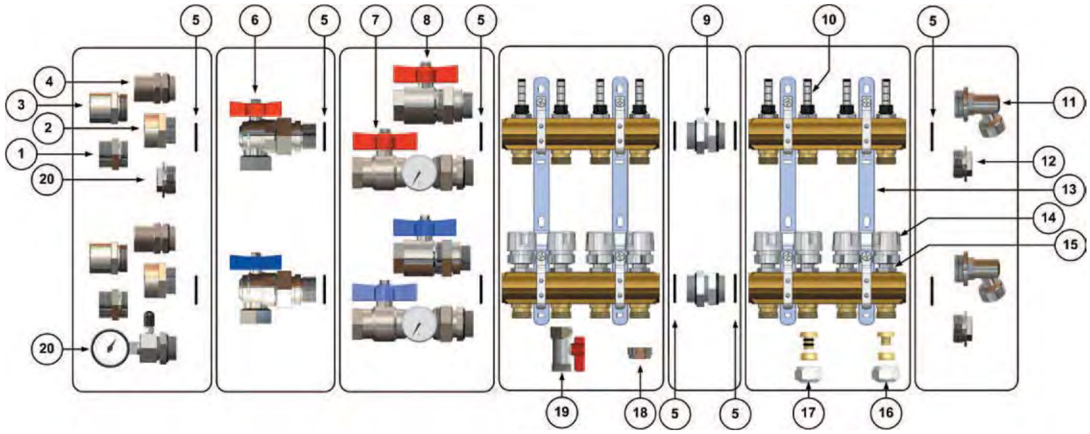
Includes one manifold bracket.

When using valve actuator 5120700, use the light grey adapter ring VA-10.

(Purchased Separately)

### 1 1/4" Return Manifold Section with Valves Ready for Actuators, 2–6 Loops

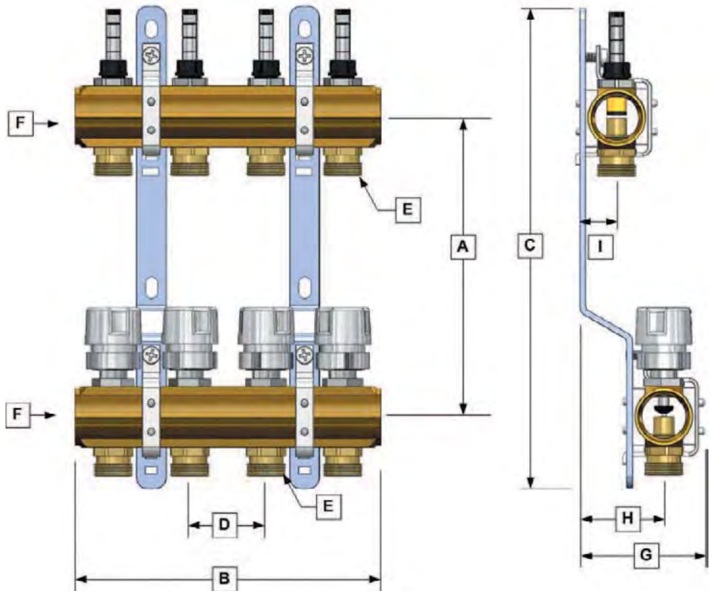
| PART# | TYPE | UNIT |
|---|---|---|
| 3130200 | 2 Branches | Each |
| 3130300 | 3 Branches | Each |
| 3130400 | 4 Branches | Each |
| 3130500 | 5 Branches | Each |
| 3130600 | 6 Branches | Each |




## Manifold Options

| # | PART# | DESCRIPTION | TYPE |
|---|---|---|---|
| 1 | 3620002 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 3/4" NPT |
| 1 | 3620003 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" NPT |
| 1 | 3620006* | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to EK 25 |
| 1 | 3620007* | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to EK 32 |
| 1 | 4372510* | NPT Transition | 1" NPT to EK 25 |
| 1 | 4373210* | NPT Transition | 1" NPT to EK 32 |
| 2 | 3620004 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" FIP |
| 3 | 3620001 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" and 1 1/4" CU |
| 4 | 3620010 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 3/4" and 1" CU w/ union lock nut |
| 5 | 3711390 | O-rings, spare part for 1" BSP Manifold transitions | for 1 1/4" Manifolds |
| 6 | 3620009 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" BSP Angle Isolation Union Ball Valve |
| 6 | 3620021 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" Female NPT Angle Isolation Union Ball Valve |
| 7 | 3620018 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" Female NPT w/ Thermometer Isolation Union Ball Valve |
| 8 | 3620008 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" BSP Isolation Union Ball Valve |
| 8 | 3620019 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP to 1" Female NPT Isolation Ball Valve |
| 9 | 3620005 | Manifold Transition for 1 1/4" Brass and Stainless Steel | 1" BSP x 1" BSP |
| 10 | 3710172 | Flowmeter Valve, spare part | for 1 1/4" Brass Manifold |
| 11 | 3610001 | End Cap with Swivel Fill/Drain Valve | for 1 1/4" Brass or Stainless Steel Manifold |
| 12 | 3610002 | Basic End Cap | for 1 1/4" Brass or Stainless Steel Manifold |
| 13 | 3710171 | Manifold Mounting Bracket, spare part | for 1 1/4" Brass Manifold |
| 14 | 3710173 | Manual Plastic Knob, spare part | for 1 1/4" Brass Manifold |
| 15 | 3710174 | On/Off Valve Assembly, spare part | for 1 1/4" Brass Manifold |
| 16 | ** | PEX Fitting Assembly | |
| 17 | ** | PEX-AL-PEX Fitting Assembly | |
| 18 | 3610003 | Loop End Cap | EK 20 |
| 19 | 3610006 | Loop Branch Ball Valve | EK 20 x EK 20 |
| 20 | 3610005 | Pressure Test Kit, (100psi gauge, Air valve & Basic End Cap) | for 1 1/4" Brass and Stainless Steel Manifolds |
| 20 | 3700183 | Pressure Test Kit | 1" NPT |

** = Requires EK Compression fitting, see compression fitting section in MrPEX® Price List*
*** = see compression fitting section in MrPEX® Price List*




## 1 1/4" Basic Manifold Section without Valves

| PART# | TYPE | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| 3110200 | 2 Branches | 8.25" | 4" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3110300 | 3 Branches | 8.25" | 6" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3110400 | 4 Branches | 8.25" | 8" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3110500 | 5 Branches | 8.25" | 10" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3110600 | 6 Branches | 8.25" | 12" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |

## 1 1/4" Supply Manifold Section with Balancing Valves & Flow Meters

| PART# | TYPE | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| 3120200 | 2 Branches | 8.25" | 4" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3120300 | 3 Branches | 8.25" | 6" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3120400 | 4 Branches | 8.25" | 8" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3120500 | 5 Branches | 8.25" | 10" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3120600 | 6 Branches | 8.25" | 12" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |

## 1 1/4" Return Manifold Section with Valves Ready for Actuators

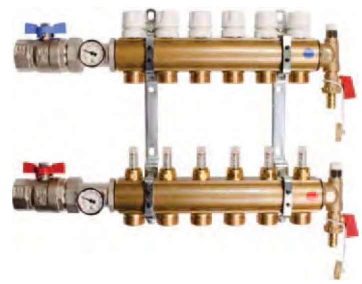
| PART# | TYPE | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| 3130200 | 2 Branches | 8.25" | 4" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3130300 | 3 Branches | 8.25" | 6" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3130400 | 4 Branches | 8.25" | 8" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3130500 | 5 Branches | 8.25" | 10" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |
| 3130600 | 6 Branches | 8.25" | 12" | 13" | 2" | EK20 | 1" BSP | 3.5" | 2.37" | 1.13" |

# 1 1/2" LARGE BRASS MANIFOLDS FOR 5/8" & 3/4" PEX AND PEX-AL-PEX TUBING, 2–10 LOOPS

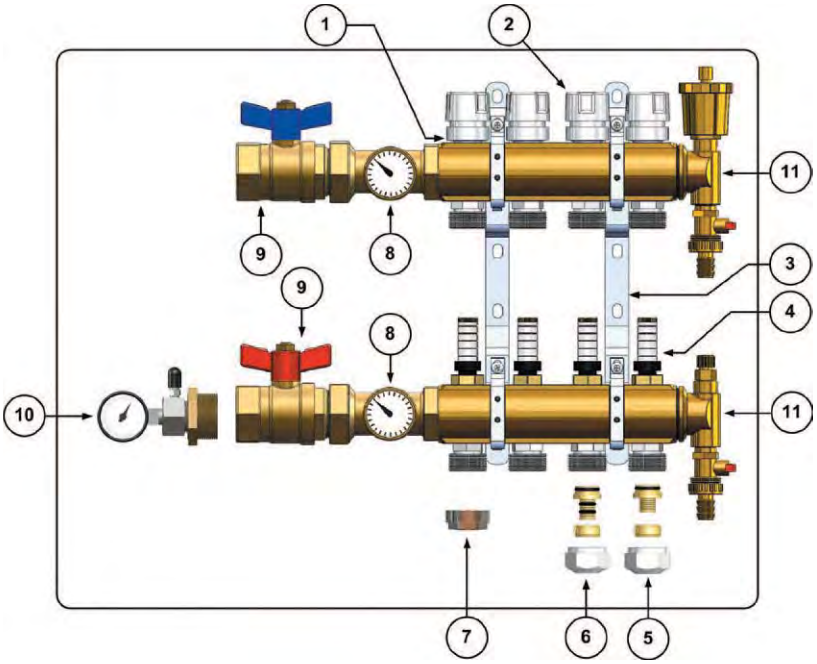
MrPEX® 1 1/2" Large Brass Manifolds are made from high-quality extruded brass and offered in 2–10 loop fully assembled manifolds. The supply body has balancing valves with adjustable flow-meters for flows up to 1.6 gpm per loop. The return body is equipped with on/off valves. The manual plastic cap on the return valve can be removed to accommodate a valve actuator #5120700 or #5120701. Actuator valve adapter #5700010 (VA-10) needs to be purchased separately with the actuator #5120700 or #5120701. The return balancing valve disc is designed to enable exact adjustments of small flows while still being able to handle large flow with minimal resistance. The branch Cv value is 1.2 and the manifold body accommodates flows up to 20 gpm. Manifolds are mounted on brackets ready to mount. Inlets comes with a 1 1/4" female NPT union ball-valve and end caps feature vent and fill/drain. The branches have EK 25 (Eurokonus) connections, and all MrPEX® EK25 fitting assemblies (PEX to EK25 or PEX-AL-PEX to EK25) can be used to connect tubing to the manifold.

### 1 1/2" Manifold Valve & Balancing Flow Meter Fully Assembled

| PART# | TYPE | UNIT |
|---|---|---|
| 3310200 | 2 Branches | Each |
| 3310300 | 3 Branches | Each |
| 3310400 | 4 Branches | Each |
| 3310500 | 5 Branches | Each |
| 3310600 | 6 Branches | Each |
| 3310800 | 8 Branches | Each |
| 3311000 | 10 Branches | Each |

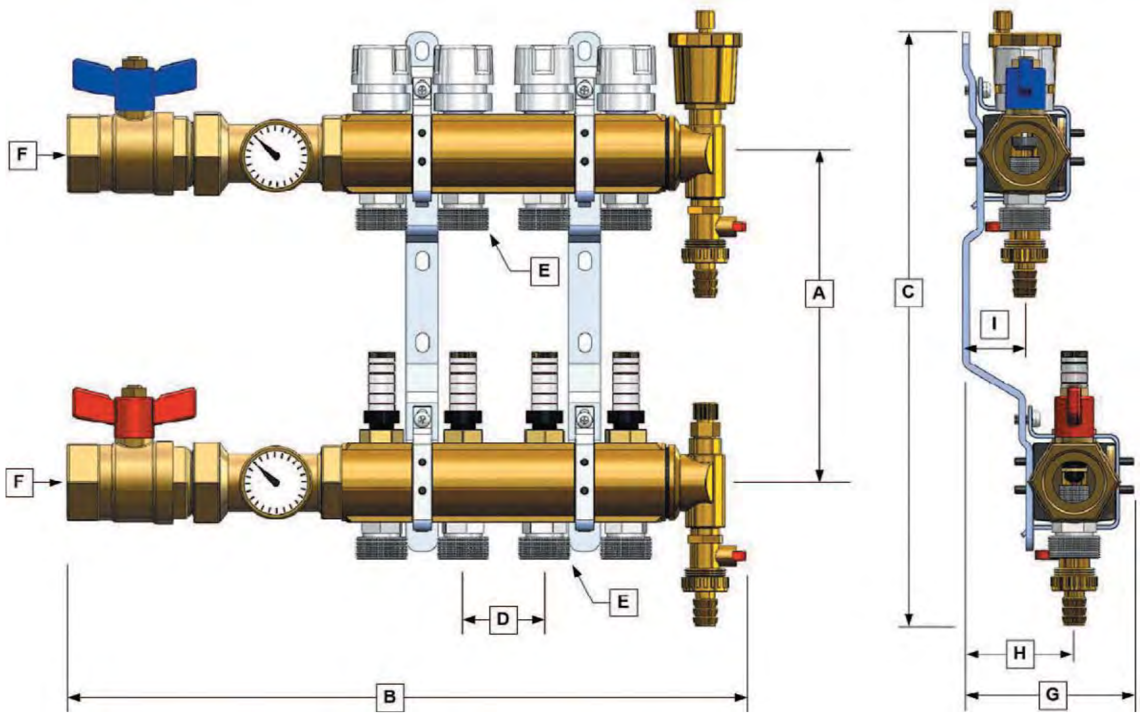


* Shipped as shown




## Manifold Options

| # | PART# | DESCRIPTION | TYPE |
|---|---|---|---|
| 1 | 3710174 | On/Off Valve Assembly, spare part | for 1 1/4" Brass Manifold |
| 2 | 3710173 | Manual Plastic Knob, spare part | for 1 1/4" Brass Manifold |
| 3 | 3730171 | Manifold Mounting Bracket, spare part | for 1 1/4" Brass Manifold |
| 4 | 3710172 | Flowmeter Valve, spare part | for 1 1/4" Brass Manifold |
| 5 | 4320625 | PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 5/8" PEX x EK 25 |
| 5 | 4320750 | PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 3/4" PEX x EK 25 |
| 6 | 2430750 | PEX-AL-PEX Fitting Assembly (Nut, Ring, & Insert) for EK | 3/4" PAP x EK 25 |
| 7 | 3610004 | Loop End Cap | EK 25 |
| 8 | 3710175 | Thermometer, spare part for 3730135 | |
| 9 | 3730135 | Union Ball Valve w/ Thermometer, set of 2 | 1 1/4" FIP x G 1 1/4" |
| 10 | 3700184 | Pressure Test Kit for 1 1/2" Brass & Stainless Steel Manifolds | 1 1/2" & 1 1/4" NPT |
| 11 | 3730120 | End Cap with Air Vent, Fill/Drain valve, Spare Part | for 1 1/2" Brass Manifold |




### 1 1/2" Brass Manifold, Valve & Balancing Flow Meter

| PART# | TYPE | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| 3310200 | 2 Branches | 8.25" | 12.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3310300 | 3 Branches | 8.25" | 14.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3310400 | 4 Branches | 8.25" | 16.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3310500 | 5 Branches | 8.25" | 18.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3310600 | 6 Branches | 8.25" | 20.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3310800 | 8 Branches | 8.25" | 24.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |
| 3311000 | 10 Branches | 8.25" | 28.4" | 13" | 2" | EK25 | 1 1/4" FIP | 4.5" | 2.87" | 1.68" |

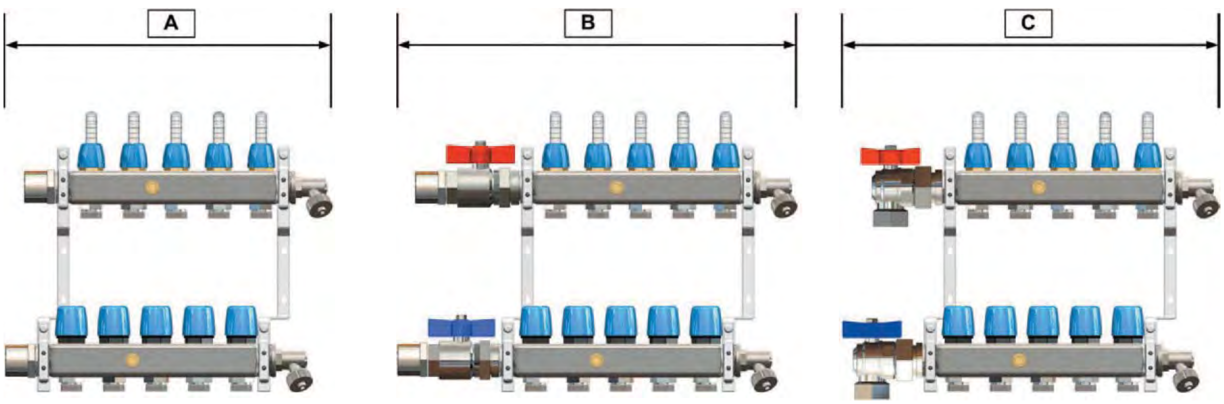
# MANIFOLD INSTALLATION

Once a location for the manifold is determined, you can surface mount the manifold or recess it into the wall. Always consider enclosing the manifold in a manifold box or frame out an enclosure with an access door. Make sure the manifold area is big enough to accommodate the manifold and any valves or zone boxes. See dimension tables below to determine the total width of your manifold.

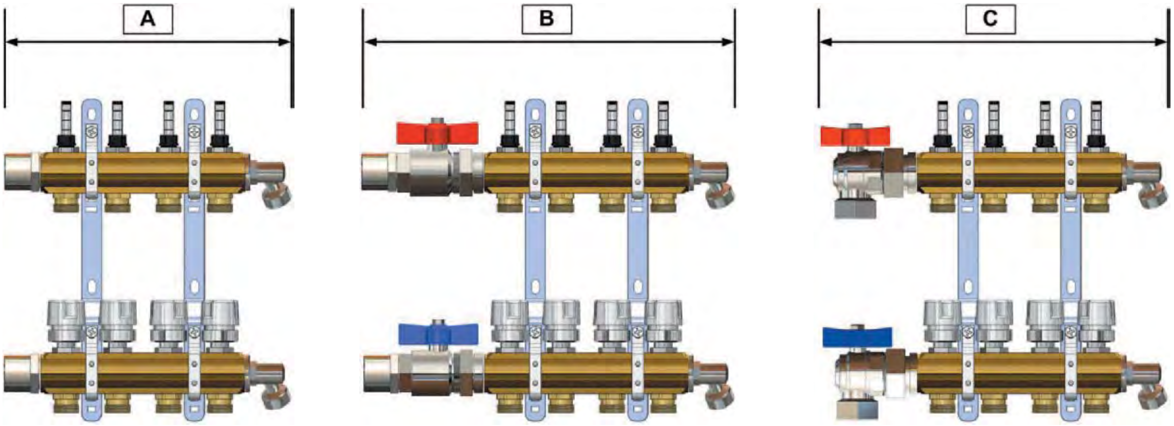
The manifold can be mounted in any direction without impacting the performance. However, if the manifold is mounted upside down, the flowmeters will not show 100% accurate flow due to the fact that the flowmeter assembly is forced down a little by gravity, thus indicating a slightly larger flow. Instead of mounting the manifold upside down to feed loops up, consider mounting the manifold sideways with the supply and return mains entering from the bottom, that way you can easily purge the manifold body using the end cap drain valve. The loops will then exit the manifold horizontally, then making a 90° turn up to feed the floor above.

Consider how you will feed the supply and return mains to the manifold location. The manifold can be fed from left or right, top or bottom. It is sometimes helpful to cross feed the manifold by feeding the supply from one side and return from the other. That way you have more room and the flow of the water will also flow in a counter-flow manner. It is a good idea to have the manifold already prepared and ready for mounting prior to arriving at the jobsite. Mount the manifold on brackets and/or on a board, or even in a manifold cabinet. Attach pressure test gauges and plugs as necessary.

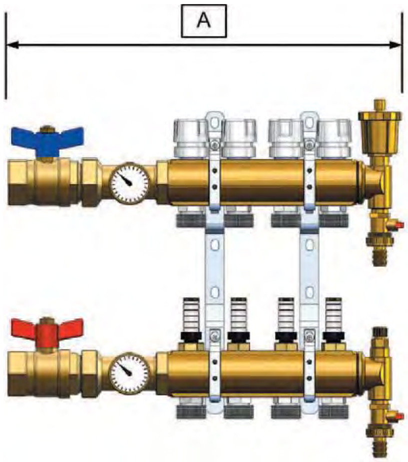
See illustration below for frame-out cavity dimensions, along with MrPEX® Manifold Cabinets, part numbers #6210707 and #6210709.



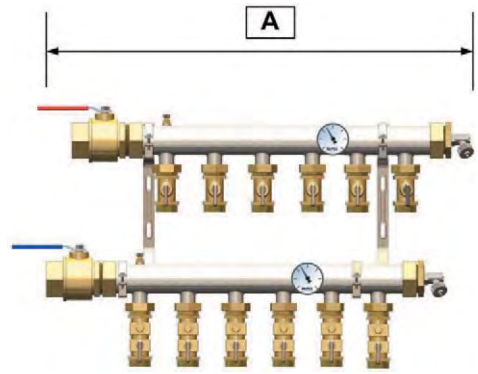

| LOOPS | WIDTH INCLUDING ADAPTER ONLY "A" | WIDTH INCLUDING STRAIGHT VALVE & ADAPTER "B" | WIDTH INCLUDING ANGLE VALVE & ADAPTER "C" |
|---|---|---|---|
| 2 | 9" | 12.5" | 11.25" |
| 3 | 11" | 14.5" | 13.25" |
| 4 | 13" | 16.5" | 15.25" |
| 5 | 15" | 18.5" | 17.25" |
| 6 | 17" | 20.5" | 19.25" |
| 7 | 19" | 22.5" | 21.25" |
| 8 | 21" | 24.5" | 23.25" |
| 9 | 23" | 26.5" | 25.25" |
| 10 | 25" | 28.5" | 27.25" |
| 11 | 27" | 30.5" | 29.25" |
| 12 | 29" | 32.5" | 31.25" |



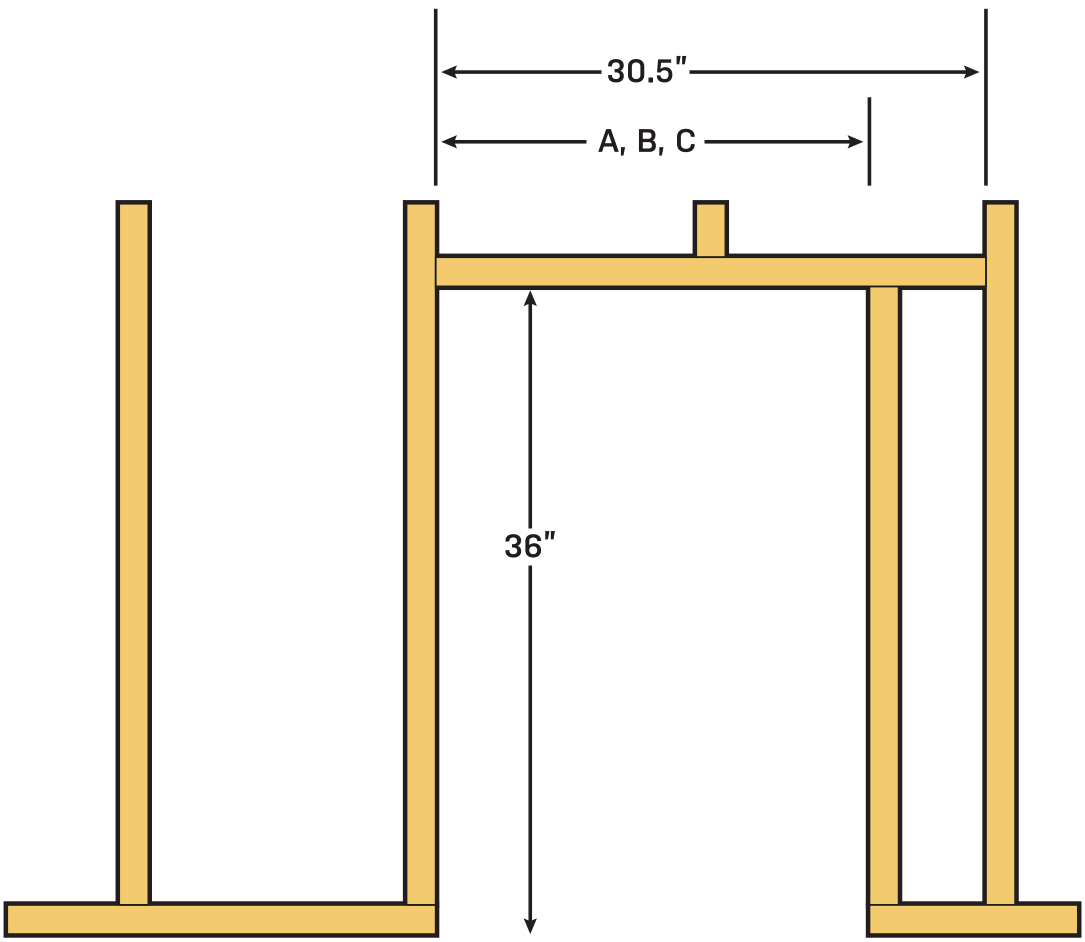

| LOOPS | WIDTH INCLUDING | | |
|---|---|---|---|
| | ADAPTER ONLY "A" | STRAIGHT VALVE & ADAPTER "B" | ANGLE VALVE & ADAPTER "C" |
| 2 | 7.25" | 10.75" | 9.5" |
| 3 | 9.25" | 12.75" | 11.5" |
| 4 | 11.25" | 14.75" | 13.5" |
| 5 | 13.25" | 16.75" | 15.5" |
| 6 | 15.25" | 18.75" | 17.5" |
| 7 | 17.25" | 20.75" | 19.5" |
| 8 | 19.25" | 22.75" | 21.5" |
| 9 | 21.25" | 24.75" | 23.5" |
| 10 | 23.25" | 26.75" | 25.5" |
| 11 | 25.25" | 28.75" | 27.5" |
| 12 | 27.25" | 30.75" | 29.5" |



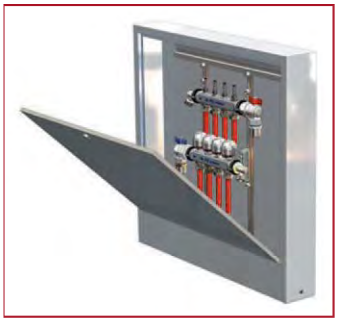

| LOOPS | WIDTH INCLUDING ADAPTER ONLY "A" |
|---|---|
| 2 | 12" |
| 3 | 14" |
| 4 | 16" |
| 5 | 18" |
| 6 | 20" |
| 8 | 22" |
| 10 | 24" |

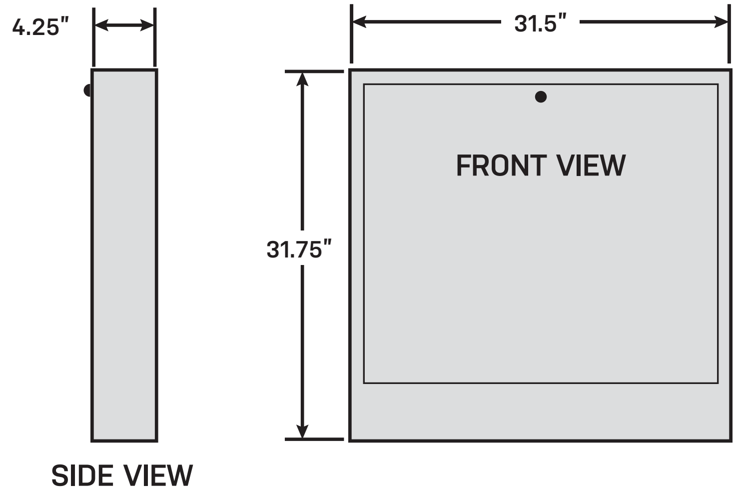



| LOOPS | WIDTH INCLUDING ADAPTER ONLY "A" |
|---|---|
| 3 | 16.4" |
| 4 | 19.2" |
| 5 | 21.9" |
| 6 | 24.7" |
| 7 | 27.4" |
| 8 | 30.2" |
| 9 | 32.9" |
| 10 | 35.7" |

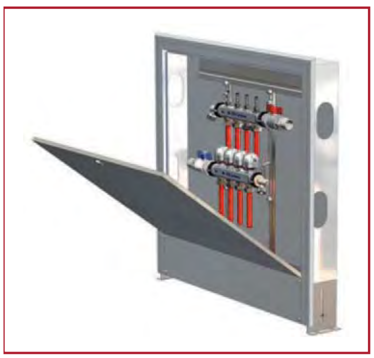


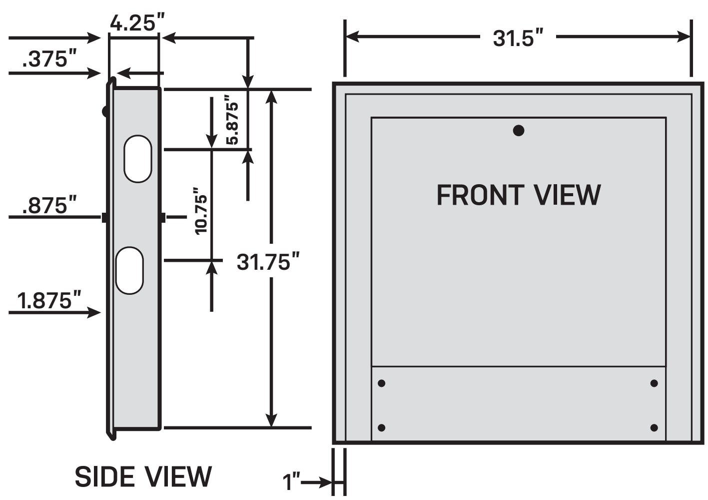
## SURFACE MOUNT, PART #6210707






## SURFACE MOUNT, PART #6210707





# INSTALLING MrPEX® TUBING

## INSTALLING THE TUBING

Now that you are ready to install the tubing, take a minute to decide which loop to start with first. Typically, working your way from left to right as you are facing the manifold is a good general guideline. Mark the area in front of the manifold to make sure all leaders fit without getting too crowded or crossed. No joints should be made in tube installed within inaccessible areas unless the type of joint is approved by MrPEX® for that application. For repairs, please see pages 60–66.

- The tubing loop length, spacing and layout pattern is designed to meet the heating and comfort needs of the occupants at design condition. All attached mechanical equipment is sized to support those needs. If a loop's length, spacing or pattern is changed from its design, it may have an adverse impact on the performance of the system. Use the following recommendations as a guideline unless otherwise specified in a MrPEX® design document.

| GENERAL LOOP LENGTH GUIDELINES | | |
|---|---|---|
| TUBE SIZE | RECOMMENDED | MAXIMUM |
| 3/8" I.D. | 200 feet | 250 feet |
| 1/2" I.D. | 300 feet | 350 feet |
| 5/8" I.D. | 350 feet | 500 feet |
| 3/4" I.D. | 450 feet | 600 feet |
| 1" I.D. | 500 feet | 750 feet |

*NOTE: Loop lengths are designed to deliver a certain heat load at a given temperature drop and pressure drop. The higher the heat load requirement, the higher the flow, resulting in a higher pressure drop. Shorter loops are required for higher heat loads. But if the heat load is low, the loops can be longer.*

| GENERAL TUBE SPACING AND LAYOUT PATTERN GUIDELINES* | | |
|---|---|---|
| | RECOMMENDED | MAXIMUM |
| Embedded in Slab | 6–12" | 12" |
| Poured Underlayment | 6–12" | 12" |
| Heat Transfer Plates Above Subfloor | 6–12" | 12" |
| Between Joists | 8" | 8" |

** Spacing shown is only a guideline. In many cases, the tube spacing in front of windows will be tighter to accommodate the higher heat-loss while the rest of the room will remain at normal spacing.*

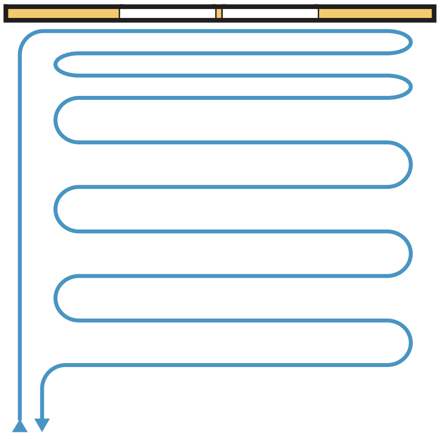
*NOTE: This chart is for indoor radiant heating (not snow melting) applications. Tube spacing may need to be closer in high heat-loss areas by windows (check with designer) and in barefoot areas such as bathrooms where surface temperatures need to be extremely even.*

*TIP: If MrPEX® LoopCAD design software is used, you can easily try different scenarios to see how it affects the system pressure drop, flow, and water temperature.*

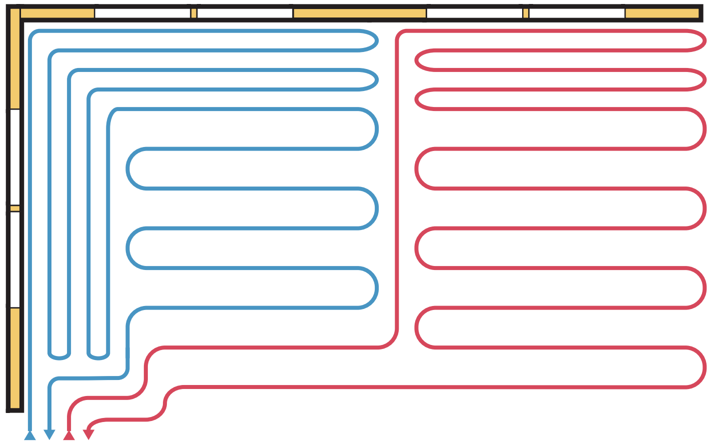
# COMMON LAYOUTS

The tubing layout pattern is selected to meet the heat loss and use pattern of the room. The heat loss of a room is always greater at the outside walls or by large windows, and gets gradually less as you move towards the inside of the room. The most common pattern is the Serpentine layout. This pattern sends the warmer supply water to follow the outside wall where the need is the greatest, and then serpentines back towards the inside of the room. Since the flow of the warm water is designed to allow it to only drop between 10° F - 20° F from the beginning of the loop to the end of the loop, it actually then better matches the heat loss profile of the room. The spacing of the tubing is also determined by the heat loss, but also by surface floor covering and the needs of the home owner. The higher the heat loss, the closer the spacing required. However, in areas where you will walk barefoot on a tile floor, a 12" spacing may actually not be the best even if the heat loss is low, only because you could possibly feel the difference between the pipes. This is typical for bathrooms.

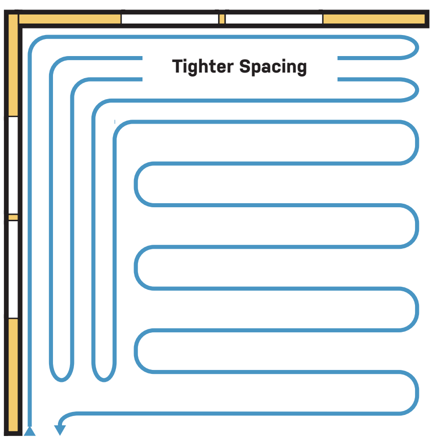
See the "Common Layouts" below. This gives you some ideas as to which patter to use for your project. Also keep the "General Loop Length and Spacing Guidelines" from previous page in mind.



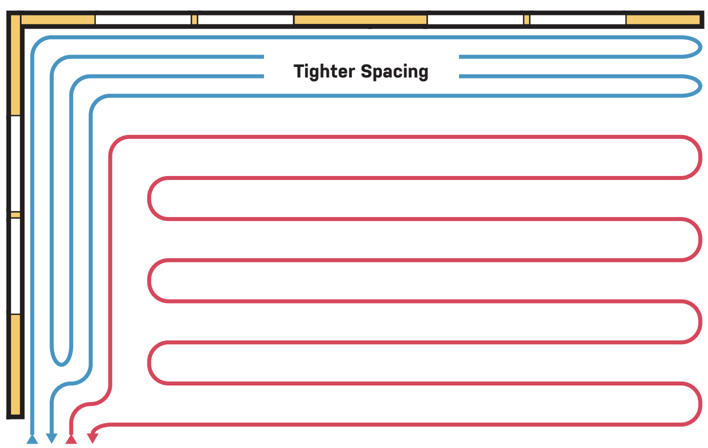
Single-Wall Serpentine



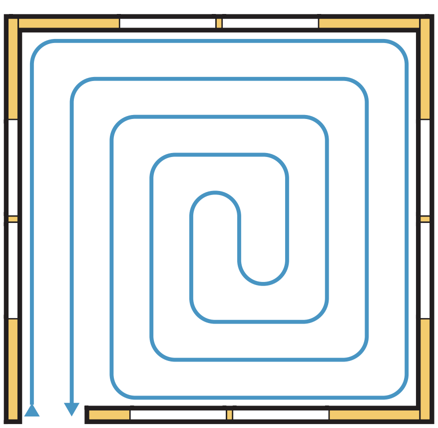
Two-Wall Serpentine. Two Loops Vertical.



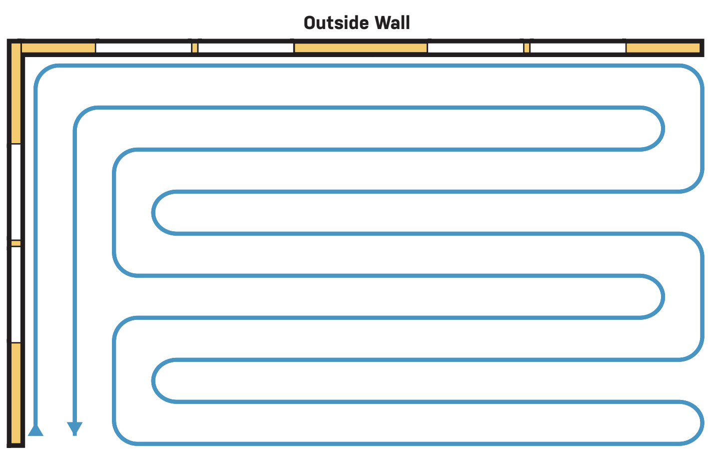

Two-Wall Serpentine




Two-Wall Serpentine. Two Loops Horizontal.



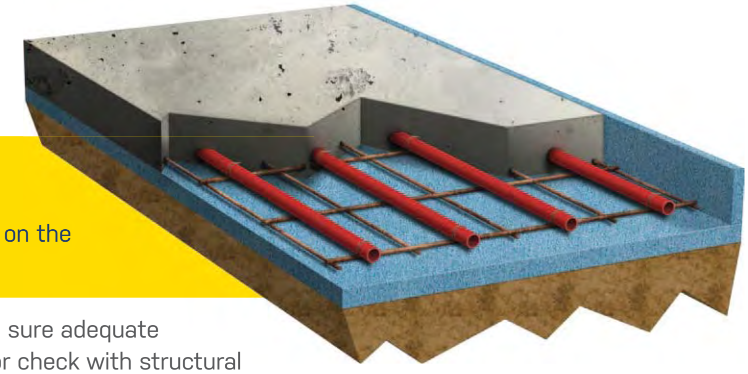
Counter-Flow Spiral




Counter-Flow Serpentine

# SLAB ON OR BELOW GRADE WITH INSULATION

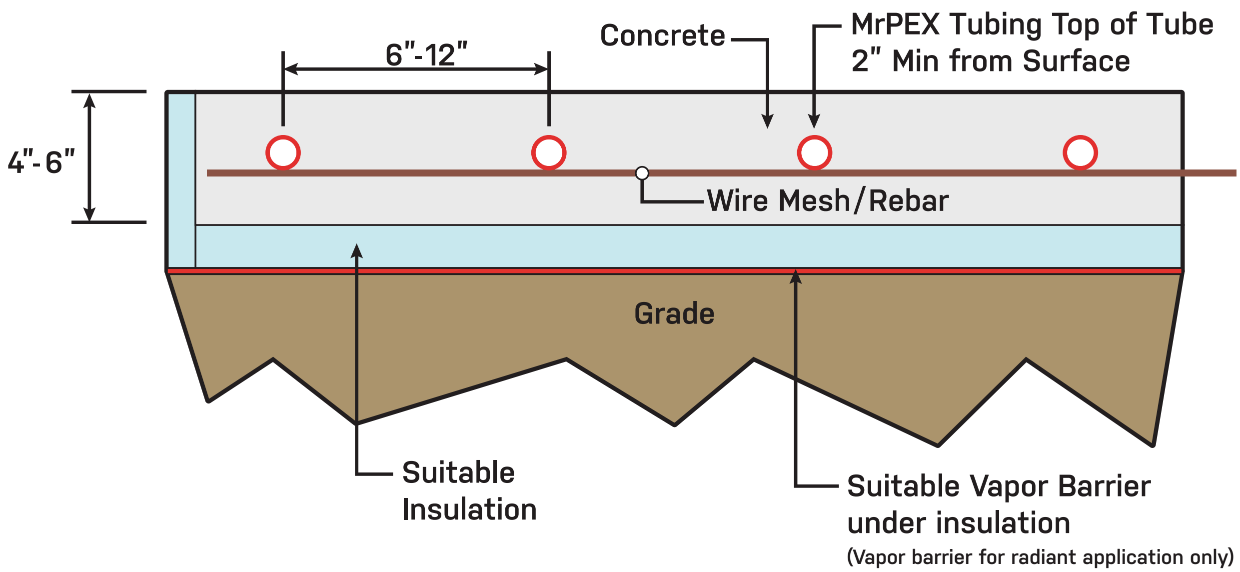
*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*



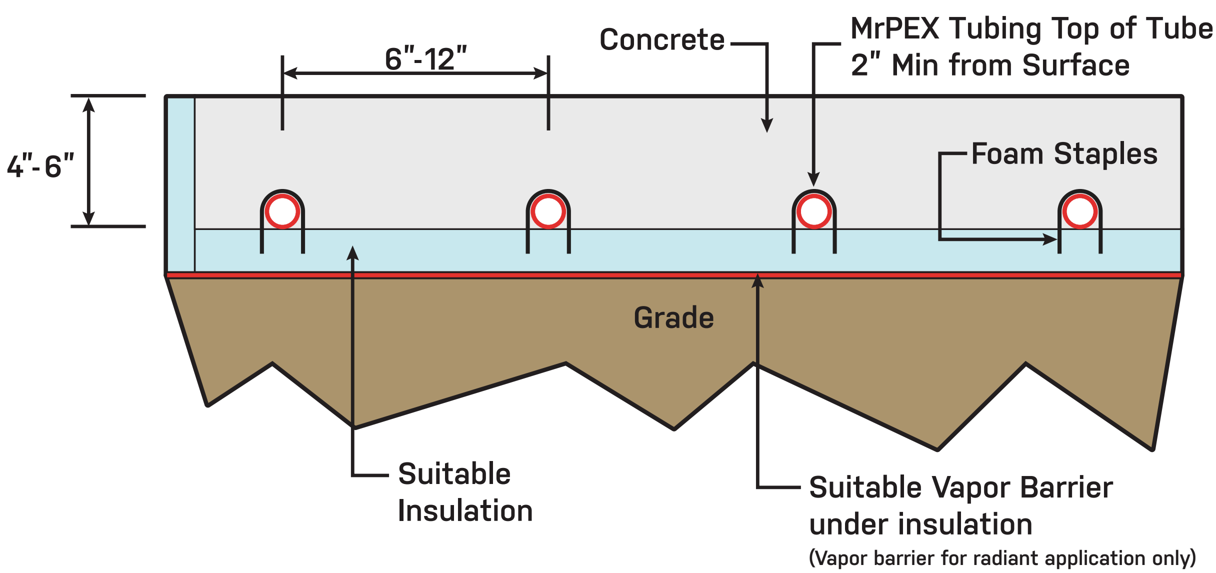
**STRUCTURAL NOTE:** Project Engineer, Project Architect or System Designer need to verify and approve the structural impact of the radiant system on the building prior to installation.

- Review "Installing Insulation" on page 10, to make sure adequate R-value is used. Also, follow local building codes or check with structural engineer for correct compressive strength (PSI) for your application.
- Lay down suitable foam insulation, covering the complete area. If a vapor barrier is required, make sure a suitable type is put down before the foam insulation. If there are areas that are uneven, you may need to adjust the grade to make sure the foam does not break when walked on. Tape the seams with suitable tape.
- If you are using foam staples or clips, it is helpful to use a tape measure or story pole to mark the spacing on the insulation at certain intervals to aid the routing of the tubing and to keep the correct spacing. It is especially helpful around the manifold and where closer spacing is needed.
- If 6 x 6 wire mesh is used, spacing is easier to maintain, but it is still helpful to mark the spacing on the insulation to plan the routing of the loops.
- Place the uncoiler in an out of the way area, still close enough to easily feed the tubing to the area you are working on. Place the tubing coil on uncoiler and remove tape/straps. To keep uncoiler from tipping over, you can fasten it to a piece of plywood.
- Pull the loose end of the coil over to the manifold and record the footage mark on tubing. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Attach a bend support to the tube. Connect to the supply of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 49, "Connecting the Loops to the Manifold."
- Start routing the tubing along the supply path (typically along the outside wall) attaching it with foam staples, clips or ties to the wire mesh every 2–3 feet on the straights as necessary and every 1 foot on the bends. It is important to secure the tubing enough so that it does not float up to the surface during the slab pour.
  *NOTE: If chairs are to be used to lift the tubing into the slab, then leave mesh flat while installing tubing, then lift the mesh assembly with the tubing placing it on the chairs.*
- The top of the tube should be embedded in the slab at a minimum of 2 inches below the surface.
- Complete the loop following the design. Once back at the manifold record the footage mark on tubing. Attach another bend support to the tube. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Connect to the return of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 46, "Connecting the Loops to the Manifold."
- Repeat the same process for remaining loops.

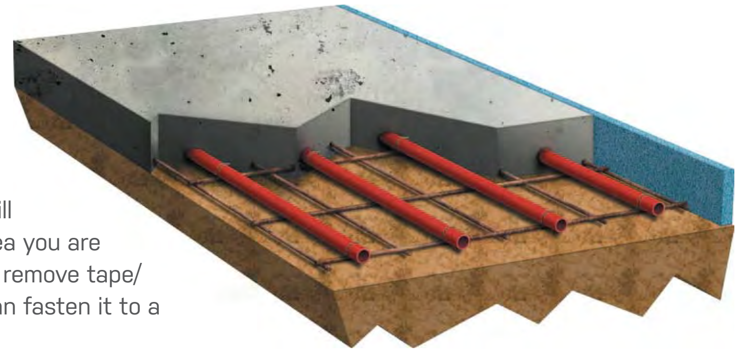
## CONCRETE SLAB ON GRADE WITH REBAR WITH INSULATION




## CONCRETE SLAB ON GRADE WITH STAPLES WITH INSULATION



# SLAB ON OR BELOW GRADE WITHOUT UNDERSLAB INSULATION



- Although not recommended for most applications by MrPEX® Systems, this is the prescribed method. Follow local building codes or check with structural engineer for correct compressive strength (PSI) for your application.

- Place the uncoiler in an "out of the way area", still close enough to easily feed the tubing to the area you are working on. Place the tubing coil on uncoiler and remove tape/ straps. To keep uncoiler from tipping over, you can fasten it to a piece of plywood.

- Pull the loose end of the coil over to the manifold and record the footage mark on tubing, if using a longer coil than needed. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Attach a bend support to the tube. Connect to the supply of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 49, "Connecting the Loops to the Manifold."

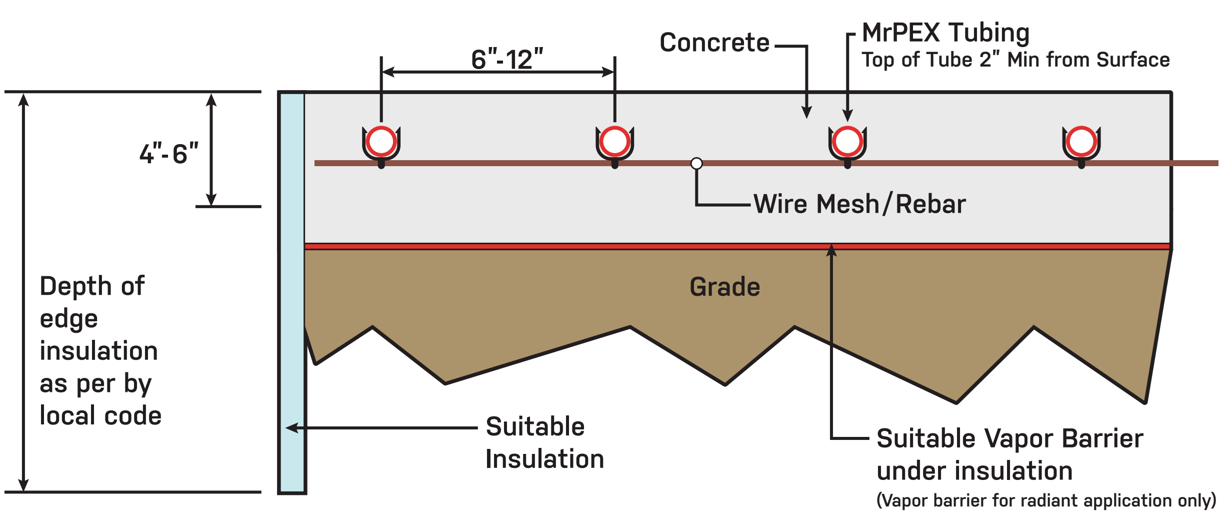
*Start routing the tubing along the supply path (typically along the outside wall/edge) attaching it with quip clips or ties to the wire mesh every 2–3 feet on the straights as necessary and every 1 foot on the bends. It is important to secure the tubing enough so that it does not float up to the surface during the slab pour. NOTE: If chairs are to be used to lift the tubing into the slab. To aid installation, leave mesh flat while installing tubing, then lift the mesh assembly with the tubing placing it on the chairs.*

- The top of the tube should be embedded in the slab at a minimum of 2 inches below the surface.

- Complete the loop following the design. Once back at the manifold record the footage mark on tubing. Attach another bend support to the tube. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Connect to the return of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 49, "Connecting the Loops to the Manifold."

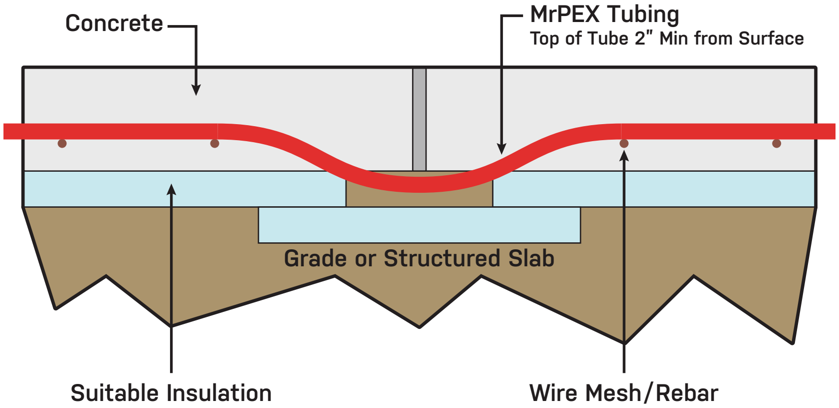
- Repeat the same process for remaining loops.

## SLAB ON GRADE USING QUIP CLIPS

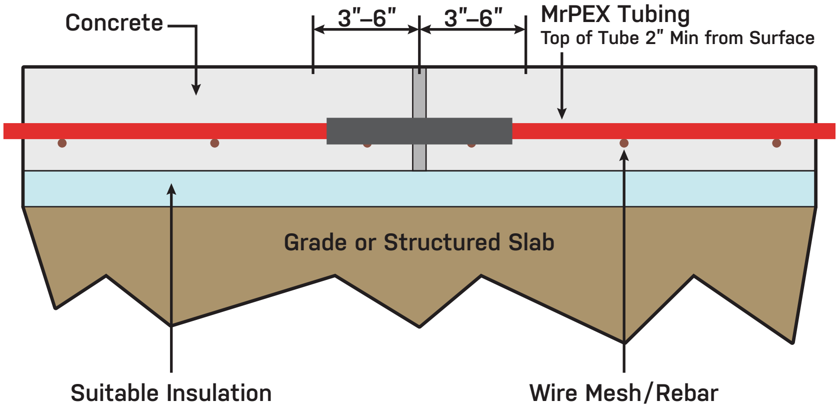


# EXPANSION JOINTS

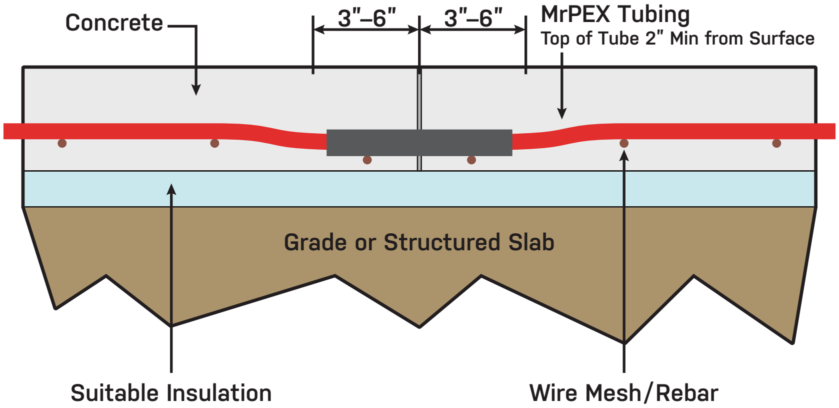
**Note 1, Expansion Joint**
Dipping the tubing underneath the expansion joint prior to where the joint is installed greatly aids the installation. This method completely avoids the tubing being subjected to any movement of the slab.




**Note 2, Expansion Joint**
For installations where tubing has to penetrate the expansion joint. Sleeve the tubing with 3/8" closed foam pipe insulation such as armoflex. This allows the slab to move at least 3/8" before interfering with the tubing.



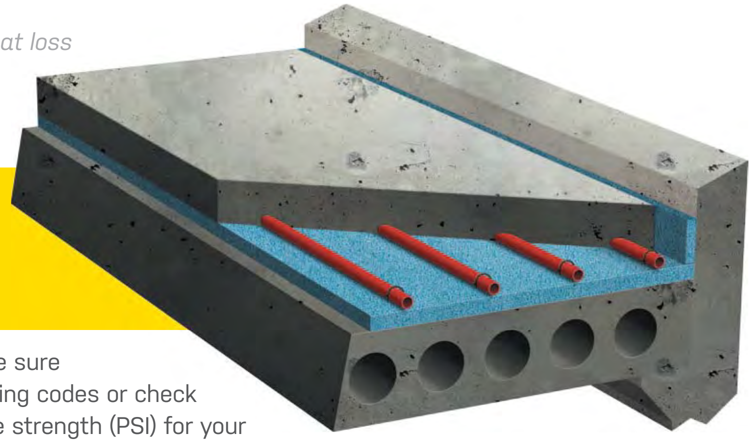

**Note 3, Control Joint (Sawcut or formed)**
For installations where tubing has to penetrate through or under a control joint. For protection against shifting slab, sleeve the tubing with 3/8" closed foam pipe insulation such as armoflex. This allows the slab to move at least 3/8" before interfering with the tubing. It is however not necessary to do this if there is no risk of the concrete shifting.



# SUSPENDED SLAB OR SLAB ON DECK

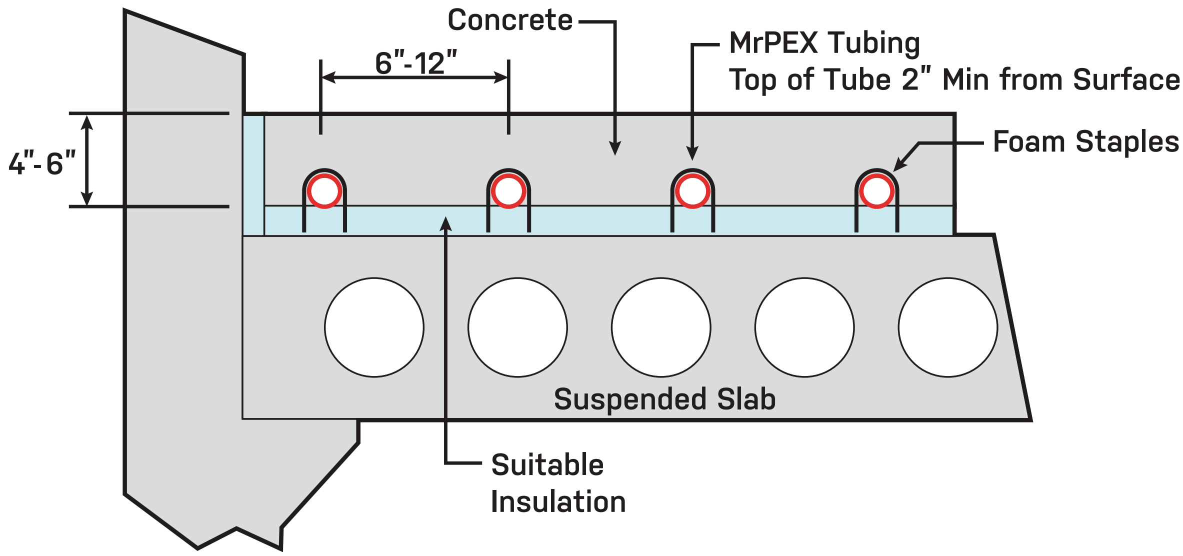
*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*

**STRUCTURAL NOTE:** Project Engineer, Project Architect or System Designer need to verify and approve the structural impact of the radiant system on the building prior to installation.

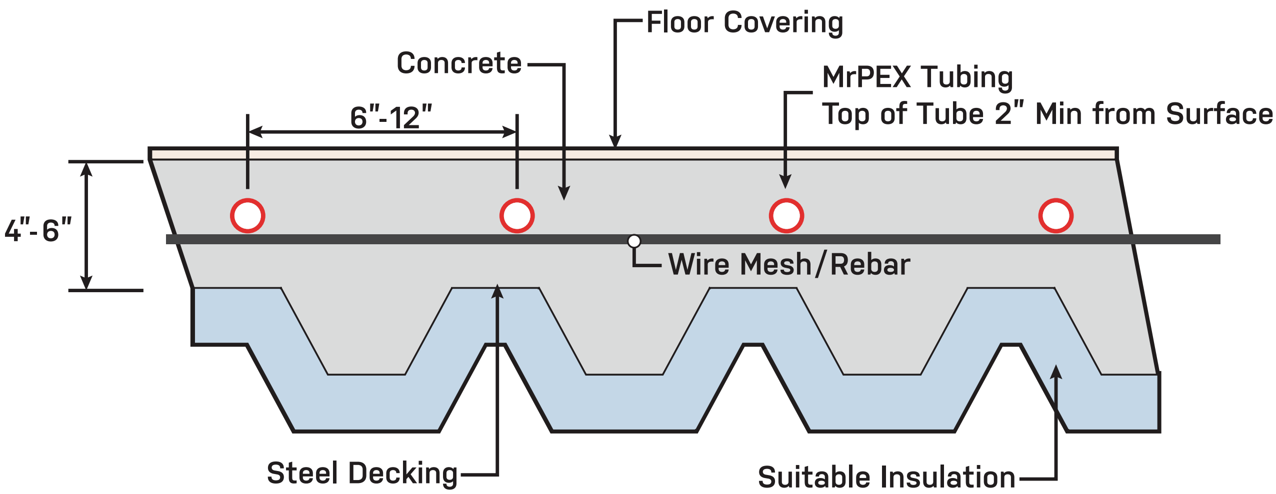


- Review "Installing Insulation" on page 10 to make sure adequate R-value is used. Also, follow local building codes or check with structural engineer for correct compressive strength (PSI) for your application.
- Lay down suitable foam insulation, covering the complete area. If there are areas that are uneven, you may need to adjust the grade to make sure the foam does not break when walked on. Tape the seams with suitable tape.
- If you are using foam staples or clips, it is helpful to use a tape measure or story pole to mark the spacing on the insulation at certain intervals to aid the routing of the tubing and to keep the correct spacing. It is especially helpful around the manifold and where closer spacing is needed.
- If 6 x 6 wire mesh is used, spacing is easier to maintain, but it is still helpful to mark the spacing on the insulation to plan the routing of the loops. *NOTE: It is helpful to leave mesh flat on the surface while tying the tubing layout to it, and then lifting the entire assembly up on chairs. Make sure that the top of the tubing is at least 2" from the surface of the finished slab.*
- Place the uncoiler in an out of the way area, still close enough to easily feed the tubing to the area you are working on. Place the tubing coil on uncoiler and remove tape/straps. To keep uncoiler from tipping over, you can fasten it to a piece of plywood.
- Pull the loose end of the coil over to the manifold and record the footage mark on tubing. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Attach a bend support to the tube. Connect to the supply of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 46, "Connecting the Loops to the Manifold."
- Start routing the tubing along the supply path (typically along the outside wall) attaching it with foam staples, clips or ties to the wire mesh every 2–3 feet on the straights as necessary and every 1 foot on the bends.
  *NOTE: If pressure testing is made with air, it is important to secure the tubing enough so that it does not float up to the surface during the slab pour.*
  *NOTE: If chairs are to be used to lift the tubing into the slab. To aid installation, leave mesh flat while installing tubing, then lift the mesh assembly with the tubing placing it on the chairs.*
- The top of the tube should be embedded in the slab at a minimum of 2 inches below the surface.
- Complete the loop following the design. Once back at the manifold record the footage mark on tubing. Attach another bend support to the tube. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the MrPEX® Reaming tool. Connect to the return of the first loop on the manifold using the correct fitting assemblies as outlined beginning on page 49, "Connecting the Loops to the Manifold."
- Repeat the same process for remaining loops.
- Organize the loops leading into the manifold before pouring the concrete.

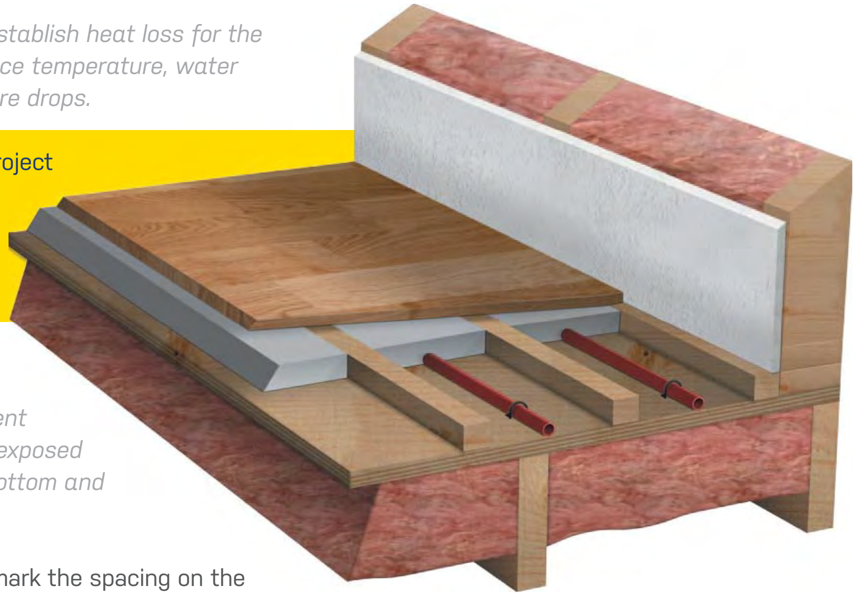
## SUSPENDED SLAB




## SLAB ON DECK



# SUSPENDED FLOORS WITH POURED UNDERLAYMENT



*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*

**STRUCTURAL NOTE:** Project Engineer, Project Architect or System Designer need to verify and approve the structural impact of the radiant system on the building prior to installation.

*NOTE: In this method, walls should be framed with double plate on the bottom to accommodate the underlayment thickness. This leaves the second plate exposed to be screwed to the sheetrock at the bottom and accommodates normal door hights.*

› Use a tape measure or story pole to mark the spacing on the subfloor at certain intervals to aid the routing of the tubing and to keep the correct spacing. It is especially helpful around the manifold and where closer spacing is needed.

› Place the uncoiler in an out of the way area, still close enough to easily feed the tubing to the area you are working on. Place the tubing coil on uncoiler and remove tape/straps. To keep uncoiler from tipping over, you can fasten it to a piece of plywood.

› Pull the loose end of the coil over to the manifold and record the footage mark on tubing. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the Mr PEX® Reaming tool. Attach a bend support to the tube. Connect to the supply of the first loop on the manifold using the correct fitting assemblies as outlined in "Connecting the Loops to the Manifold" beginning on page 49.

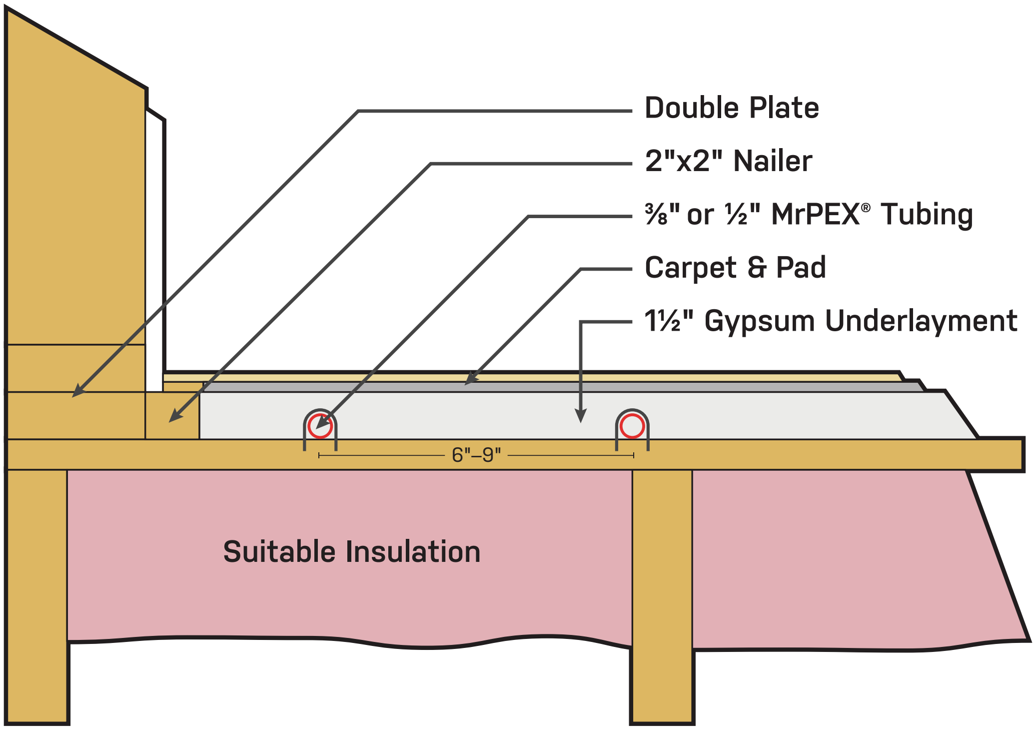
› Start routing the tubing along the supply path (typically along the outside wall) attaching it with a suitable staple gun every 2–3 feet or so on the straights as necessary and every 1 foot on the bends. It is important to secure the tubing enough so that it does not float up to the surface during the underlayment pour.

› Tube embedded in gypsum or lightweight concrete should have a minimum of 3/4" underlayment material over the highest point of the tube

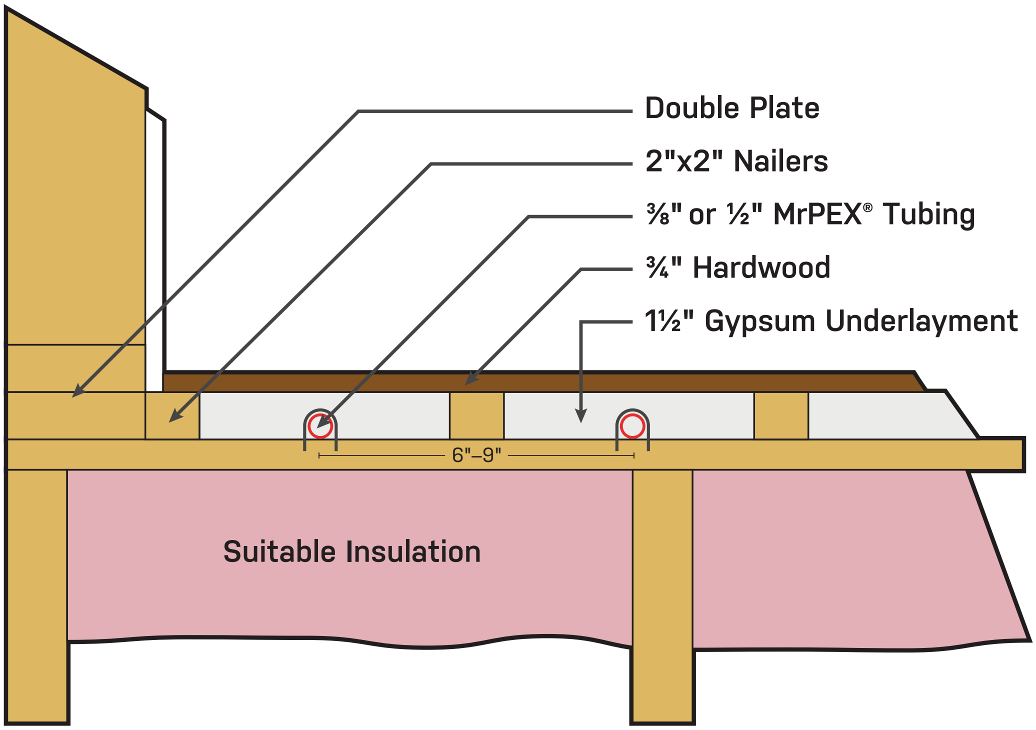
› Complete the loop following the design. Once back at the manifold record the footage mark on tubing. Attach another bend support to the tube. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. If PEX-AL-PEX is used, also ream the end of the tubing using the Mr PEX® Reaming tool. Connect to the return of the first loop on the manifold using the correct fitting assemblies as outlined in "Connecting the Loops to the Manifold" beginning on page 49.

› Repeat the same process for remaining loops.

## WITH CARPET & PAD



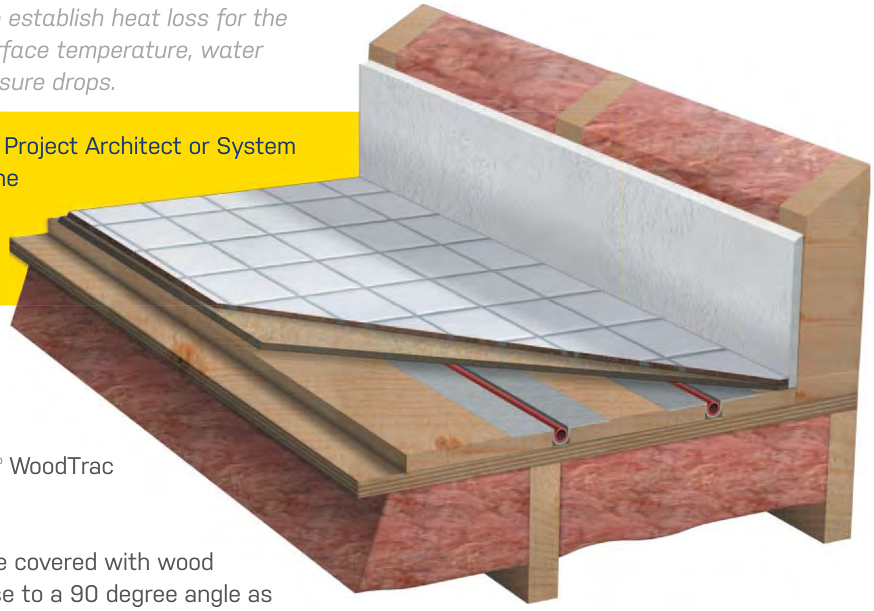

## WITH HARDWOOD FLOORING



# SUSPENDED FLOORS WITH ALUMINUM HEAT EMISSION PLATES ON TOP OF THE SUBFLOOR

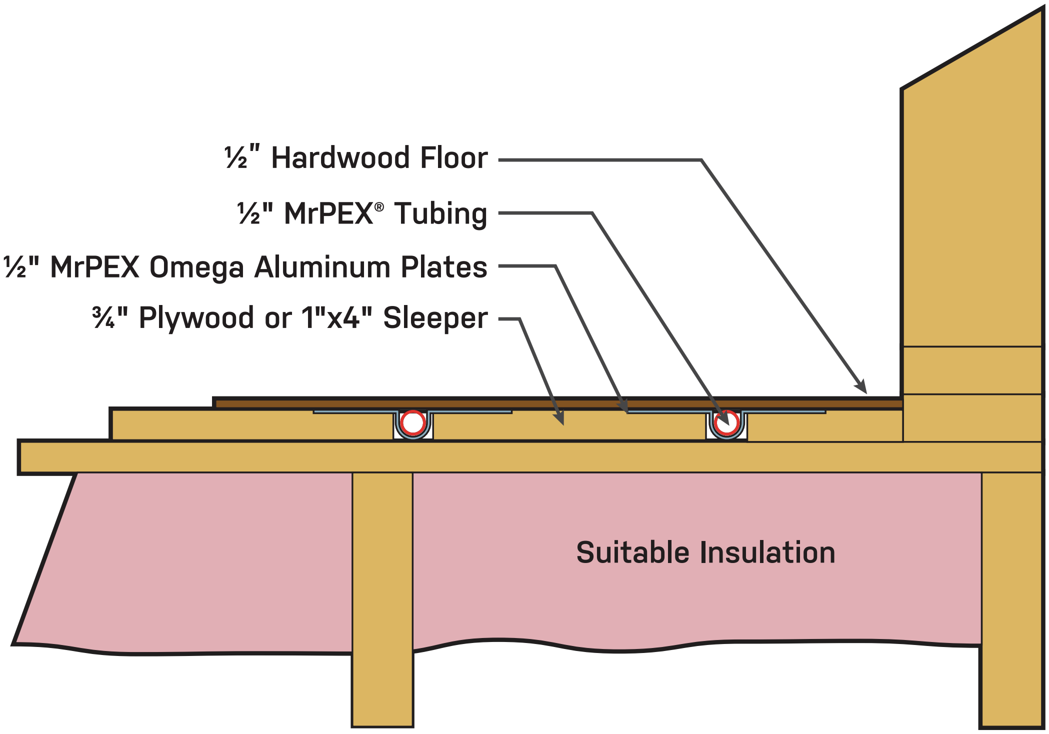
*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*

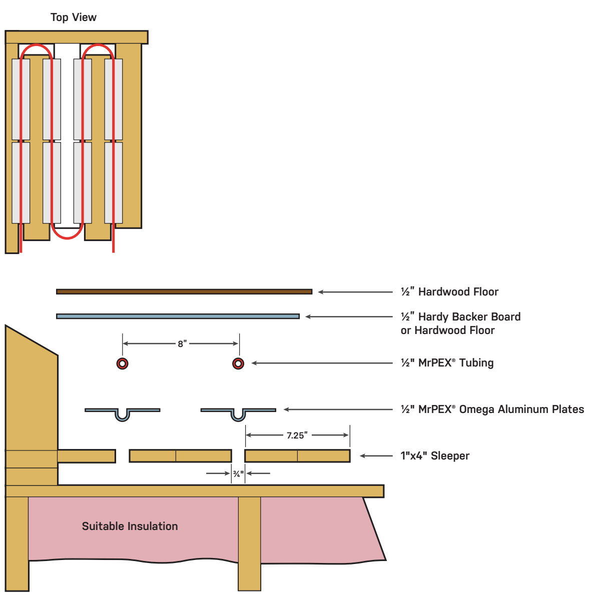
**STRUCTURAL NOTE:** Project Engineer, Project Architect or System Designer need to verify and approve the structural impact of the radiant system on the building prior to installation.

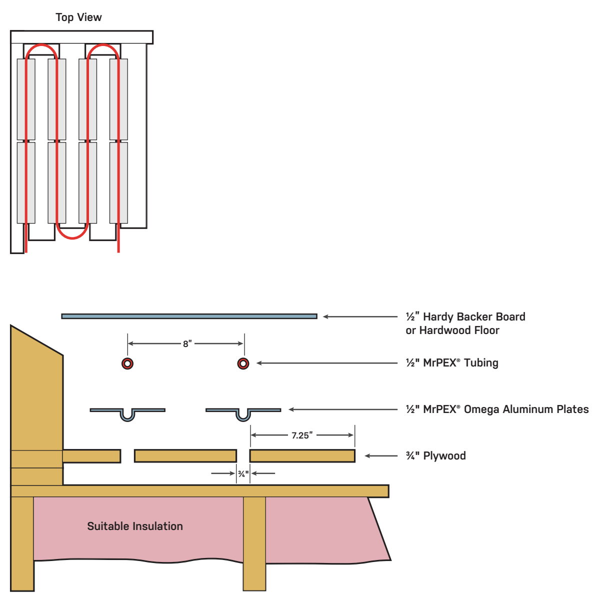


- Make sure subfloor is clean and free of nails/screws etc..
- For this application use either 1 x 4 sleepers, ripped plywood, or MrPEX® WoodTrac Panels.
- Frame-in two walls of the area to be covered with wood sleepers. Make sure to keep as close to a 90 degree angle as possible. Glue and screw the sleepers to the sub-floor.
- Following the first sleeper, leave a 1" gap and then continue to fasten two 1 x 4 sleepers next to each other to the subfloor covering the rest of the area, or one piece of ripped plywood. Stagger the sleepers at the end at least 8"-12" at the end of each run to leave ample room for tube turn. Accommodate for the return tube run back to the manifold.
- Place omega plates in the 1" grooves. Leave ¼" - ½" space between plates. Using a pneumatic stapler, staple only one side of the omega plate to the sleeper.
- Start laying the tube snapping it into the omega plates as you go along. Connect the tubing to the manifold and repeat process for next loop.
- Once tubing is installed, perform a pressure test of 40 – 60 psi for 24 hrs to ensure that the tubing has not been damaged during installation.
- Install adequate underlayment for planned floor covering. For carpeting and tile it is recommended to use ¼" hardy backer board or similar. Pay close attention to where the tubes are located before gluing and screwing down the backer board. For hard wood floor, follow wood floor manufacturers recommendations. Leave system under pressure on to notice any damage during installation.

## WITH HARDWOOD OR HARDY BACKER BOARD FLOORING

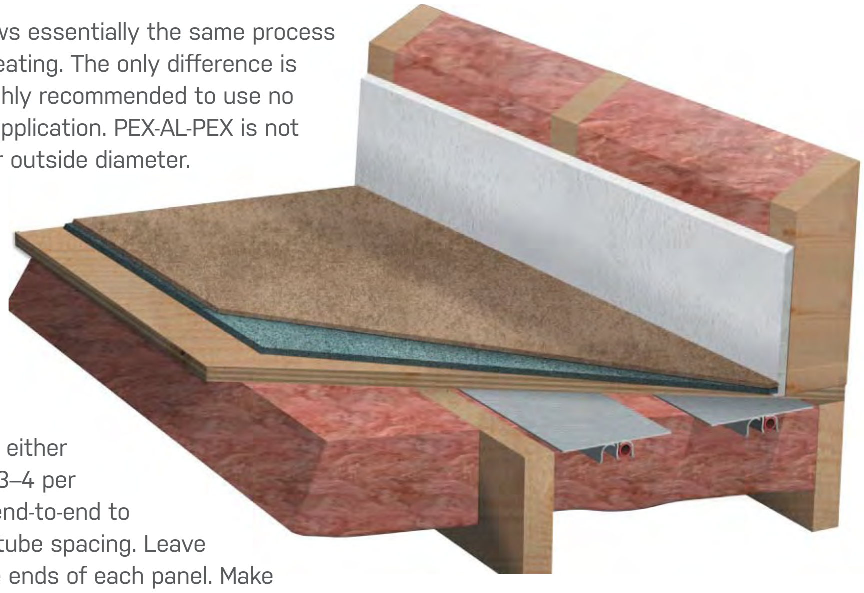


# SUSPENDED FLOORS WITH ALUMINUM HEAT EMISSION PLATES BETWEEN JOISTS BELOW

Tubing installed in the joist cavity follows essentially the same process for Duo-Track, Omega Plates or Joist Heating. The only difference is the way the tubing is attached. It is highly recommended to use no larger than 1/2" MrPEX® tubing for this application. PEX-AL-PEX is not used in this application due to its larger outside diameter.



- Review design to determine how tubing should be routed in the joist cavity. Drill suitable holes through the joist (follow local codes to maintain structural integrity).

- For Duo-Track installation only, using either screws or other suitable fasteners (3–4 per side), start by attaching the plates end-to-end to the bottom of the subfloor at an 8" tube spacing. Leave about a 1/4"–1/2" space between the ends of each panel. Make sure tubing groove is free from sharp edges and burrs. Use a dowel or piece of pipe in the groove to line up the plates.

- Place the uncoiler in an out of the way area, still close enough to easily feed the tubing to the area you are working on. Place the tubing coil on uncoiler and remove tape/straps.

- Pull the loose end of the coil and feed the tubing through the holes in the joists from the area closest to the manifold to the joist cavity for the loop farthest away. Make a large loop with tubing and start threading the loose end back through the same holes over to the manifold leaving the large loop of tubing at the far joist cavity. You have to continually feed the tubing from the uncoiler as you thread the tubing back. Record the footage mark on tubing. Attach a bend support to the tubing as necessary. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. Connect to the supply of the first loop on the manifold using the correct fitting assemblies as outlined in "Connecting the Loops to the Manifold" beginning on page 46.

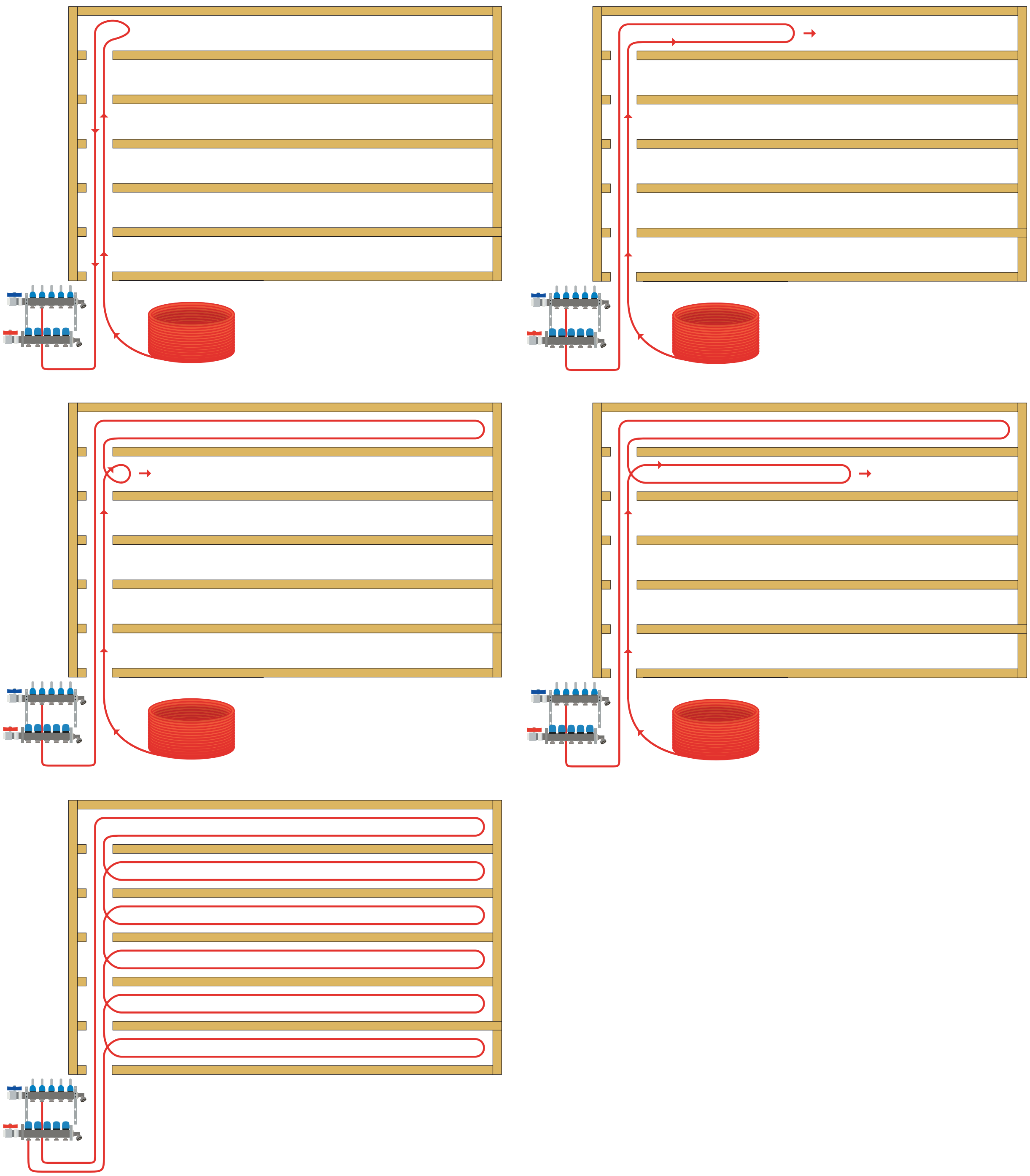
- At the farthest joist cavity, start expanding the large loop by pulling on the end that is fed from the uncoiler, at the same time, carefully twist it 180 degrees to make a pig-tail. Extend the loop end all the way to end of the joist cavity. Temporarily attach the loop end to hold it in place.

  - For Joist Heating, starting from the loop end, hang the tubing in the joist cavity using suitable clips or hangers. Leave about a 1–2" air gap between the tubing and the bottom of the subfloor. Work your way all way down to the beginning of the joist cavity. Arrange tubing, making sure everything looks professional and neat. Complete next loop cavity following steps above.

- Once back at the manifold, record the footage mark on tubing. Attach another bend support to the tube as necessary. Cut the end of the tubing with a suitable tubing cutter making sure the end is square and clean. Connect to the return of the first loop on the manifold using the correct fitting assemblies as outlined in "Connecting the Loops to the Manifold" beginning on page 49.

- Repeat the same process remaining loops.

# INSTALLING MrPEX® TUBING IN JOIST CAVITY

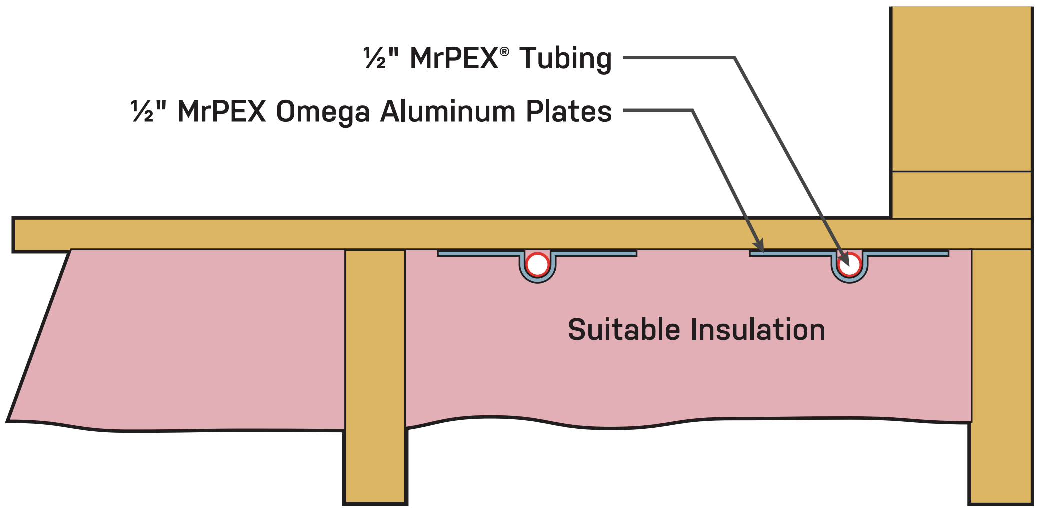


# BELOW FLOORING (cont.)

*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*

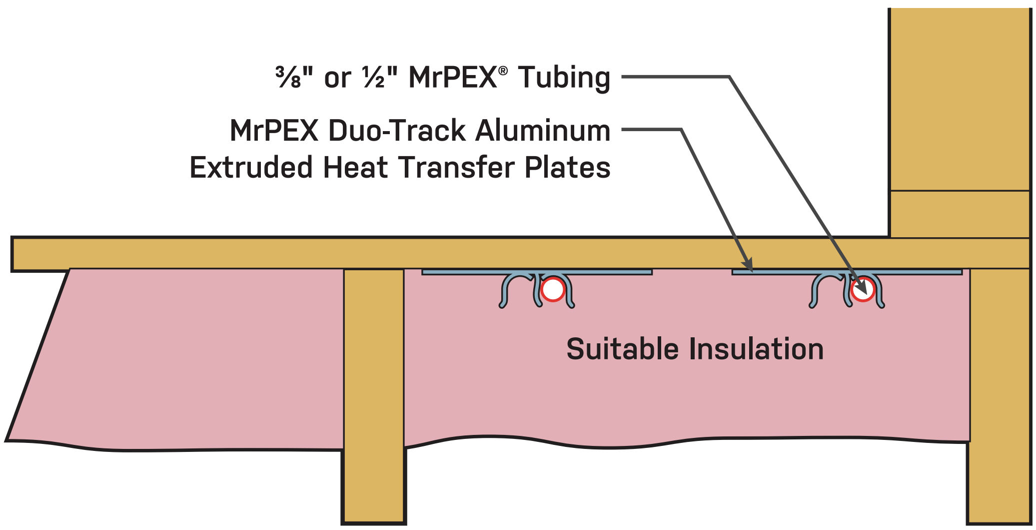
STRUCTURAL NOTE: Project Engineer, Project Architect or System Designer need to verify and approve the structural impact of the radiant system on the building prior to installation.

- For Omega Plates, starting from the loop end, put the first Omega plate up against the subfloor at the same time snapping the tubing into the groove. Attach the plate to the subfloor using suitable fasteners such as 5/8" staples (2–3 per side). Leave about a 1/4"–1/2" space between the ends of the panels. Work your way all way down to the beginning of the joist cavity. Arrange tubing, making sure everything looks professional and neat. Make sure tubing groove is free from sharp edges and burrs. Complete next loop cavity following steps above.




## DUO-TRACK

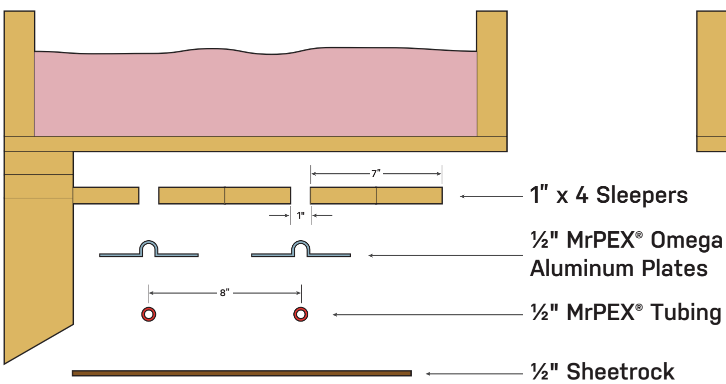
- For Duo-Track (installed before running tubing), start from loop the end and snap tubing into the grooves using a rubber mallet or palm-nailer. Work your way all way down to the beginning of the joist cavity. Arrange tubing, making sure everything looks professional and neat. Complete next loop cavity following steps above.

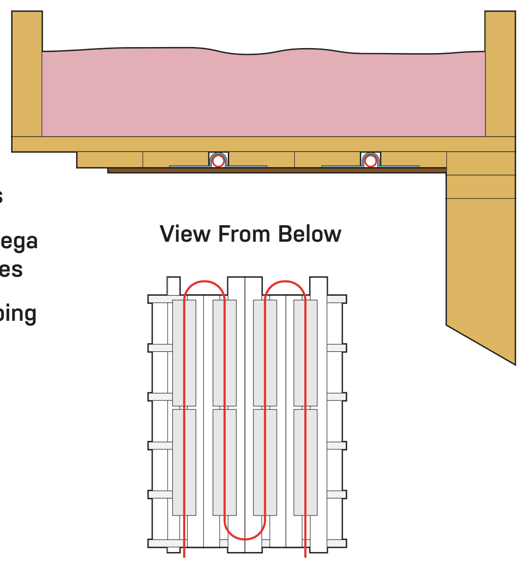


# RADIANT CEILING WITH ALUMINUM HEAT EMISSION PLATE

*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate*

- Make sure the bottom of the ceiling joists are clean and free of nails/screws etc..
- For fastest installation, use 1 x 4's ad sleepers.
- Start by the outside wall and attach one run of the 1 x 4 sleeper perpendicular (90 degrees) to the ceiling joists.
- Following the first sleeper, leave a 1" gap and then continue to fasten two 1 x 4 sleepers next to each other to the ceiling joists covering the rest of the area. Stagger the sleepers at the end at least 8"-12" at the end of each run to leave ample room for tube turn. Accommodate for the return tube run back to the manifold.
- Place omega plates in the 1" grooves. Leave ¼" - ½" space between plates. Using a pneumatic stapler, staple only one side of the omega plate to the sleeper.
- Start laying the tube snapping it into the omega plates as you go along. Connect the tubing to the manifold and repeat process for next loop.
- Once tubing is installed, perform a pressure test of 40 – 60 psi for 24 hrs to ensure that the tubing has not been damaged during installation.
- Install sheetrock making sure not to damage the tubing.  Leave system under pressure on to notice any damage during installation.

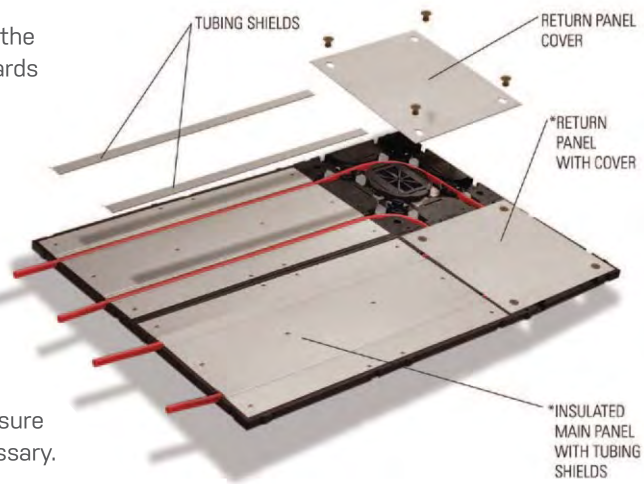


# RETROPANEL ON EXISTING CONCRETE

*NOTE: Use MrPEX® Design Software to establish heat loss for the structure, and to calculate output, surface temperature, water temperature and tubing/manifold pressure drops.*

- Review layout and start by identifying the manifold location. If the manifold is located behind a stud wall, cut out the bottom plate and about 1.5" of the sheet rock at the bottom.
- Make sure concrete floor is level, clean, and knock down or grind off any bumps or high spots that may interfere with the panels. If necessary, do a skim coat of self leveling concrete as per manufacturers instructions.
- Cover complete area where the panels will be with a 2 mil vapor barrier. It is helpful to hold the vapor barrier in place with tape.




- Start in a far corner by laying the RetroPanels across the width of the room row by row building the layout towards the manifold.
- Once the layout is complete for that room, slide the RetroPanel floor assembly so that it has at least 3" around the perimeter of the whole assembly. Typically one or two sides will be bigger than the other two. If there is an uneven spot where there's too much movement. Use tapcon masonry screws as necessary to tighten down the panels.
- Complete the remaining rooms the same way making sure to follow the design layout. Make adjustments if necessary.
- To start the tube installation, run the end of the PEX coil under the sheetrock wall and up about 3'–4' up the wall at the manifold location. Keep tubes organized and labeled.
- Follow the design walking the tubing into the grove of the RetroPanel. Use work boots or other hard-sole shoes to push the tubing to make it seat fully in the grove.

*NOTE: Do not use a rubber mallet as it may dent or deform the metal.*

- Once back at the manifold, estimate the tubing needed to complete the run, cut it and run it under the wall and tie it together with the supply for that loop.
- Complete all the loops in the same fashion.
- Once all the loops are installed, mount the manifold and connect the tubes, perform a pressure test of 40–60 psi for 24 hrs to ensure that the tubing has not been damaged during installation. Leave the pressure on until all construction is completed.
- Use 3/4" green treated plywood to fill in the areas not covered by the RetroPanels. Plan a 1/4" gap between the panels and the plywood to accommodate any movement. When securing the plywood to the concrete, use tapcon masonry screws or ramsets to adequately secure the plywood.

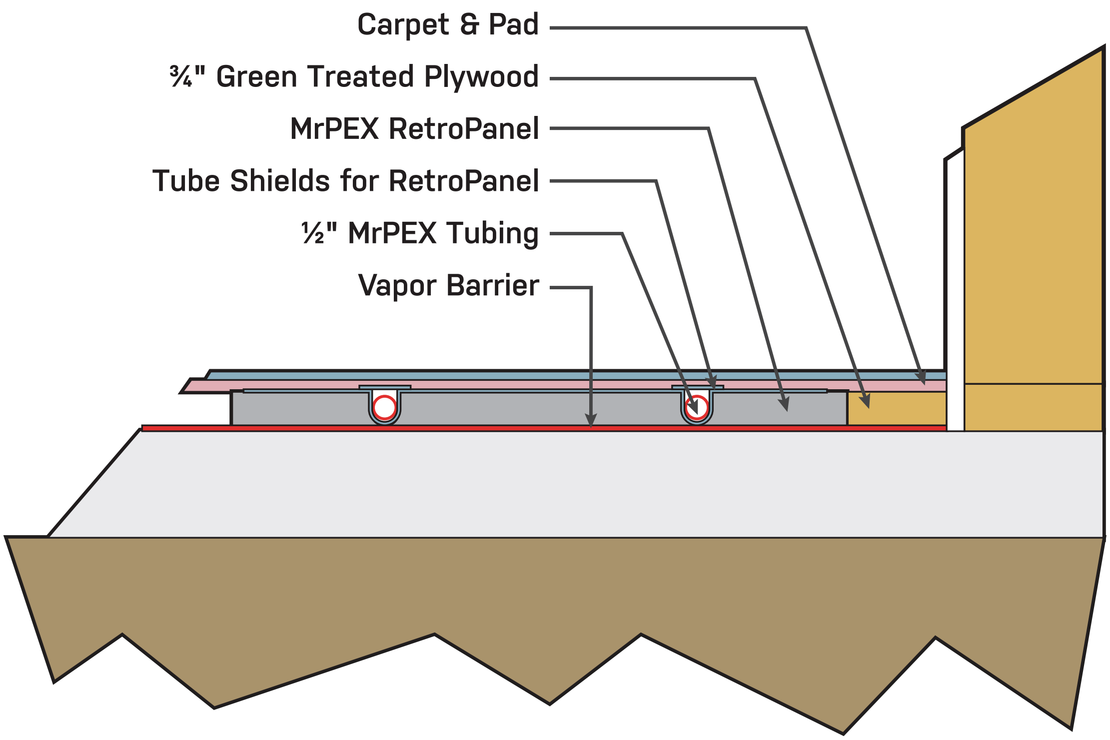
- For the area around the manifold, organize the tubes and make sure they lay flat. Use conduit clamps screwed to the concrete if necessary. Then fill in the area with self-leveling patching concrete to the level of the panels and let fully harden over night. Touch up if necessary.

- Attach covers for the turn-around panels using supplied plastic clips. Place tube shields over the exposed tubing in the straight panels. Use packing tape to secure the tube shields. Make sure the panels are clean prior to taping to ensure adequate adhesion.

- For carpeting, make sure the carpet installer is aware of where the tubes are when installing the tack-strips. In areas close to the tubing, use construction glue and let harden over night. Install carpet and pad as usual.

- For tile, it is only recommended to use in smaller areas such as bathrooms or in front of sliding doors etc. Use 1/4" cement backer board or similar. Pay close attention to where the tubes are located before gluing and screwing down the backer board. Follow tile installer recommendations.

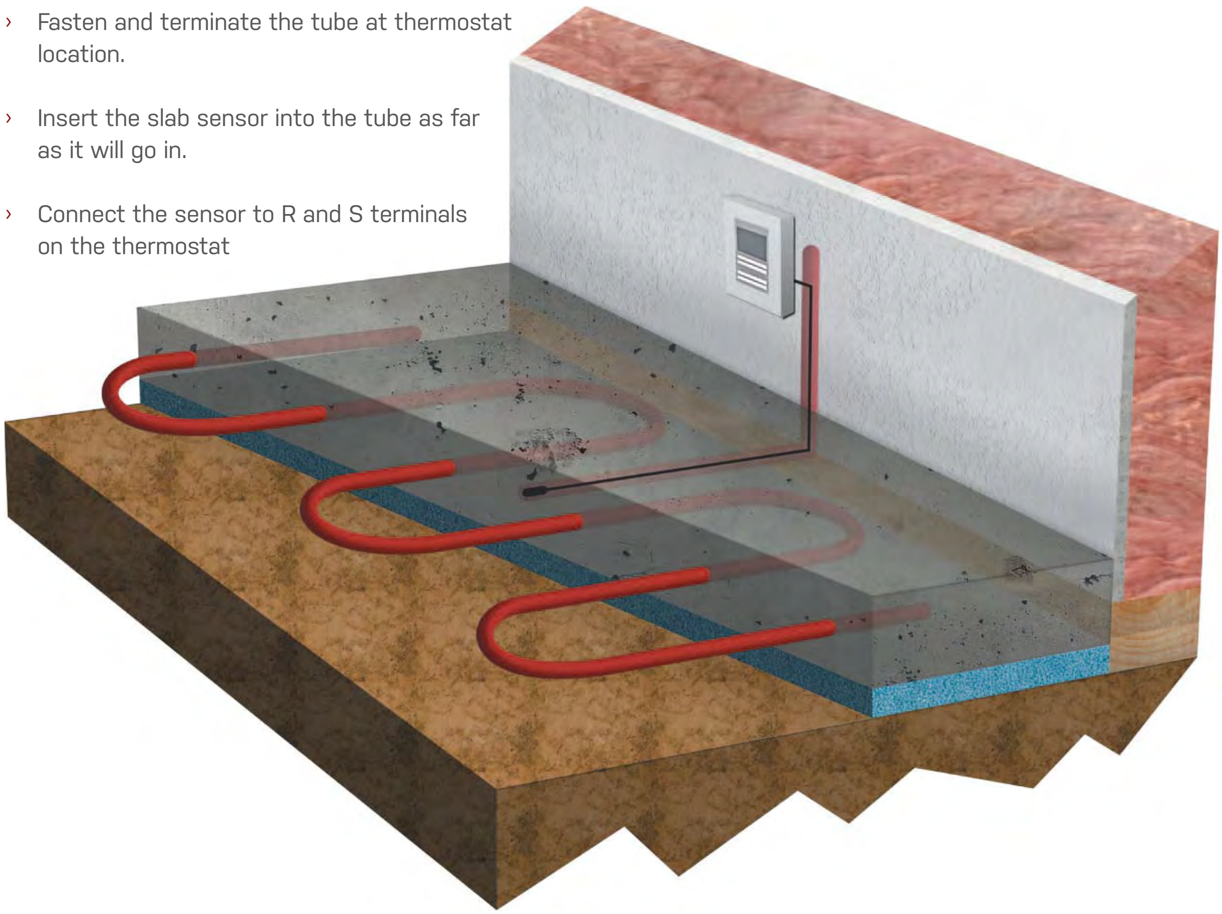
- Only floating wood floors are recommended. Follow wood floor manufacturers recommendations.



# INSTALLING THE SLAB SENSOR

When Using MrPEX® air and floor sensing thermostats (part 5110741), and you want to use the floor (slab) sensor, follow the recommended steps.

- Determine the thermostat location.
- Use 1/2" or 5/8" Pex tubing, start with capping one end of the tube, place capped end directly between MrPEX® tubing runs, preferably a foot or two from the wall. Fasten capped end to subfloor with staple or straps from capped end to the wall.
- Install a bend support onto the tube to direct the up the wall cavity..
- Fasten and terminate the tube at thermostat location.
- Insert the slab sensor into the tube as far as it will go in.
- Connect the sensor to R and S terminals on the thermostat

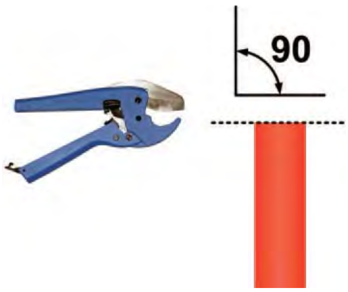


# CONNECTING THE LOOPS TO THE MANIFOLD

The MrPEX® residential manifolds use a 20mm Eurokonus (EK20) connection also know as G 3/4". You must use one of the MrPEX® fitting assemblies that fit our manifold. Use either the three piece EK compression fitting assembly for "MrPEX® PEX Tubing" and "MrPEX® PEX-AL-PEX Tubing", or the press fitting to EK for "MrPEX® PEX-AL-PEX Tubing" only. Both types of tubing can be connected to our manifolds using one of these style fittings.

### FOR PEX FITTING ASSEMBLY

› Start by making a square cut at the end of the tube even with the bottom of the manifold outlet nipple (without the fitting) using a suitable tubing cutter.
If PEX-AL-PEX tubing is used, also ream the tubing using our reaming tool.




› For three piece compression fittings:

**STEP 1–2** Slide on the large nut over the tubing (threads facing up).

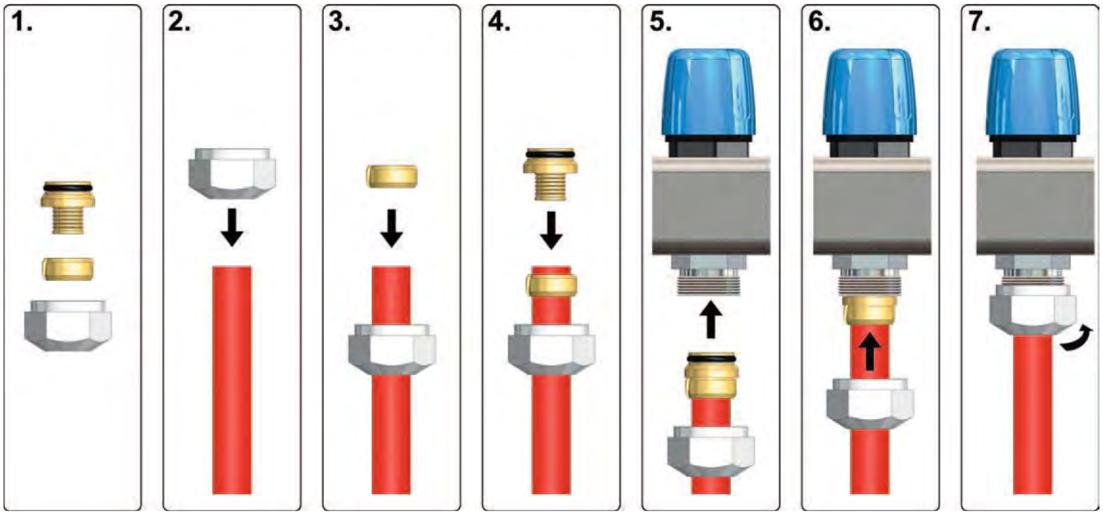
**STEP 3** Slide the compression ring on the pipe.

**STEP 4** Put the insert into the end of the pipe and push it all the way in until it stops. You can use a non-metallic object such as a block of wood and gently tap it to make sure it is completely seated.

**STEP 5** Slide the compression ring up against the insert. Lubricate the o-ring at the top of the insert.

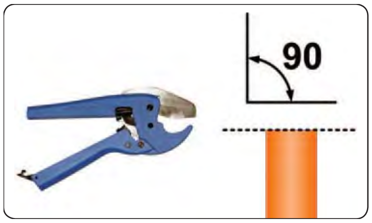
**STEP 6** Gently push the insert into the manifold seat making sure the o-ring doesn't get caught.

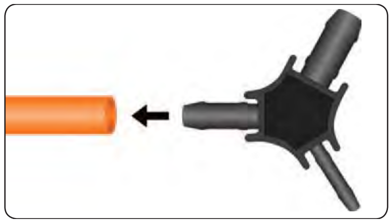
**STEP 7** Holding the tubing straight and in place, slide up the compression nut and thread it onto the manifold outlet. Tighten nut with suitable wrench. The tubing will relax slightly under the pressure, so the fitting needs to be tightened a second time after about 20–30 minutes to ensure tightness.



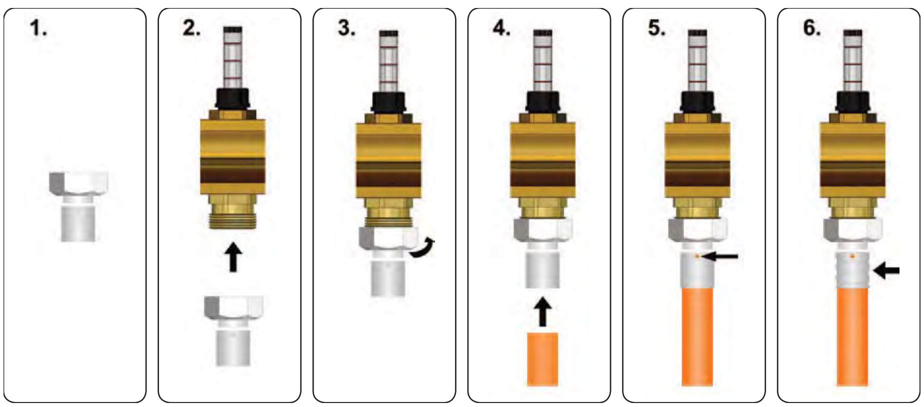
## FOR PEX-AL-PEX PRESS FITTING ASSEMBLY:

› Start by making a square cut at the end of the tube even with the bottom of the manifold outlet nipple (without the fitting) using a suitable tubing cutter.
If PEX-AL-PEX tubing is used, also ream the tubing using our reaming tool.



| | |
|---|---|
| STEP 1–2 | Start by attaching the press fitting assembly to the manifold. |
| STEP 3 | Tighten nut with suitable wrench. |
| STEP 4–5 | Slide the tubing into the press fitting until you can see the end of the tube in the view port. Lubricating the inside of the pipe may aid the installation. |
| STEP 6 | Using either a manual or battery press tool, complete the fitting. Make sure that the press jaw is up against the shoulder of the fitting. |

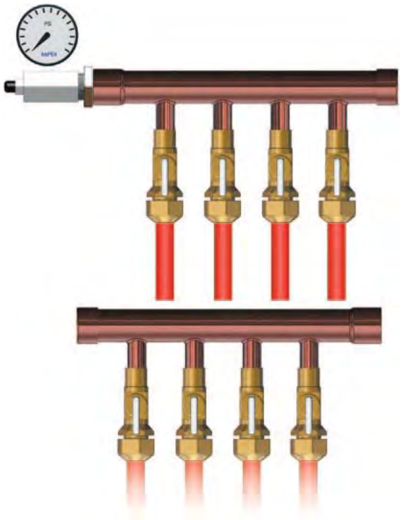


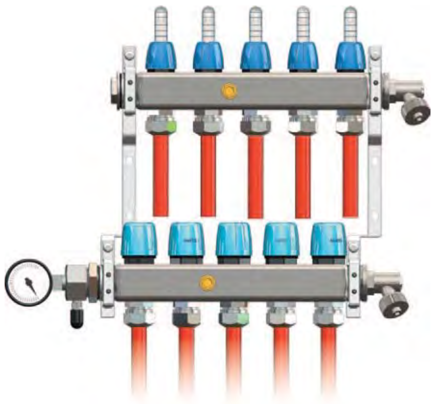
# PRESSURE TESTING THE LOOPS

## TEMPORARY MANIFOLD FOR PRESSURE TESTING

Temporary manifolds can be quite simple since the only requirement you have is to connect the loops for pressure testing. A simple copper plumbing manifold will do fine. As mentioned in previous section, it is a good idea to have the manifold already prepared and ready for mounting prior to arriving at the jobsite. This includes mounting the pressure test kit on the manifold. Make sure to mount the temporary manifold slightly higher than the finish manifold to make sure that you have enough length of the tubing left after you remove the test manifold. For the finish manifold, the lower manifold ports should be at least 18"–24" off the floor to make sure that you have enough tubing to work with. Mount the temporary manifold about 6" higher.

Use appropriate tools and fasteners to secure the manifold before starting the tubing installation.





## PRESSURE TESTING THE LOOPS AND MANIFOLD

Once all loops have been installed and connected to the manifold, it is time to pressure test the tubing and manifold.

- Connect a pressure test kit with a 0–100 psi gauge and an air valve to the manifold.
- Prior to filling the system, make sure to open the manifold supply and return valves.
- Pressure test any portion of the system that will be embedded in the floors, walls or ceilings of the building to 40–60 psi or 1.5 times the operating pressure, whichever is greater, for at least 30 minutes or for a sufficient period of time to determine if any leaks exist in the system, and as consistent with local and mechanical codes. Reduce pressure to 30 psi prior to embedding the tubing. A 30–40 psi pressure test should remain during phases of construction to monitor system integrity.

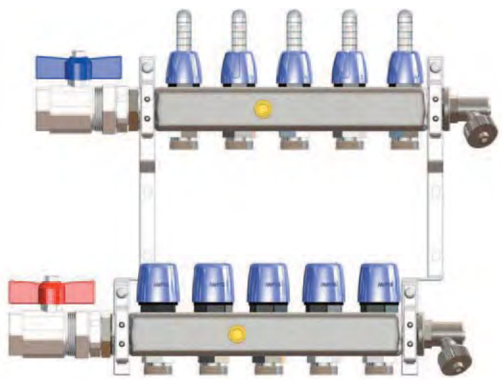
*NOTE: If tubing is to be left under pressure for a longer period, make sure to reduce the pressure to 30 psi.*

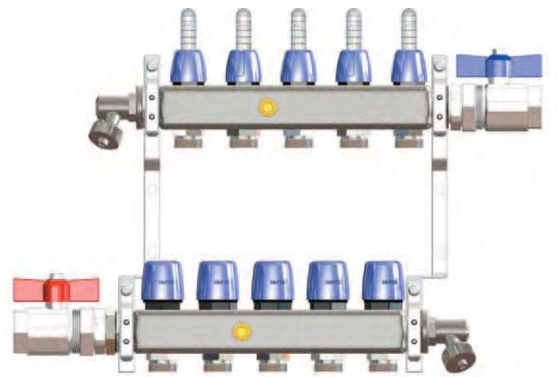
*NOTE: Consult local mechanical code for specific requirement in your area.*

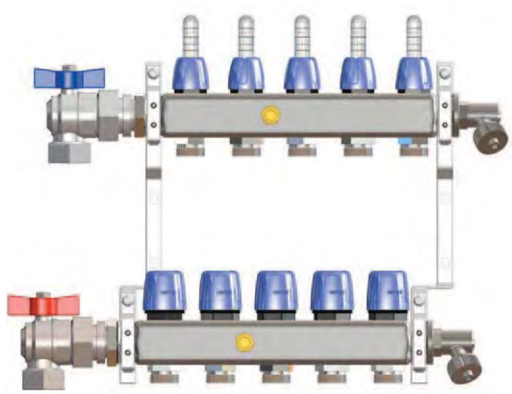
## FINISH MANIFOLD

The finish manifold consists of a supply and a return header. The supply body is equipped with a balancing valve and flowmeter, and the return body is equipped with an on/off valve. A plastic knob comes standard on the on/off valve for manual control and can be removed to accommodate a valve actuator for electronic zone control. If you are using the finish manifold on the jobsite for pressure testing, take appropriate measures to protect the manifold from jobsite damage, dust, and/or paint etc. Make sure installation looks professional and neat. It is a good idea to have the manifold already prepared and ready for mounting prior to arriving at the jobsite. This includes mounting the pressure test kit on the manifold. For the finish manifold, the lower manifold ports should be at least 12"–18" off the floor to make sure that you have enough tubing to work with. Use appropriate tools and fasteners to secure the manifold before starting the tubing installation.

Finish manifolds should be equipped with a fully sealing ball valve on the supply and return to allow servicing the manifold and tube without interrupting the pressure in the rest of the system.







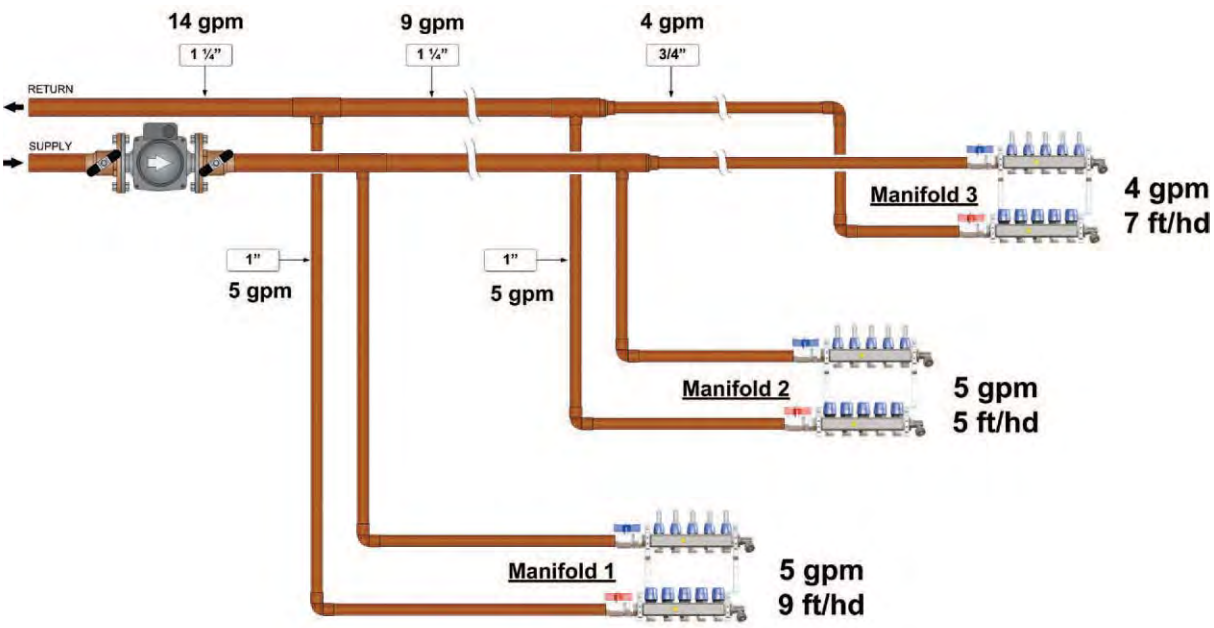
# INSTALLING MAINS

## ROUTING OF MAINS

There are two methods used to route the mains from the mechanical room to the manifold(s), Home Run or Branch and Tee. The decision of which to use depend on a couple of things. If the manifolds are zoned using zone valves or zone pumps, the Home Run method seems to work best since the zone valve and pumps are typically located in the mechanical room. This method does however utilize more piping for mains. If the manifolds are zoned using actuators, you can use either method. In either method, make sure to size the mains and pump to accommodate the flow for all the manifolds served by that pump, then as you branch off and flow is reduced, you can down size as needed.

Fluid Velocities should be between 1.5 and 4 feet per second for mains 1/2" through 2", and between 1.5 and 5 feet per second for mains 2.5" and larger.

| GENERAL GUIDELINES | |
|---|---|
| GPM | MAIN SIZE |
| 0–4 | 3/4" |
| 4–8 | 1" |
| 8–14 | 1.25" |
| 14–25 | 1.5" |
| 25–45 | 2" |




*Example of zoned loops (Branch System)*

MrPEX SYSTEMS



# HEAT SOURCES

The heating source should be part of the design prescribed be the engineer or project manager that best fits the design parameters. Supply temperature exiting the heat source should not exceed the maximum supply temperature required by the floor panel unless tempered by a water temperature control device that insures that the maximum floor supply temperature will not be exceeded. Maximum supply water temperatures allowed for concrete is 150°F and for gypsum poured underlayment is 140°F.

*DISCLAIMER: Manufacturers installation and operation instructions and local codes must be followed. MrPEX® does not take responsibility for heat source warranty or performance. System designer is responsible for sizing the heat source to meet actual demand.*

## Boiler Specifications

- The system designer should consult with the boiler manufacturer or supplier on the type of piping, operating fluid temperatures, and flow conditions appropriate for the application of the boiler in radiant panel or combination systems.
- Where the boiler manufacturer specifies a minimum return water temperature, flow rate and temperature rise, the designer will ensure the system arrangement and control method will automatically allow the system to operate at or above the manufacturer minimums for every normal operating cycle.

## Boiler Output

- The boiler net output should be within 100% to 120% of the actual heat loss unless design factors, pipe losses or boiler ratings require exceeding this range.
- Additional output capacity should be allowed when other heating demands such as domestic water priority systems, hot-tub, swimming pool, snow-melting, etc. are serviced from the same source.
- Future system expansion should be considered.

## Condensing Boilers

- A condensing boiler, in which the heat exchanger and venting system is specifically designed to operate with condensing flue gases, can be connected directly to the panel heating system without any type of boiler protection mixing device.
- These boilers should be operated at lowest possible temperature in order to maximize their efficiency.
- Consult with boiler manufacturer for any specific installation or application instructions.

## Non-Condensing Boilers

- A non-condensing boiler, in which neither the heat exchanger nor the venting system is designed to handle condensed flue gases, must be properly protected from flue gas condensation.
- Non-condensing boilers should not have an operating temperature below the minimum fluid temperature recommended by the manufacturer.
- In many cases an appropriate mixing arrangement may be required to ensure the flue gases do not condense throughout the full operating range of the system.
- Consult with boiler manufacturer for any specific installation or application instructions

## Dedicated Water Heaters

- Where permitted by code, a domestic water heater may be used as a heat source for hydronic radiant heating in a closed system providing all generally accepted piping practices for closed loop hydronic heating are used. This includes the use of a properly sized relief valve, expansion tank, fill valve, air eliminator and backflow preventer where required. The required temperature and pressure relief valve for the water heater must be installed regardless of whether a lower pressure relief valve is installed. Consult with water heater manufacturer and local codes for any specific installation instructions.

- The water heater net output should be within the range of 100% to 120% of the actual heat loss unless design factors, pipe losses or water heater ratings require exceeding this range.

- The dedicated water heater should be clearly and permanently marked "Not For Potable Water Use".

### Combination Of Potable Water And Hydronic Heating Systems

- At the present time, some combined systems are approved by the major code councils, and some are not. MrPEX® reminds its customers and installers that they must protect the potability of the domestic water supply while complying with all relevant codes. MrPEX® further suggests that homeowners/end users be informed of the advantages and disadvantages of each system currently available. Consult with water heater manufacturer and local codes for any specific installation instructions.

- Use of water heater for a combination of potable and hydronic systems should conform to one of the following methods:

  - Water heater and heat exchanger:

    - Hydronic radiant heating and domestic use water may be heated by the same water heater provided a heat exchanger is used to separate the domestic water from the closed side of the system used for the radiant panel system.

    - The closed radiant panel side of the system should utilize all generally accepted piping practices for closed loop hydronic heating. This includes the use of a properly sized expansion tank, pressure reducing valve, fill valve, air eliminator, pressure relief valve and backflow preventer where required.

    - Heat exchanger may be integral to the water heater or external and must meet applicable codes for the separation of potable water from other fluids.

  - A domestic water heater may be used as a heat source for both hydronic heating and domestic potable water in an open system when all the pipe, fittings and fixtures used within both the heating system and domestic system are suitable for potable water and pressure tested to regulatory limitations for each.

    - A control device should be installed on the radiant heating portion of the system to insure that the water will be periodically circulated through the heating system to avoid stagnation during the off-season. This circulation should be at least one complete water change every seven days.

- Additional requirements for use of a water heater in combined systems

  - No chemical additives to the system

  - No water heater should replace an existing boiler

  - Anti-scald valve should be provided for proper domestic water temperature on the potable side.

***Please refer to MrPEX® Design Manual for further information*

## PUMPS

The pump used should be a wet rotor circulator type for use in hydronic applications.

Delivering the correct BTU to the designated space is sole purpose of the pump. Verify that the designed pump is in conjunction with the design parameters, looking at the pressure drop of the system, along with the desired flow needed. Keeping in mind, the viscosity of anti-freeze that is being used.

There are two different pumps that are commonly used in installations. "Fixed speed" pumps are generally less expensive to purchase but cost more to operate and will only move a specific GPM depending on the amount off head loss/pressure drop. A "variable speed" pump has the ability to deliver different GPM with the same pump due to the fact that the speed can be changed depending on the systems parameters. Variable speed pumps use less energy to operate simply because the pump runs at a lower speed still delivering the proper amount of fluid.

*DISCLAIMER: Manufacturers installation and operation instructions must be followed. MrPEX® does not take responsibility for pump warranty or performance. System designer is responsible for sizing the pump to meet actual system requirements.*

## WIRING

› Thinking about how the system will be controlled and the type of zoning (if any), is a must, at the time of installing MrPEX® tubing.

› Refer to design to pull correct wire to proper location.

› MrPEX® recommends using a thermostat with a slab sensor (part #5110741). Use 18Gauge wire, 4 conductor for this thermostat, pulling wire from the thermostat to either the manifold if using actuators to zone or to the heating plant to turn on the heat source.

› MrPEX® air sensing thermostat (part #5110740), uses 18/4 wire, pulling to either the manifold if using actuators to zone or to the heating plant to turn on the heat source.

› If using a remote manifold, power must be located at the manifold, either a 24volt transformer, or an 18/4 wire pulled to this location from the heat source. The 18/4 wire will be used for 24volt power along with an end switch.

› If transformer is mounted at manifold location, pull 18/4 wire to heat source for end switch.

# FILLING/PURGING INSTRUCTIONS FOR CONVENTIONAL BOILER (UTILITY PUMP)

*Safety tip: Before beginning, turn off power to boiler and circulator.*

## FILLING AND PURGING LOOPS THROUGH MANIFOLD

**STEP 1** Close Manifold Isolation Ball Valves (#10) and (#12).

**STEP 2** Open all the manifold flow meter valves (#11) by turning counter-clockwise.

**STEP 3** Close all manifold valves (#13) except for the first loop by turning the plastic knob clockwise. Leave it wide open.

**STEP 4** Connect a garden hose (#15) to the drain valve on the return manifold end cap (#14) and put the open end in a 5 gallon bucket. Place bucket over a drain or outside. Turn the cap over and use it to open the drain valve on the end cap valve fully.

**STEP 5** Connect a double ended female washing machine hose (#17a) to the drain valve on the supply manifold end cap (#14a) and connect it to the outlet side of the utility pump (#16). Connect a garden hose or washing machine hose (#15) to the inlet side of the utility pump and put the open end in the 5 gallon bucket.

**STEP 6** Fill bucket 3/4 full with distilled or RO (Reverse Osmosis) water. Have enough additional water ready to keep filling the bucket as it fills the system.

**STEP 7** Turn over the cap for the supply manifold end cap (14a), and use it to open the drain valve fully. Turn on the utility pump and start filling the first loop on the manifold.

**STEP 8** Water will start filling the first open loop and empty into the bucket. Let the water run until ALL air is purged from that loop. Monitor water for air bubbles in the 5 gallon bucket. This is a good indicator that the system is free of air. Close the on/off valve (#13) and repeat this process for each loop on the manifold. Add more water to the bucket as needed.

**STEP 9** Repeat step 8 a second time. Leave all on/off valves (#13) closed for now. Close first return manifold end cap drain valve (#14), then the supply manifold end cap drain valve (#14a). Shut off the utility pump. Loops are now filled and purged.

## FILLING AND PURGING THE REST OF THE SYSTEM

**STEP 10** Remove the double ended washing machine hose (#17a) from supply manifold end cap drain valve (#14a) and connect it to Boiler Drain (#19).

**STEP 11** Open Return Manifold Isolation Ball Valve (#12), and Ball Valves (#3) on supply and return side of the boiler.

**STEP 12** Manually set Mixing Valve (#9) in a mid-position so that it allows water to flow through all ports.

**STEP 13** Loosen cap on air eliminator (#6). *filling*

**STEP 14** Start the utility pump and slowly open Boiler drain (#19) to fill the boiler and the rest of the system. *NOTE: Do NOT exceed 30 psi. Full water pressure may damage the expansion tank or force open the pressure relief valve. A second person may be needed to monitor pressure while filling.*

**STEP 15** Water will start filling the boiler, boiler piping, and return piping and empty into the bucket. Let the water run until ALL air is purged from that loop. Monitor water for air bubbles in the 5 gallon bucket. This is a good indicator that the system is free of air. Add more water into the bucket as needed.

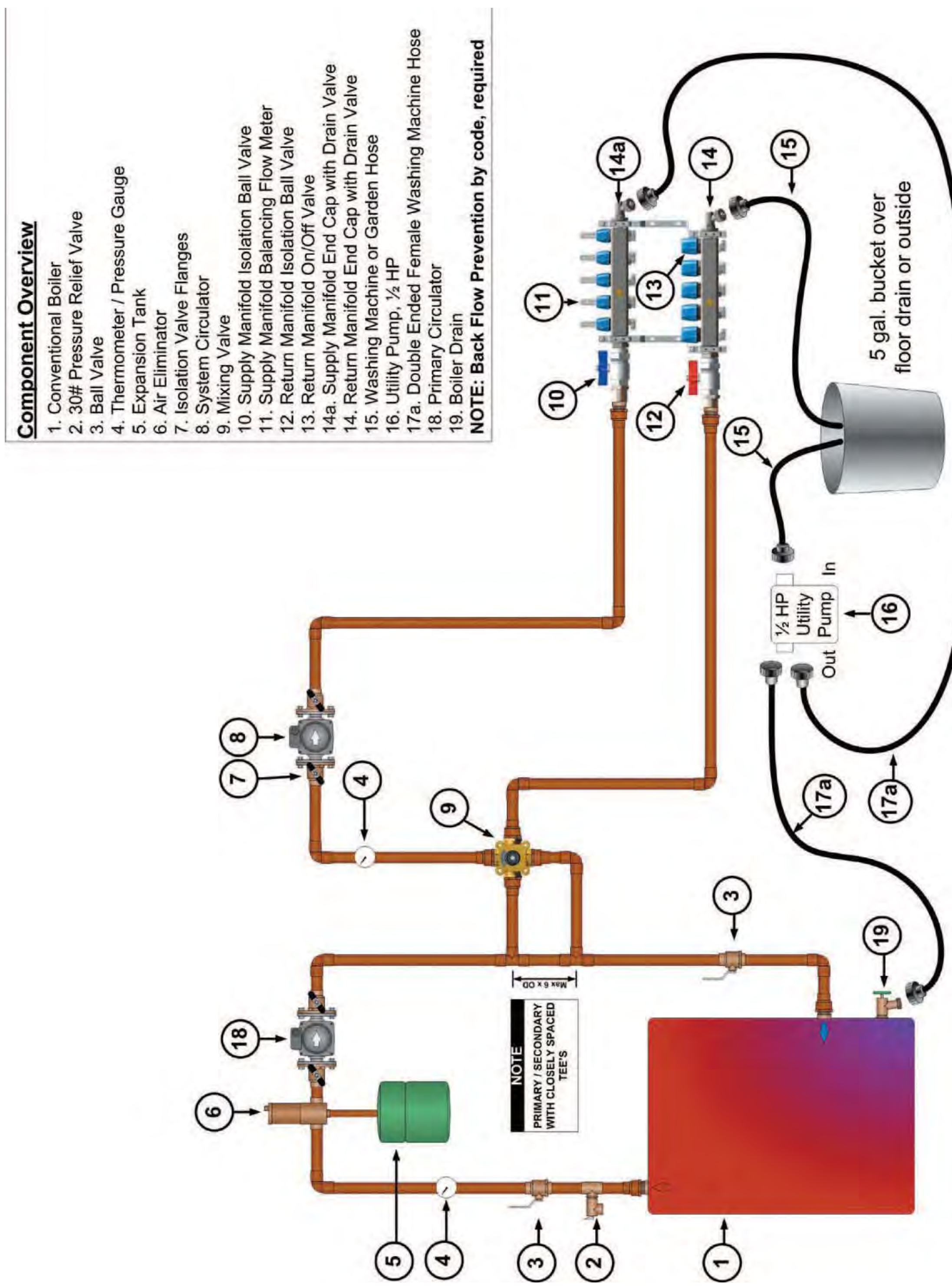
**STEP 16** Close return manifold isolation ball valve (#12). Open all manifold on/off valves (#13) and supply manifold isolation ball valve (#10). Again, let the water run in bucket until all the air bubbles are gone.

*continued on* ***next page***

**STEP 17** Slowly close the drain valve (#14) and monitor the system pressure. Close Boiler Drain (#19) when system pressure reaches about 12–18 psi.

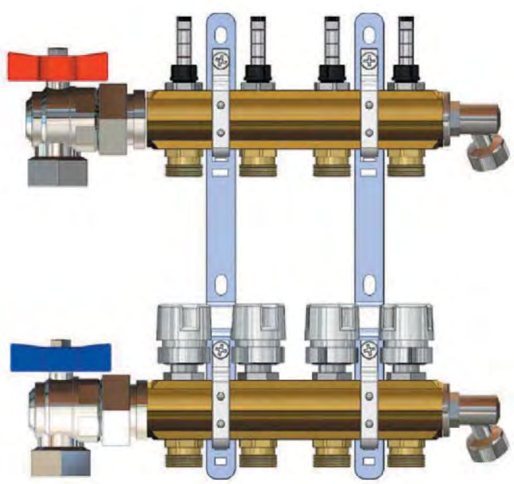
**STEP 18** Open return manifold isolation ball valve (#12).

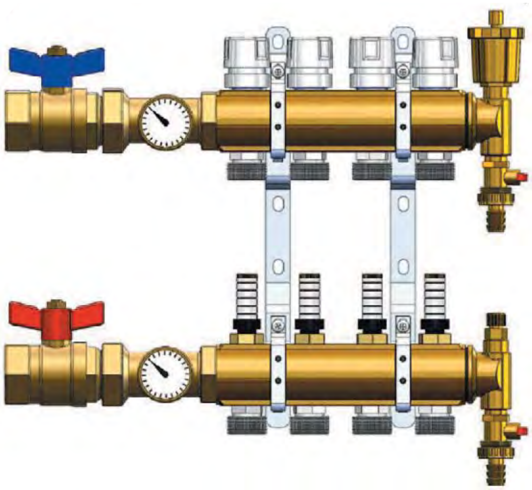
**STEP 19** System is now ready for start-up. Turn power on for the circulator (#8) and (#18) and let run for about one hour before turning firing the boiler. Monitor the pressure. During this phase additional air may be vented from the system, lowering the system pressure. Add water with utility pump through Boiler Drain (#19) to maintain 12–20 psi. If zoning system is not yet connected, have the electrician make a temporary hook up to power the pumps.

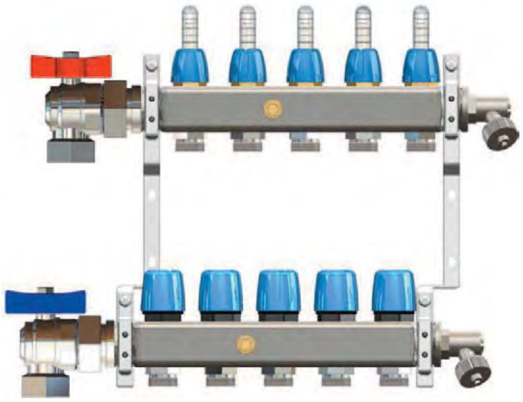


# BALANCING THE MANIFOLDS

Balancing the manifold is the key to having the right heat delivered to the correct loop, zone, or room. The manifold is the distribution point where all the loops connect. Depending on design requirements, each loop will cover a specific area, and subsequently, its length and heat demand will be different from that of the other loops on the manifold. To meet the heat demand of a particular loop, first, flow needs to be established, then, the pressure drop of the worst loop so that a pump can be selected. The pump is sized to deliver the correct flow to the manifold. However, that's not the end of it. Water will travel the path of least resistance. A longer loop will have a higher pressure drop compared to a shorter loop, so, given the opportunity, the water will try to go the path of least resistance, through the short loop. This results in too much flow through the short loops (potentially over-heating), and too little flow (never satisfying the thermostat) in the long loops. Balancing takes in account the heat demand (flow) needed and the pressure drop, and diverts the flow to accurately give all the loops their required amount. All Mr PEX® Manifolds have loop flow meters available. Use the Mr PEX® Design Software to complete the design, each manifold and loop will have a target design flow and pressure drop. The manifold info is used for pump sizing (see Pump Sizing Section) and the loop flow for balancing the loops by dialing in the correct flow on the flow meters.







# REPAIRING DAMAGED PEX

## REPAIRING A KINK (PEX ONLY)

*Note: When repairing a kink in a Pex-al-Pex tubing follow step 3 only!*

Although MrPEX® Tubing is the most flexible and kink-resistant tubing on the market, it may still happen that a kink could occur. PEX-a (peroxide cross-linked PEX) has the very important property of being extremely crack-resistant, so that the kink will not result in a crack. This property results in a couple of "extra" options to repair kinks:

If the kink is not very accentuated, just rounding the tubing carefully with a pair of smooth pliers is acceptable. However, if the kink is in a place where there has to be a bend, there could be a risk that the kink re-develops. If so, measures have to be taken in order to prevent this from happening. One option is to apply a bend support in such a way that the kink gets firm support.

A kink will disappear if the kinked section of the tubing is heated to a temperature above the material's crystalline melting point, 270°F. This temperature can be reached with a thermostat controlled hot air gun. It is quite important that the hot air reaching the tubing surface does not exceed 330°F. Please check with a thermometer. First, relieve the tension on the kink by straightening the tubing. Carefully heat the tubing while continuously turning the hot air gun, allowing all sides of the kinked tubing section receive the same heat. The tubing wall will turn transparent in 2–4 minutes. When turning transparent, the kink will disappear. Stop heating and let the tubing cool down to room temperature, untouched, before continuing the installation. Applying cool water will speed up the cooling. The Tubing wall will turn opaque again. The very thin barrier layers may be slightly damaged during this process, but the core of the PEX Tubing will be fine. Local damage to the barrier layers will not affect the integrity of the installation. You may notice a very slight expansion of the heated section. That is because of the slight dimensional calibration performed during manufacturing will disappear, and that is okay. Never use a torch to heat the tubing! Overheating the tubing can lead to thermal degradation, which means that the life expectancy is compromised.

The third method to repair a kink is the "conventional repair method". See following pages 60–66 for instruction on specific coupling style used.

# PEX COMPRESSION REPAIR COUPLING

## Making the repair:

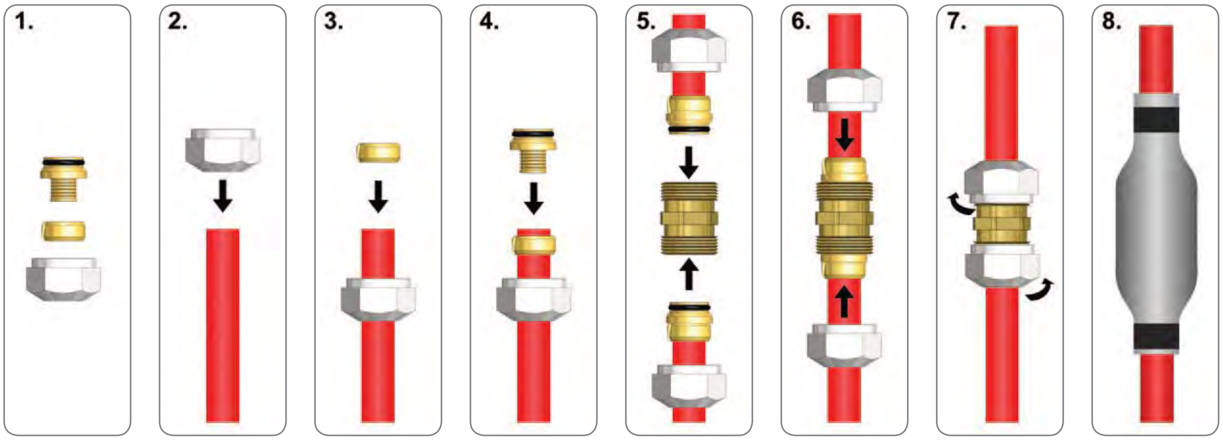
**STEP 1** Start by cutting out the damaged piece of PEX, make sure the cut is square using a suitable tubing cutter.

**STEP 2–3** After cutting the tubing, slide the nut then the compression ring onto each tubing end.

**STEP 4** Push the inserts into the tubing until it stops.

**STEP 5–7** Using a coupling nipple, connect each tubing end onto the nipple making sure not to damage the o-ring. Tighten the compression nuts using two suitable wrenches. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 8** Wrap coupling with suitable material such as foam insulation if coupling is to be buried to making sure the fitting is not in direct contact with the ground or concrete.



# PEX F1807 PRESS BRASS REPAIR COUPLING

*Note: This coupling method is considered a manufactured fitting and is approved by MrPEX® to be used to repair the MrPEX® PEX Tubing.*

## Making the repair:

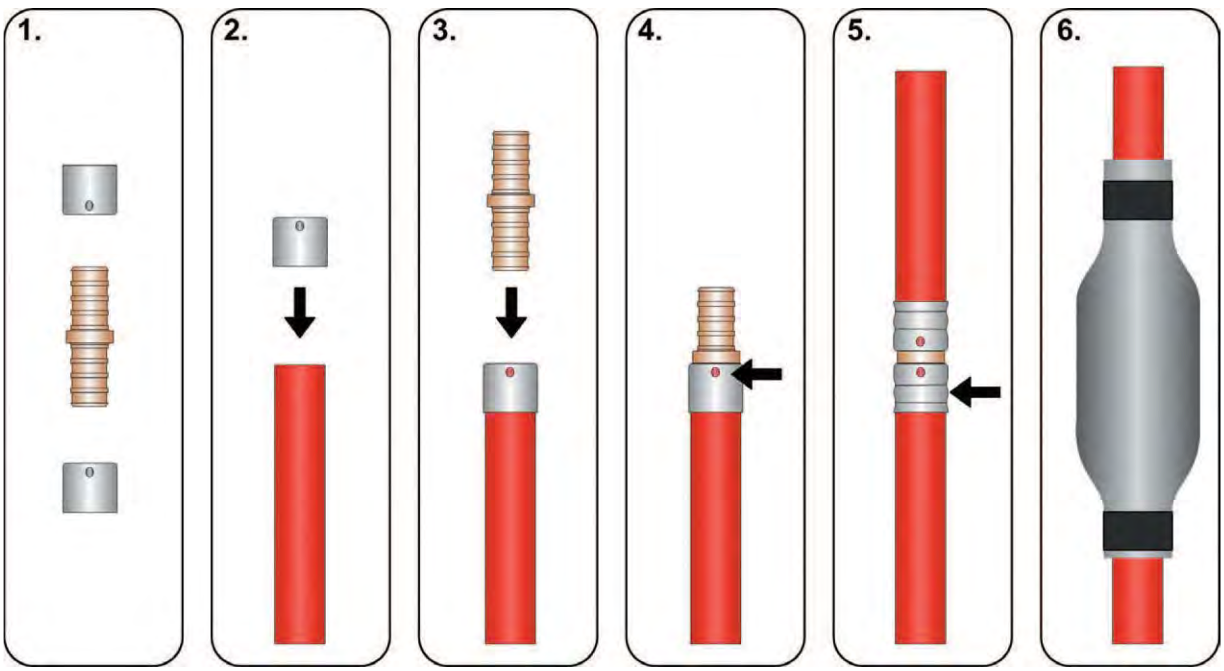
**STEP 1** Start by making a square cut at the end of the tube using a suitable tubing cutter.

**STEP 2** After cutting the tubing, slide the stainless steel press sleeve onto the tubing, making sure it seats all the way at the bottom. Tubing should be visible in the witness hole at the bottom of the press sleeve.

**STEP 3** Push the tubing and sleeve onto the fitting until it stops.

**STEP 4** Using either a manual or battery press tool, complete the fitting. Making sure that the press jaw is up against the shoulder of the fitting. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 5** Wrap coupling with suitable material such as foam insulation if coupling is to be buried to making sure the fitting is not in direct contact with the ground or concrete.



# PEX PRESS F2159 PPSU REPAIR COUPLING

*Note:This coupling method is considered a manufactured fitting and is approved by MrPEX® to be used to repair the MrPEX® PEX Tubing.*

## MAKING THE REPAIR:

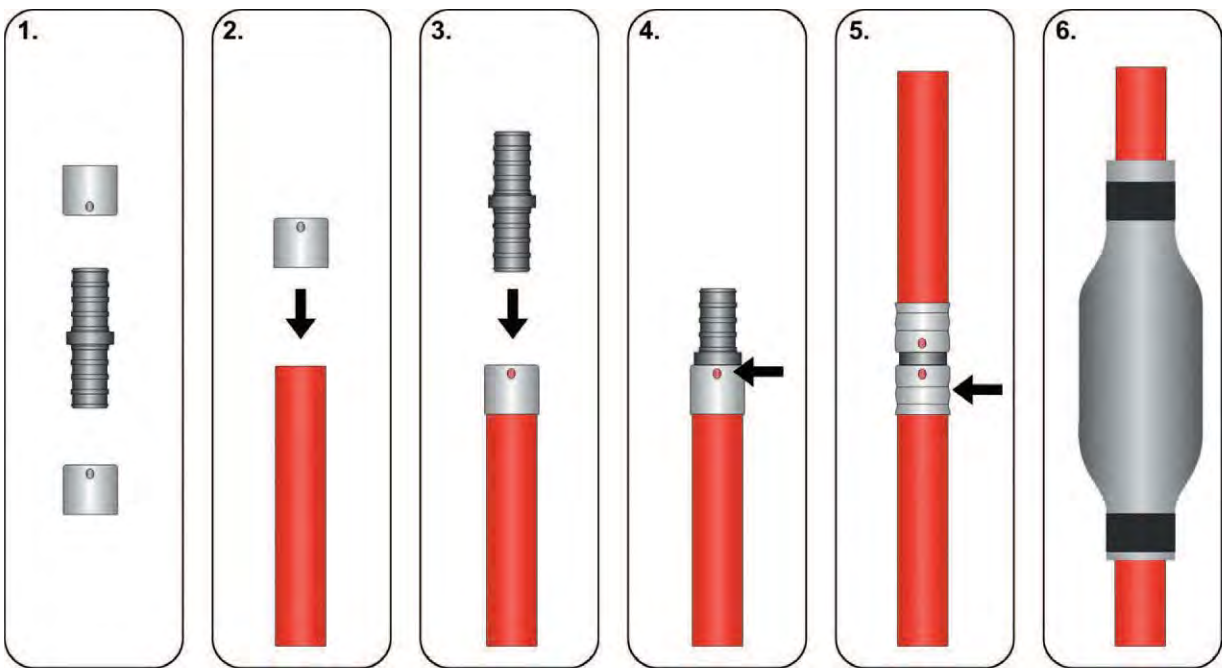
**STEP 1** Start by making a square cut at the end of the tube using a suitable tubing cutter.

**STEP 2** After cutting the tubing, slide the stainless steel press sleeve onto the tubing, making sure it seats all the way at the bottom. Tubing should be visible in the witness hole at the bottom of the press sleeve.

**STEP 3** Push the tubing and sleeve onto the fitting until it stops.

**STEP 4** Using either a manual or battery press tool, complete the fitting. Making sure that the press jaw is up against the shoulder of the fitting. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 5** Wrap coupling with suitable material such as foam insulation if coupling is to be buried to making sure the fitting is not in direct contact with the ground or concrete.



# PEX F2080 AXIAL PRESS BRASS COUPLING

*Note: This coupling method is considered a manufactured fitting and is approved by MrPEX® to be used to repair the MrPEX® PEX Tubing. Make sure to follow tool instructions.*

## MAKING THE REPAIR:

**STEP 1** Start by making a square cut at the end of the tube using a suitable tubing cutter.

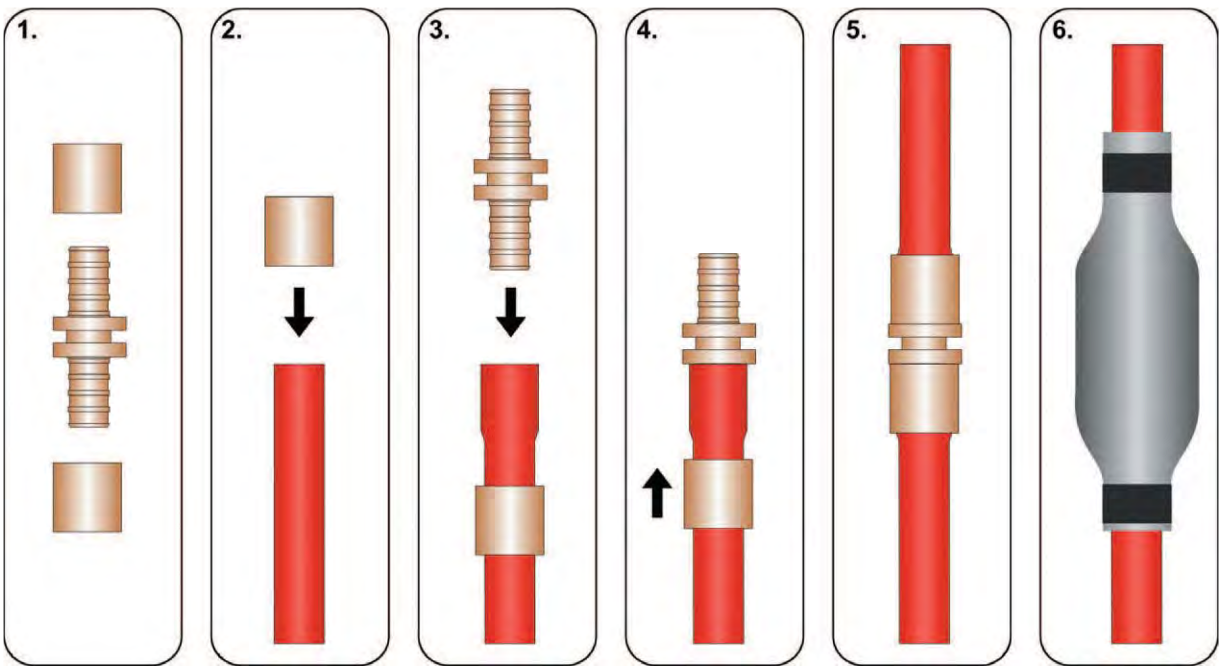
**STEP 2** After cutting the tubing, slide the brass press sleeve onto the tubing. Using the blunt expander tool, expand the end of the tubing.

**STEP 3** With the tubing expanded, push the fitting into the tubing until it stops.

**STEP 4** Then using the ratchet tool, slide the brass sleeve up onto the fitting.

**STEP 5** Secure the tubing until the sleeve seat against the brass shoulder. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 6** Wrap coupling with suitable material such as foam insulation if coupling is to be buried to making sure the fitting is not in direct contact with the ground or concrete.



# PEX F1960 COLD EXPANSION COUPLING

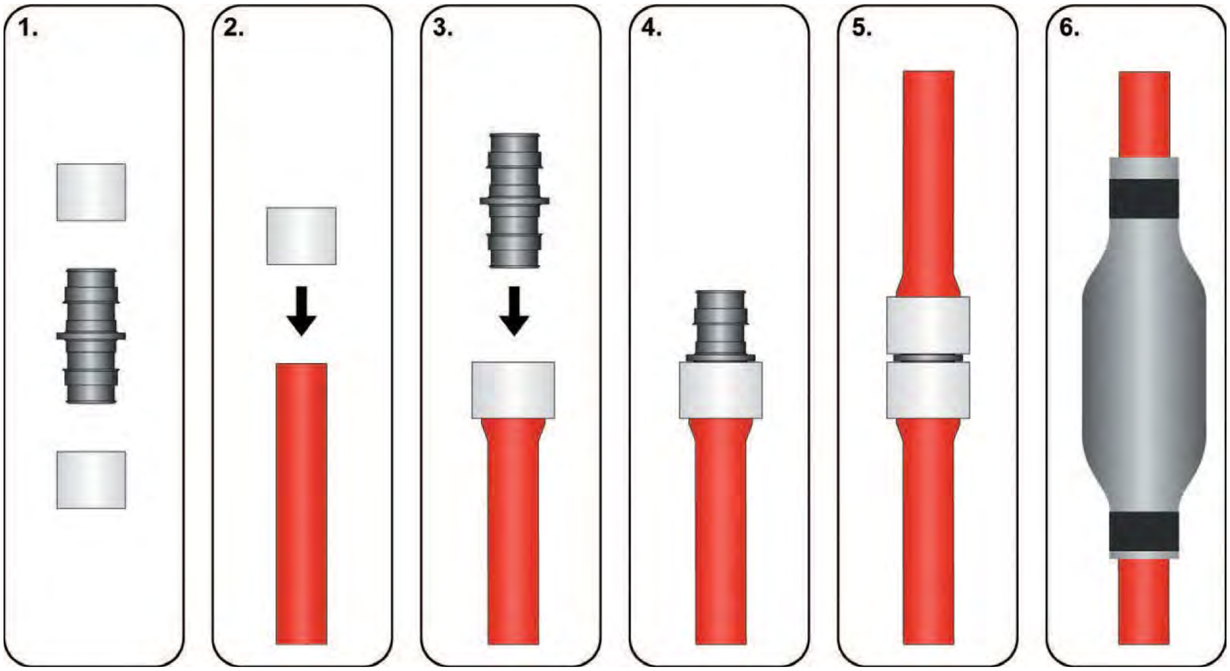
*Note: This coupling method is considered a manufactured fitting and is approved by MrPEX® to be used to repair the MrPEX® PEX Tubing. Make sure to follow tool instructions.*

## MAKING THE REPAIR:

**STEP 1–2** Start by making a square cut at the end of the tube using a suitable tubing cutter. After cutting the tubing, slide the PEX ring onto the tubing leaving about 1/16" over hang, or if the ring has a stop slide it until it stops. Using the expander tool, expand the tubing and ring as per instructions. Rotate tool ¼ turn

**STEP 3–5** With the tubing and ring expanded, push the fitting into the tubing until it stops. Timing is critical since the tubing and ring wants to retract right away. If the fittings is not seated all the way, the fitting needs to be redone. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 6** Wrap coupling with suitable material such as foam insulation if coupling is to be buried.



# PEX-AL-PEX PRESS COUPLING REPAIR

*Note: This coupling method is considered a manufactured fitting and is approved by MrPEX® to be used to repair the MrPEX® Pex-Al-Pex Tubing.*

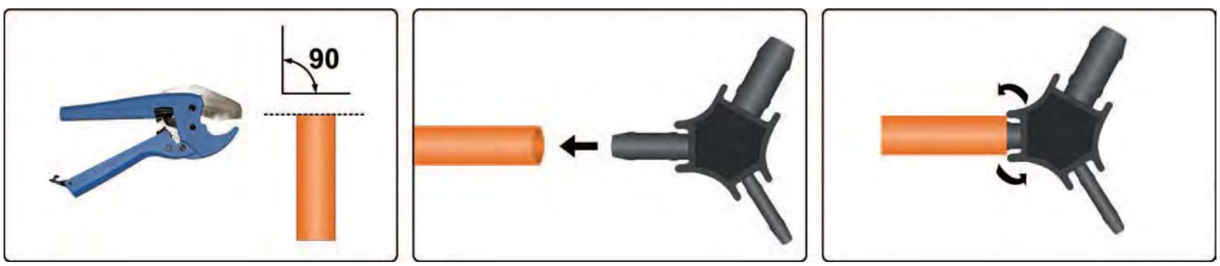
## MAKING THE REPAIR:

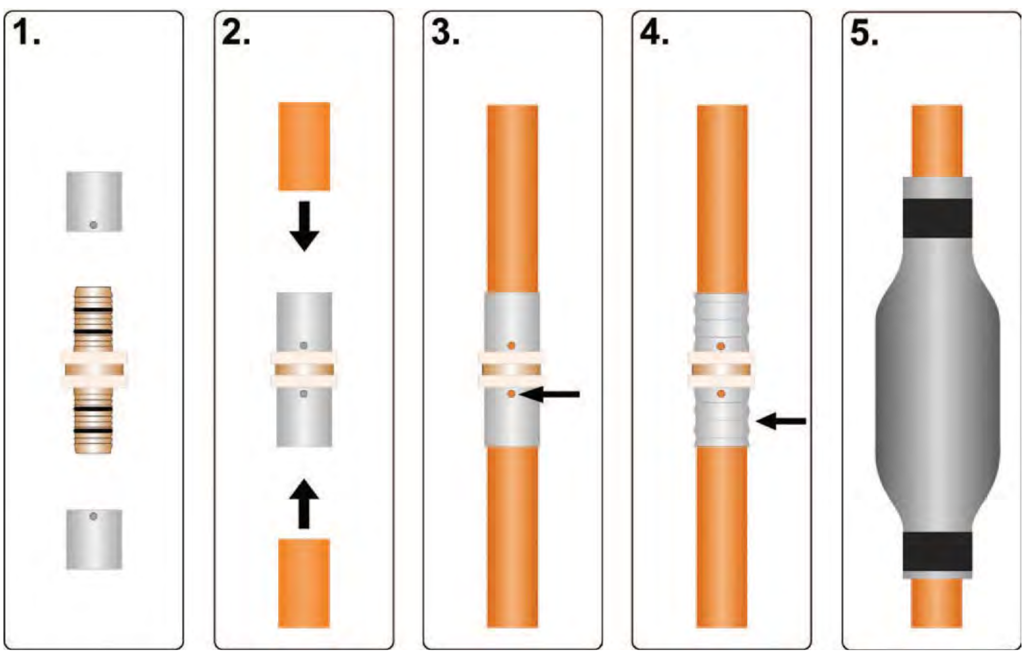
**STEP 1** Start by making a square cut at the end of the tube using a suitable tubing cutter. If PEX-AL-PEX tubing is used, also ream the tubing using our reaming tool.

**STEP 2** After reaming the tubing, push the tubing into the fitting making sure that the tubing seat all the way at the bottom. Tubing should be visible in the witness hole at the bottom of the press sleeve.
CAUTION: THE FITTING HAS 2 O-RINGS TO ENSURE TIGHNESS. IF TUBING IS NOT REAMED/CHAMFERED, IT COULD CUT THE O-RING AND RESULT IN A LEAK.

**STEP 3** Using either a manual or battery press tool, complete the fitting. Making sure that the press jaw is up against the shoulder of the fitting. Make sure to perform a pressure test prior to covering or burying the coupling.

**STEP 4** Wrap coupling with suitable material such as foam insulation if tubing is to be buried making sure the fitting is not in direct contact with the ground or concrete.



# APPENDIX

## COMPARATIVE R-VALUES OF FLOORING AND SUBFLOORS

| MATERIAL | MATERIAL | MATERIAL | MATERIAL |
|---|---|---|---|
| Plywood | 1.1 | 3/4" | 0.825 |
| OSB | 1.4 | 3/4" | 1.05 |
| Softwood | 1.1 | 3/4" | 0.825 |
| Sheet Vinyl | 1.6 | 1/8" | 0.2 |
| Vinyl Composition Tile (VCT) | 1.6 | 1/8" | 0.2 |
| Linoleum | 1.6 | 1/4" | 0.4 |
| Linoleum | 1.6 | 1/8" | 0.2 |
| Dense Rubber Flooring | 1.3 | 21/64" | 0.25 |
| Recycled Rubber Flooring | 2.2 | 1/2" | 1.1 |
| Cork | 3 | 3/8" | 1.125 |
| Cork / MDF / Laminate | 2.35 | 1/2" | 1.175 |
| Brick | 2.25 | 1 1/2" | 3.375 |
| Marble | 0.8 | 1/2" | 0.4 |
| Ceramic Tile | 1 | 1/4" | 0.25 |
| Thinset Mortar | 0.4 | 1/8" | 0.05 |
| MDF / Plastic Laminate | 1 | 1/2" | 0.5 |
| Laminate Floor Pad | 1.92 | 5/32" | 0.3 |
| Engineered Wood | 1 | 1/4" | 0.25 |
| Engineered Wood | 1 | 3/8" | 0.375 |
| Engineered Wood | 1 | 5/8" | 0.625 |
| Engineered Wood | 1 | 3/4" | 0.75 |
| Engineered Wood Flooring Pad | 1.6 | 1/8" | 0.2 |
| Engineered Bamboo | 0.96 | 3/4" | 0.72 |
| Oak | 0.85 | 3/4" | 0.638 |
| Ash | 1 | 3/4" | 0.75 |
| Maple | 1 | 3/4" | 0.75 |
| Pine | 1.3 | 3/4" | 0.975 |
| Fir | 1.2 | 3/4" | 0.9 |
| Carpet Pad / Slab Rubber 33 lb. | 1.28 | 1/4" | 0.320 |
| Carpet Pad / Slab Rubber 33 lb. | 1.28 | 3/8" | 0.480 |
| Carpet Pad / Slab Rubber 33 lb. | 1.28 | 1/2" | 0.640 |
| Carpet Pad / Waffle Rubber 25 lb. | 2.48 | 1/4" | 0.620 |
| Carpet Pad / Waffle Rubber 25 lb. | 2.48 | 1/2" | 1.240 |
| Carpet Pad / Frothed Polyurethane 16 lb. | 3.53 | 1/8" | 0.530 |
| Carpet Pad / Frothed Polyurethane 12 lb. | 3.48 | 1/4" | 0.870 |
| Carpet Pad / Frothed Polyurethane 10 lb. | 3.22 | 3/8" | 1.200 |
| Carpet Pad / Frothed Polyurethane 10 lb. | 3.22 | 1/2" | 1.610 |
| Hair Jute | 3.88 | 1/2" | 1.940 |
| Hair Jute | 3.88 | 21/64" | 1.250 |
| Synthetic Fiber Pad 20 oz. | 1.80 | 15/64" | 0.421 |
| Synthetic Fiber Pad 27 oz. | 1.98 | 18/64" | 0.545 |
| Synthetic Fiber Pad 32 oz. | 2.10 | 19/64" | 0.630 |
| Synthetic Fiber Pad 40 oz. | 2.20 | 11/32" | 0.770 |
| Prime Urethane | 4.30 | 21/64" | 1.400 |
| Prime Urethane | 4.30 | 1/2" | 2.150 |

| MATERIAL | MATERIAL | MATERIAL | MATERIAL |
|---|---|---|---|
| Bonded Urethane | 4.20 | 21/64" | 1.350 |
| Bonded Urethane | 4.20 | 1/2" | 2.100 |
| Carpet | 2.80 | 1/4" | 0.700 |
| Carpet | 2.80 | 3/8" | 1.050 |
| Carpet | 2.80 | 1/2" | 1.400 |
| Carpet | 2.80 | 5/8" | 1.750 |
| Carpet | 2.80 | 3/4" | 2.100 |
| Wool Carpet | 4.20 | 3/8" | 1.575 |
| Wool Carpet | 4.20 | 1/2" | 2.100 |

## HEAT OUTPUT FORMULA

**BTU / H = 501 X GPM X ΔT**

*(GPM is the flow, and ΔT (delta-T) is the temperature drop over the loop, 501 is the weight of 1 gallon of water x 60 minutes in 1 hour)*

## GPM FLOW FORMULA

**GPM = BTU/H / ΔT / 501**

*(GPM is the flow, and ΔT (delta-T) is the temperature drop over the loop, 501 is the weight of 1 gallon of water x 60 minutes in 1 hour)*

## TO FIND AMOUNT OF TUBING REQUIRED TO COVER SQ.FT.

**MULTIPLY SQUARE FEET WITH MULTIPLIER**

| TUBE SPACING | MULTIPLIER |
|---|---|
| 6" | 2 |
| 8" | 1.5 |
| 9" | 1.33 |
| 12" | 1 |
| 18" | 0.67 |
| 24" | 0.5 |

## TO FIND AREA COVERED BY LOOP AT SPACING

**MULTIPLY LOOP LENGTH WITH MULTIPLIER**

| TUBE SPACING | MULTIPLIER |
|---|---|
| 6" | 0.5 |
| 8" | 0.67 |
| 9" | 0.75 |
| 12" | 1 |
| 18" | 1.5 |
| 24" | 2 |

## FLOOR SURFACE TEMPERATURE APPROXIMATION

**$T_{ROOM}$ + HEAT INTENSITY ÷ 2** *[HEAT INTENSITY EXPRESSED AS BTU / (H X SQ.FT)]*

- For snowmelt applications use 2.2 (Instead of 2) in above formula—at no wind.
- For snowmelt applications use 3.7 (Instead of 2) in above formula—at 10 mph official wind speed.
- For radiant ceiling, use 1.3 (Instead of 2) in above formula.

## DATA FOR TUBING / PIPES

| SIZE & TYPE | VOLUME | WEIGHT |
|---|---|---|
| 3/8" PEX | 0.497 gallons/100 ft. | 4.1 lbs/100 ft. |
| 1/2" PEX | 0.917 gallons/100 ft. | 5.3 lbs/100 ft. |
| 5/8" PEX | 1.392 gallons/100 ft. | 7.1 lbs/100 ft. |
| 3/4" PEX | 1.832 gallons/100 ft. | 10.2 lbs/100 ft. |
| 1" PEX | 3.067 gallons/100 ft. | 16.5 lbs/100 ft. |
| 1/2" Copper (Class M) | 1.32 gallons/100 ft. | 20.4 lbs/100 ft. |
| 3/4" Copper (Class M) | 2.690 gallons/100 ft. | 32.8 lbs/100 ft. |
| 1" Copper (Class M): | 4.540 gallons/100 ft. | 46.5 lbs/100 ft. |
| 1.25" Copper (Class M): | 6.810 gallons/100 ft. | 66.2 lbs/100 ft. |
| 1.5" Copper (Class M): | 9.510 gallons/100 ft. | 94.0 lbs/100 ft. |

## ASTM F876 PEX TUBING DIMENSION CHART

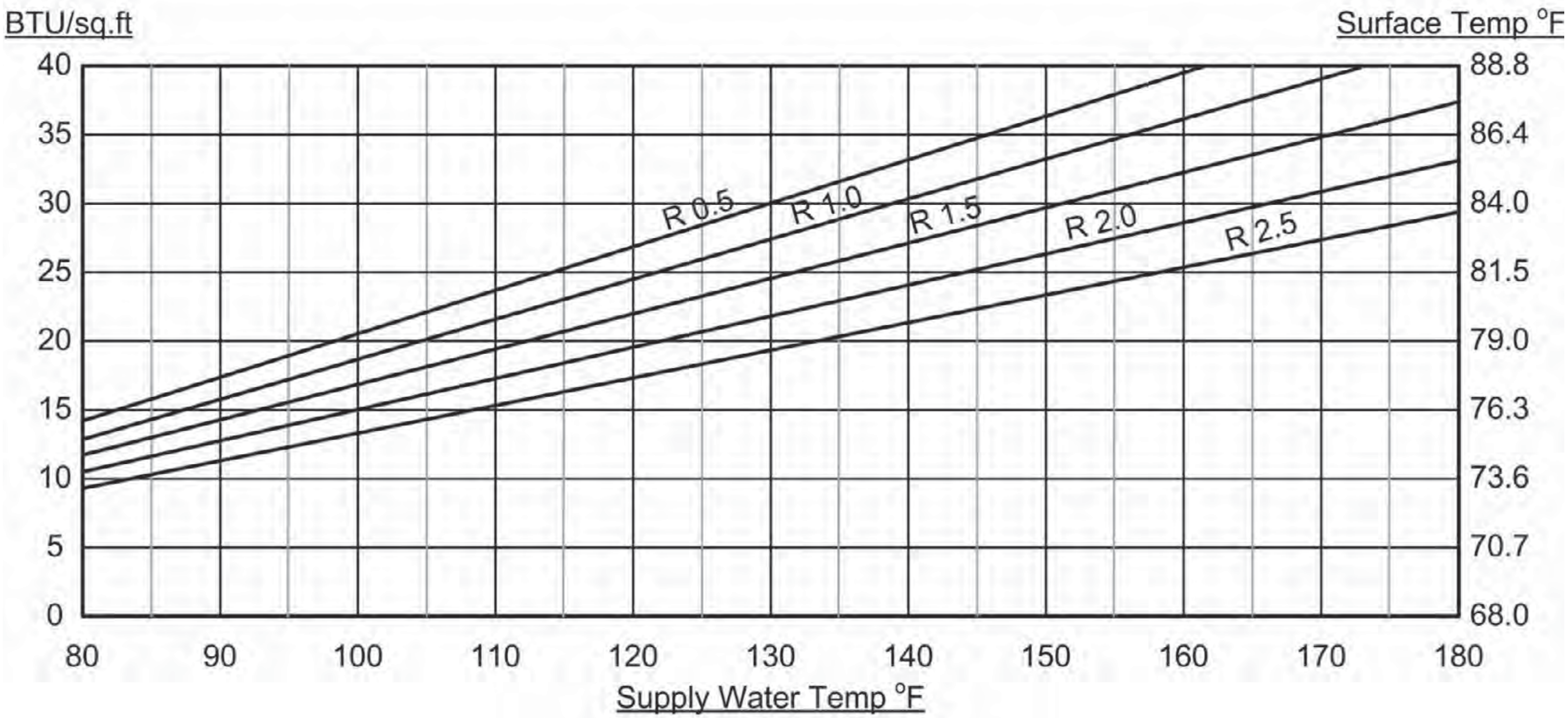
| | OD | WALL | ID |
|---|---|---|---|
| **3/8** | 0.500 | 0.070 | 0.360 |
| **1/2** | 0.625 | 0.070 | 0.485 |
| **5/8** | 0.750 | 0.083 | 0.584 |
| **3/4** | 0.875 | 0.097 | 0.681 |
| **1** | 1.125 | 0.125 | 0.875 |
| **1 1/4** | 1.375 | 0.153 | 1.069 |
| **1 1/2** | 1.625 | 0.181 | 1.263 |

## ASTM F1281 PEX-AL-PEX TUBING DIMENSION CHART

| | OD | WALL | ID |
|---|---|---|---|
| **1/2** | 0.630 | 0.065 | 0.500 |
| **5/8** | 0.787 | 0.075 | 0.637 |
| **3/4** | 0.984 | 0.089 | 0.806 |
| **1** | 1.260 | 0.118 | 1.024 |

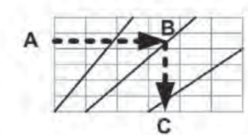
# HEAT OUTPUT CHARTS

## HEAT OUTPUT FOR RETROPANEL ON SUBFLOOR OR CONCRETE 8" O.C.




**Using the Chart:**

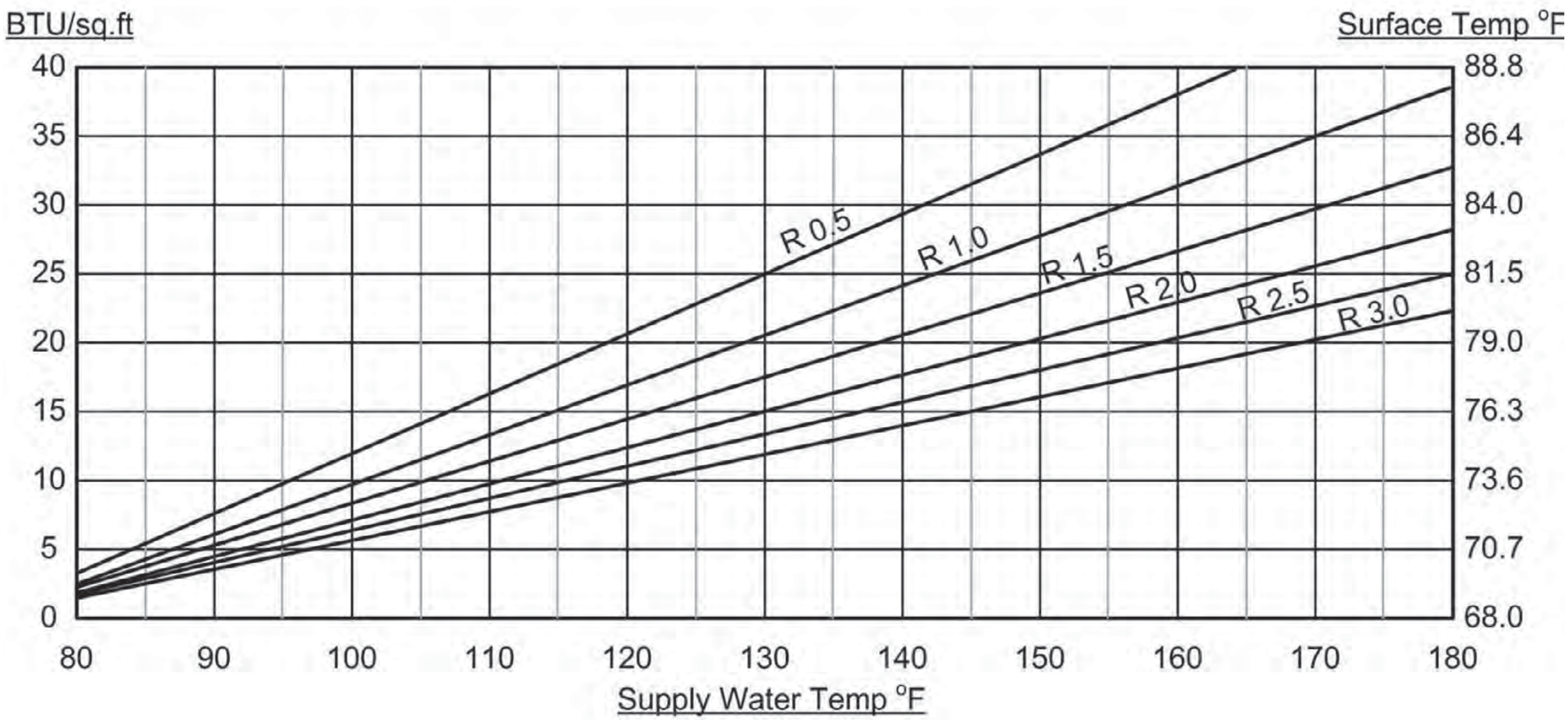
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

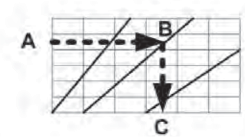
**CONSTRUCTION NOTE:** R-value represents all layers installed on top of RetroPanel. Verify heat loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below, and slab installations without insulation below, with highly conductive soil or high water table. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR HEAT TRANSFER PLATES BELOW SUBFLOOR 8" O.C.




**Using the Chart:**

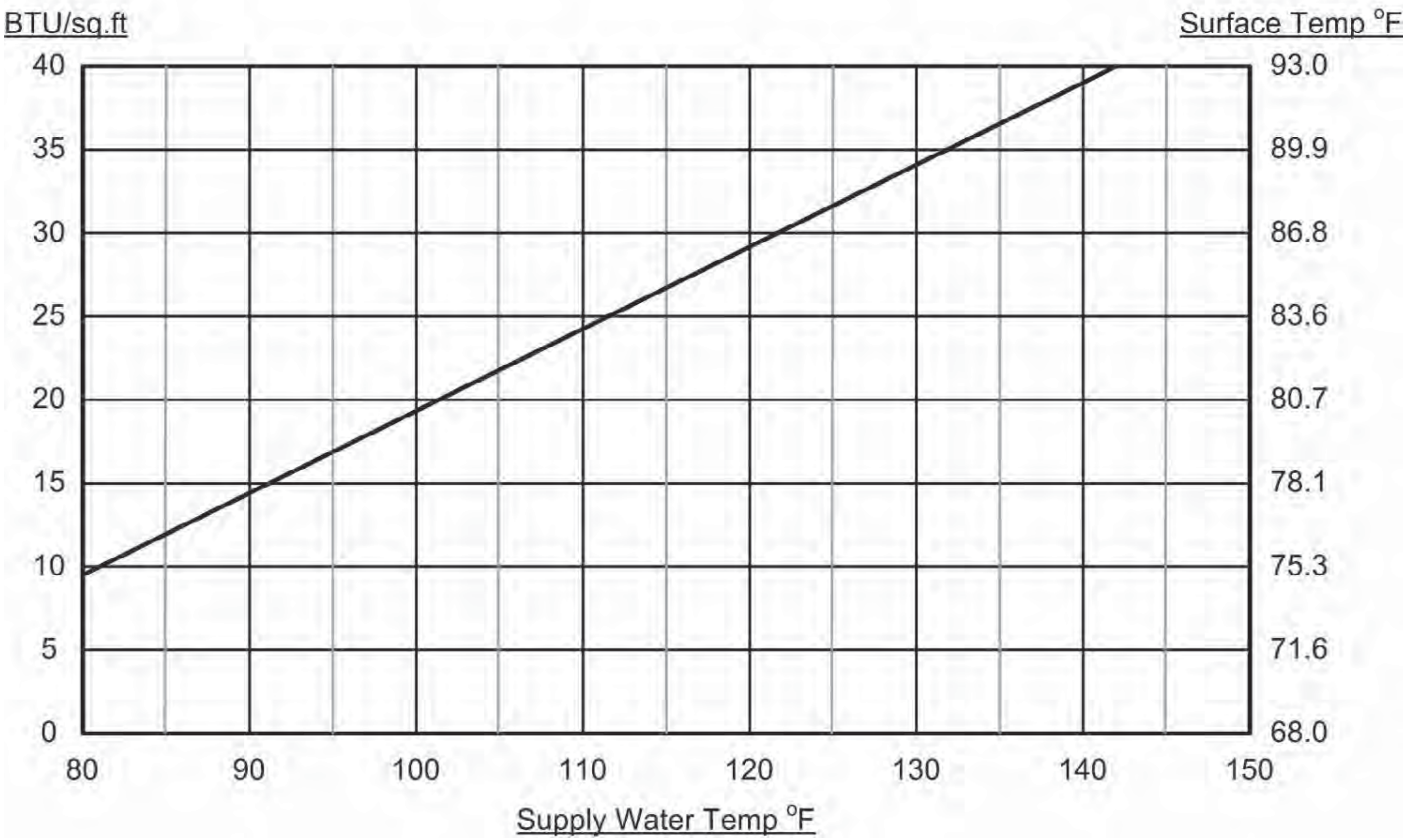
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68ºF room setpoint

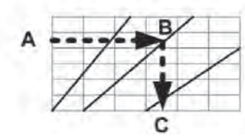
**CONSTRUCTION NOTE:** This chart assums a 3/4" subfloor and the R-values represents all layers installed on the top subfloor. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR RADIANT CEILING USING ALUMINUM HEAT TRANSFER PLATES 8" O.C.




**Using the Chart:**

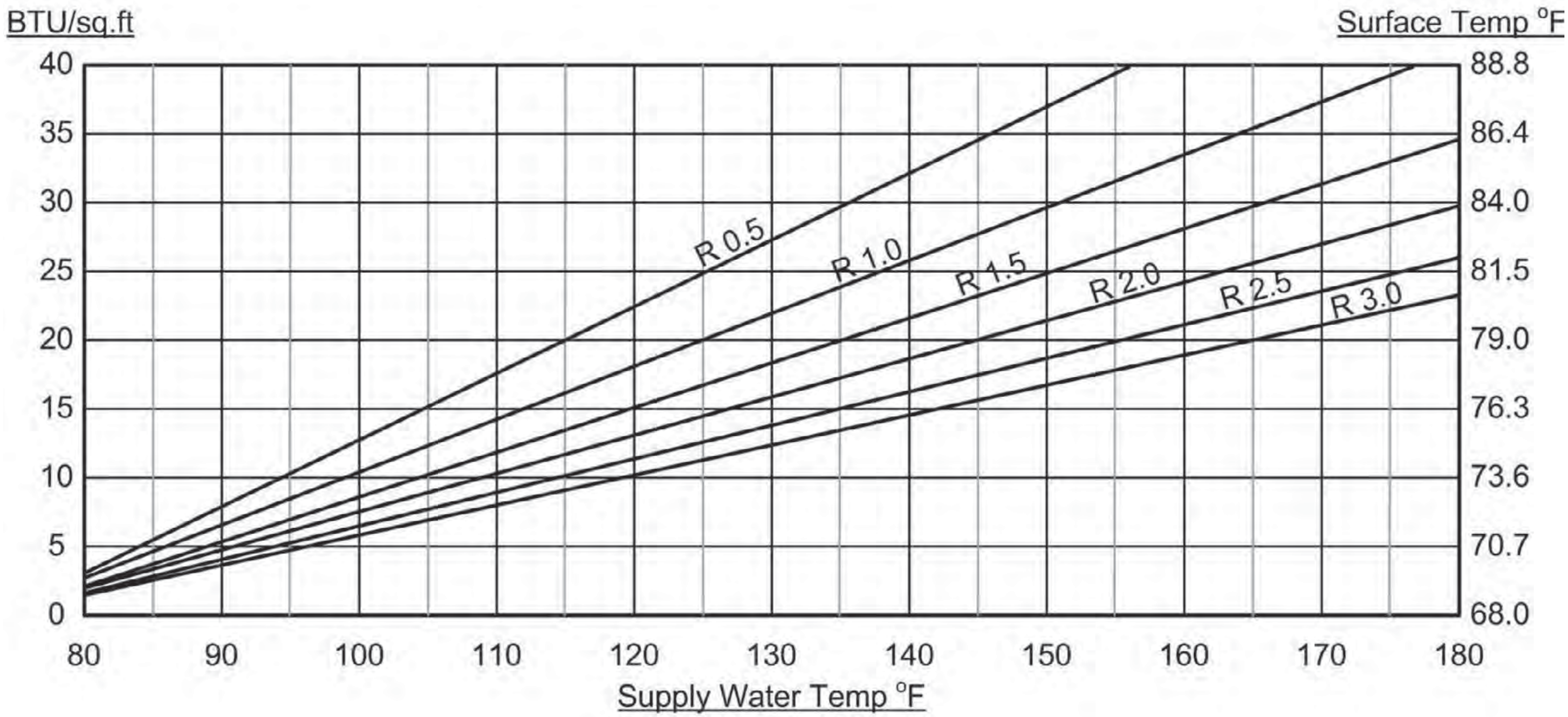
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

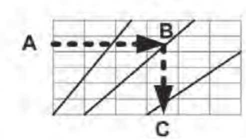
**CONSTRUCTION NOTE:** This chart assumes 5/8" sheetrock. Verify heat-loss and construction prior to installation. Performance may be greatly reduced with inadequate insulation above. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR ALUMINUM HEAT TRANSFER PLATES ON SUBFLOOR 8" O.C.




**Using the Chart:**

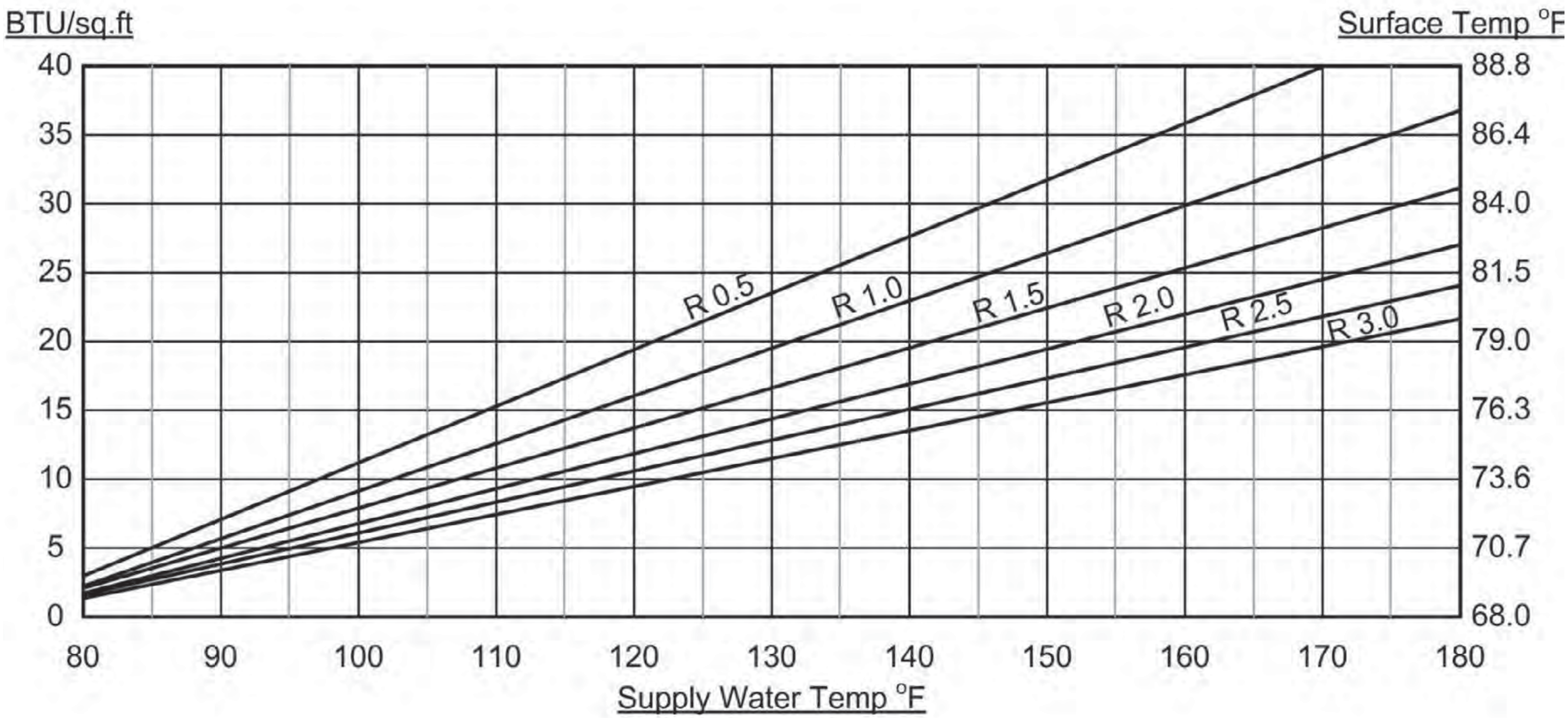
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

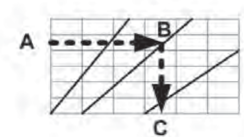
**CONSTRUCTION NOTE:** R-value represents all layers installed on top of the aluminum heat transfer plates. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR ALUMINUM HEAT TRANSFER PLATES BELOW SUBFLOOR 8" O.C.




**Using the Chart:**

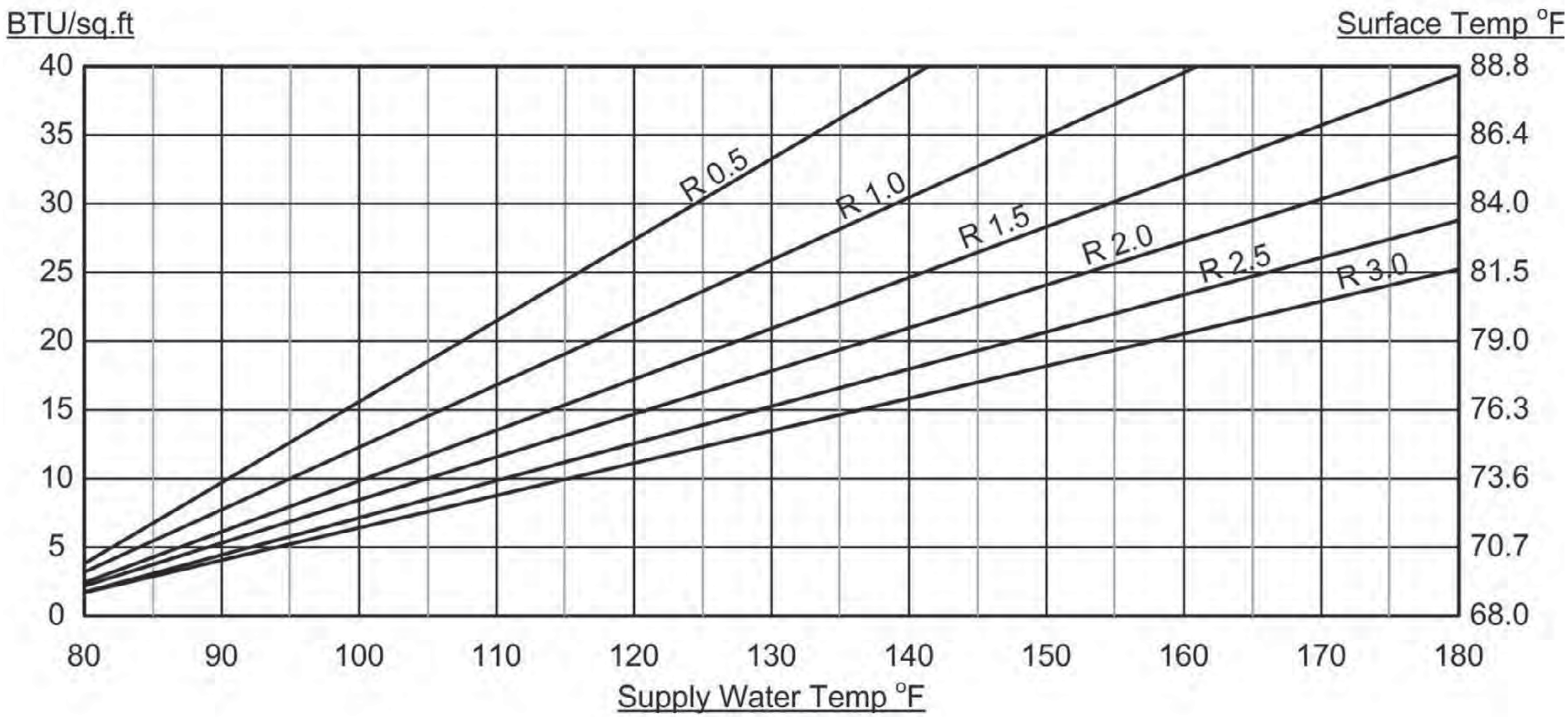
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

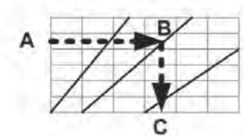
**CONSTRUCTION NOTE:** This chart assumes a 3/4" subfloor and the R-values represents all layers installed on top of subfloor. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SUSPENDED POURED UNDERLAYMENT 6" O.C.




**Using the Chart:**

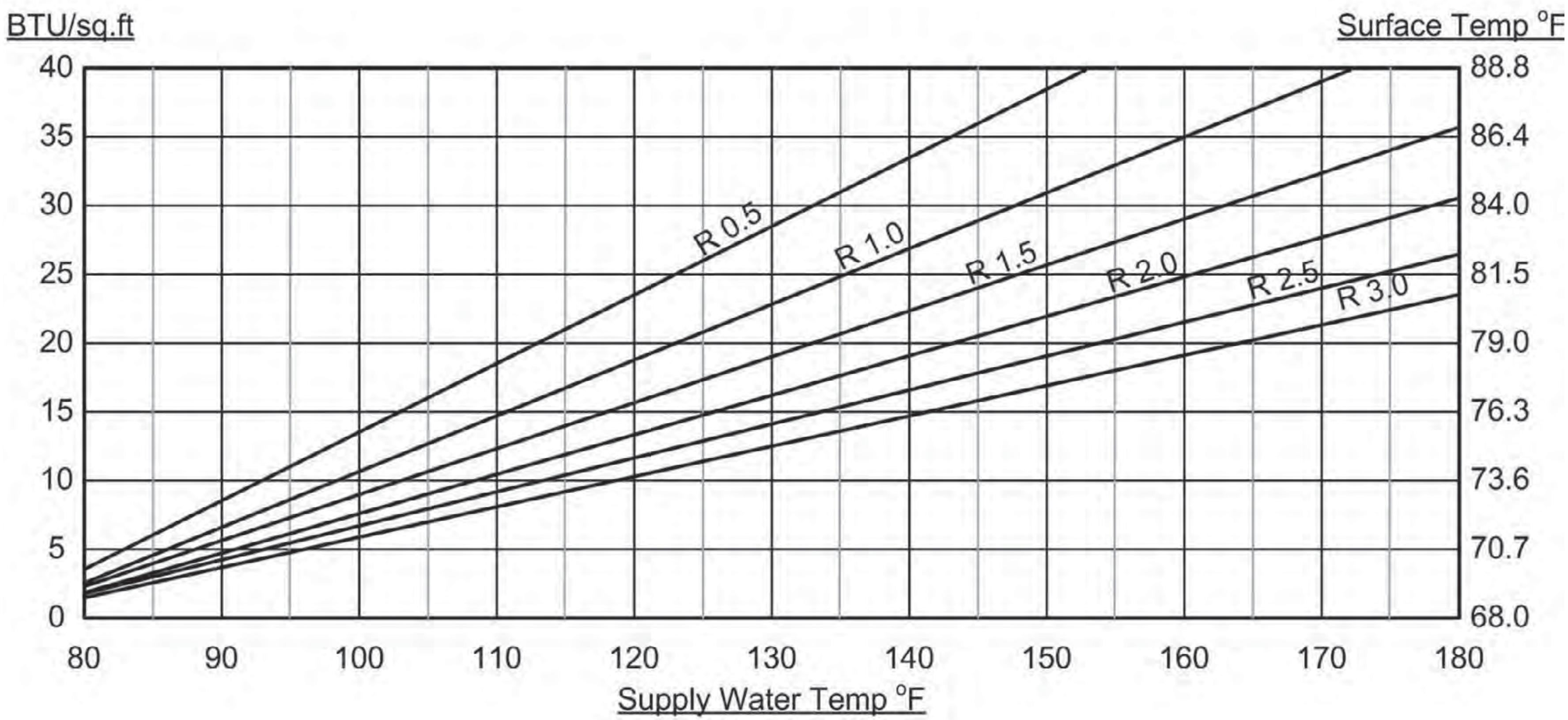
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

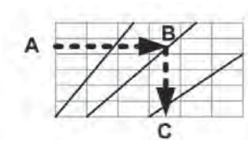
**CONSTRUCTION NOTE:** This chart assumes a 3/4" subfloor and the R-values represents all layers installed on top of the poured underlayment. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SUSPENDED POURED UNDERLAYMENT 9" O.C.




**Using the Chart:**

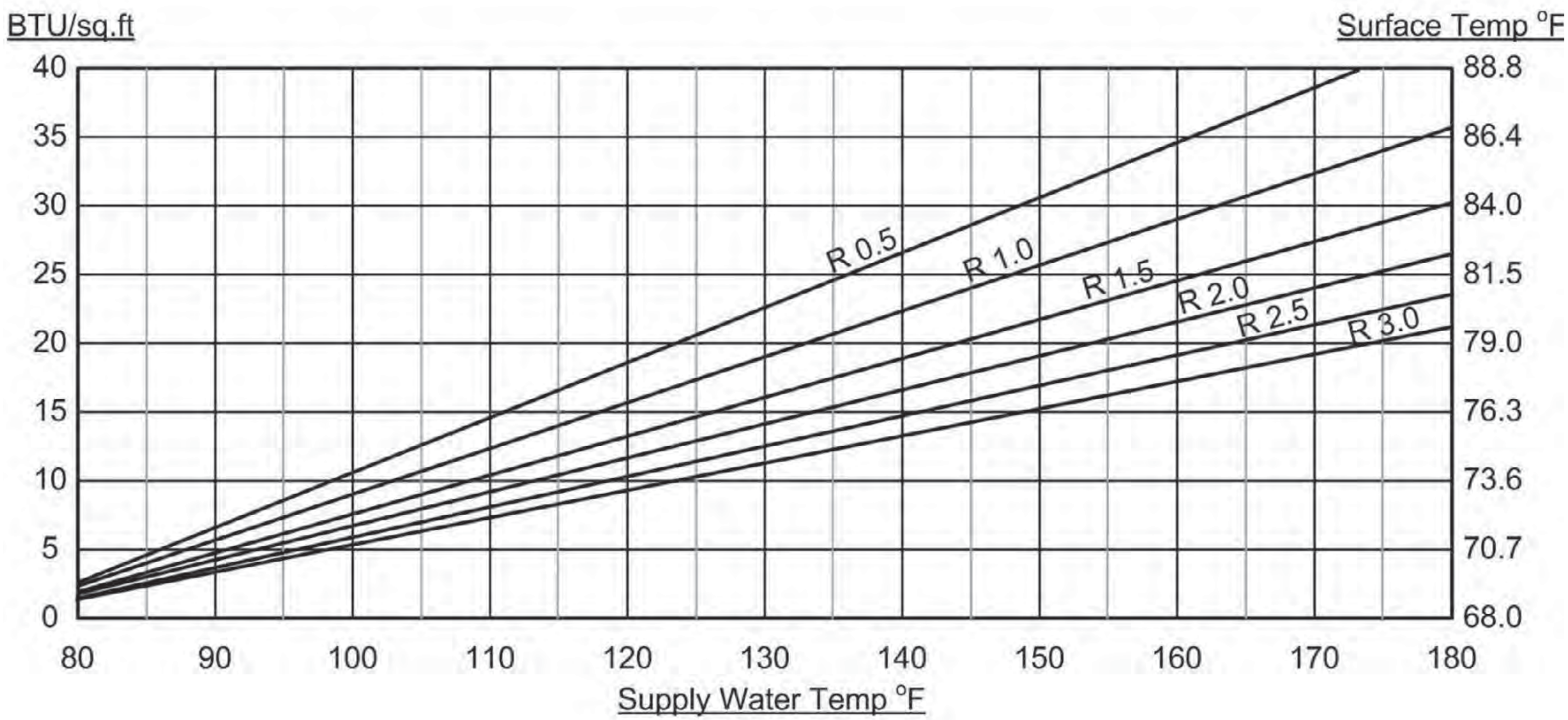
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature



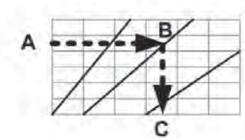

**NOTE:** Chart output requirements based on 68ºF room setpoint

**CONSTRUCTION NOTE:** This chart assumes a 3/4" subfloor and the R-values represents all layers installed on top of the poured underlayment. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SUSPENDED POURED UNDERLAYMENT 12" O.C.




**Using the Chart:**

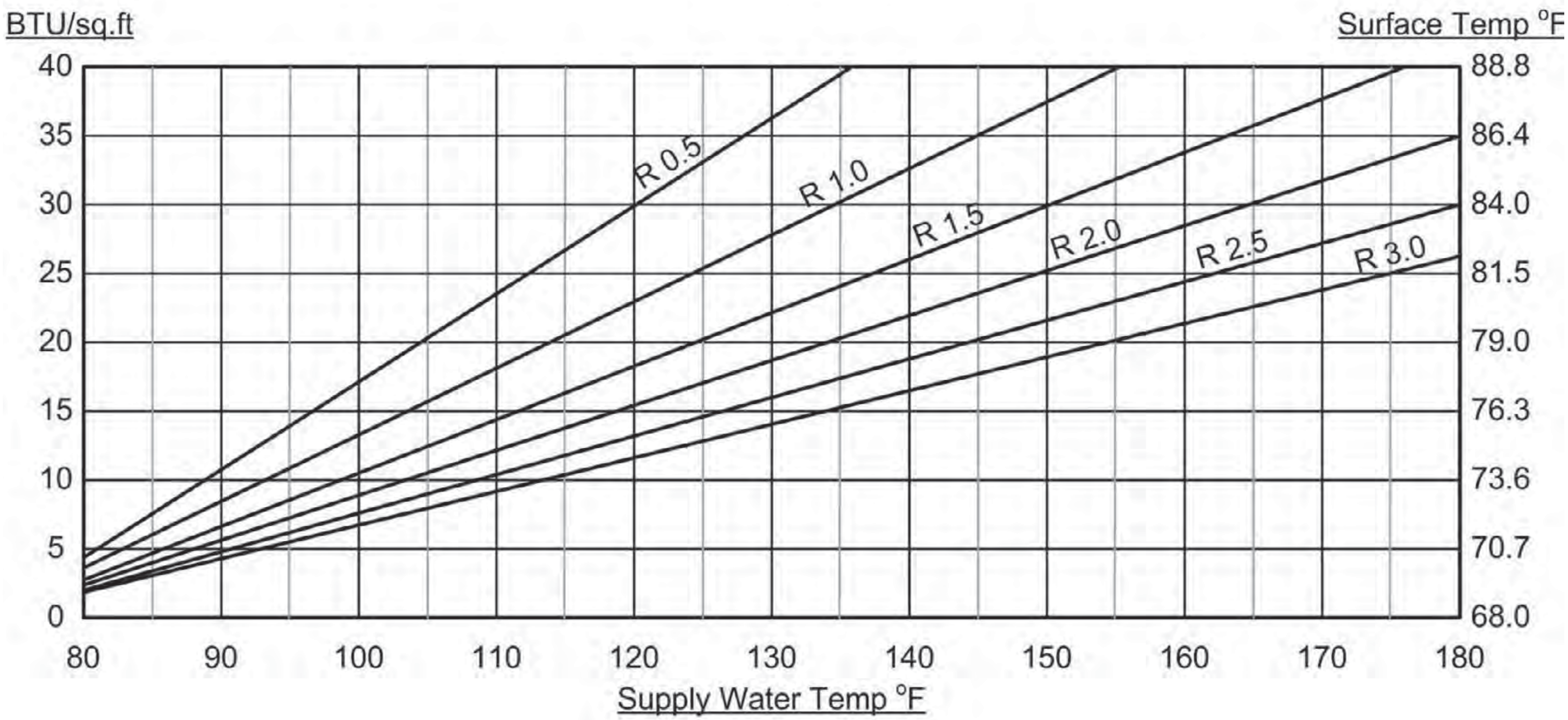



- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature

**NOTE:** Chart output requirements based on 68ºF room setpoint

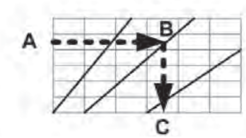
**CONSTRUCTION NOTE:** This chart assumes a 3/4" subfloor and the R-values represents all layers installed on top of the poured underlayment. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; subfloor installations with inadequate insulation below. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SLAB ON OR BELOW GRADE 6" O.C.




**Using the Chart:**

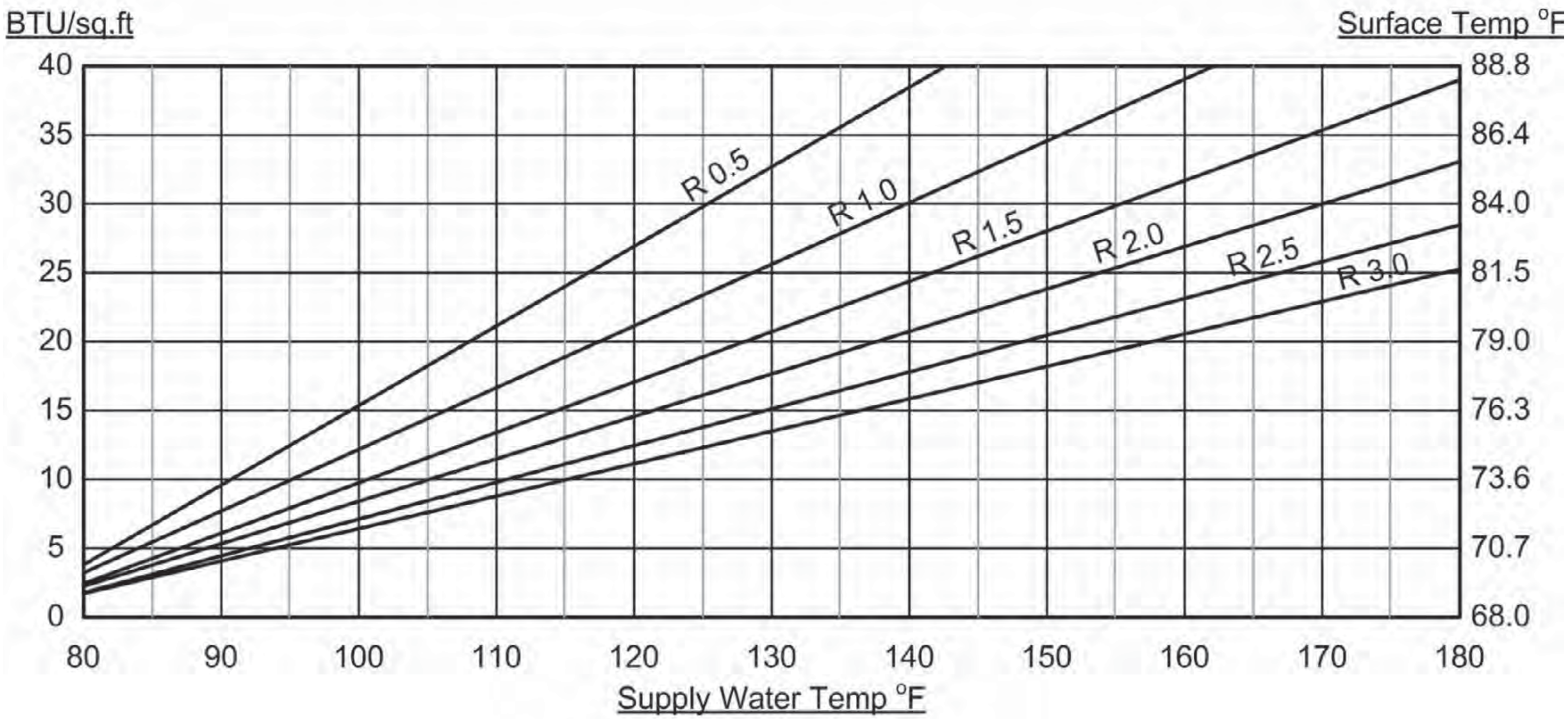
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68ºF room setpoint

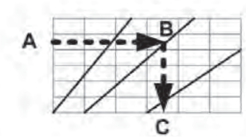
**CONSTRUCTION NOTE:** This chart assumes tubing installed in a 4"-6" slab. R-values represent all layers installed on top of the slab. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; slab installations without insulation below, with highly conductive soil or high water table. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SLAB ON OR BELOW GRADE 9" O.C.




**Using the Chart:**

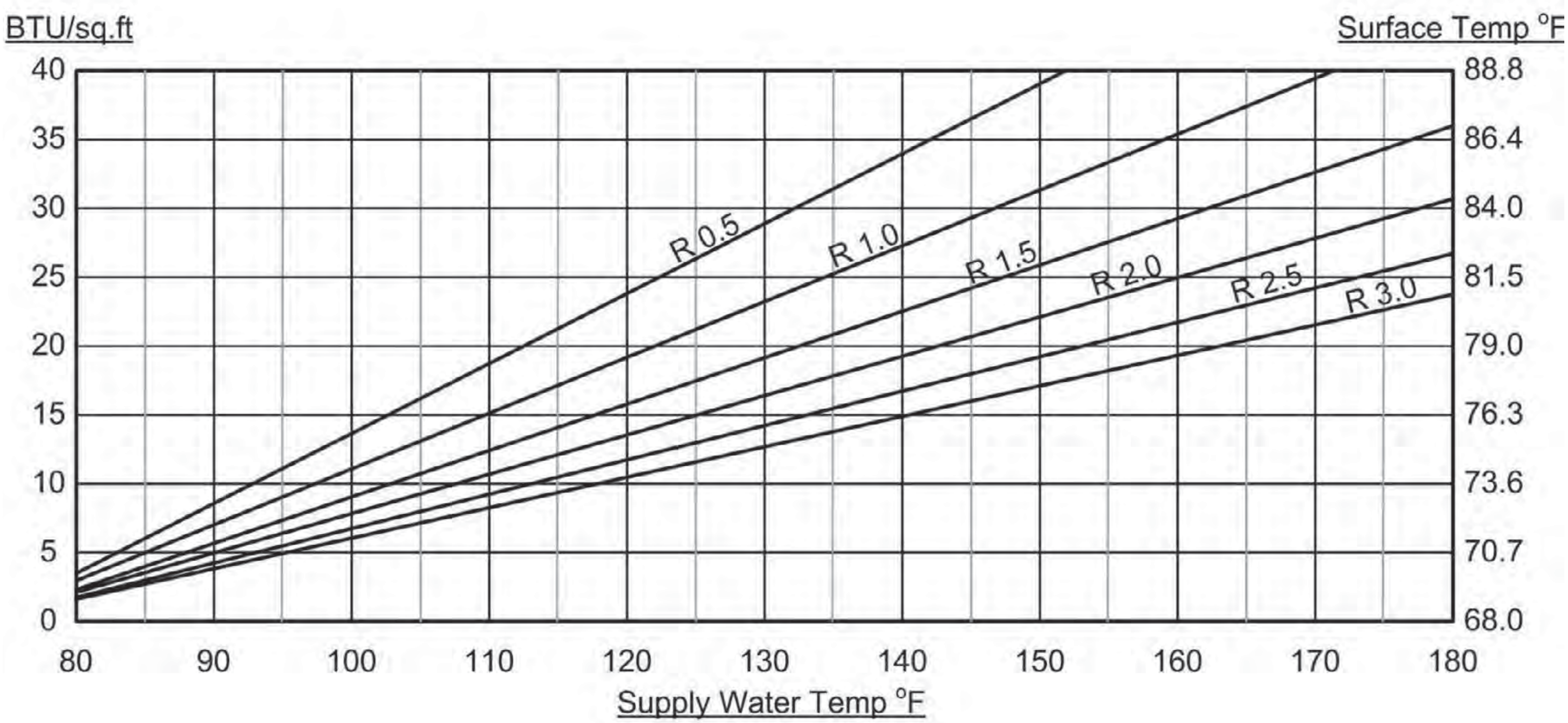
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

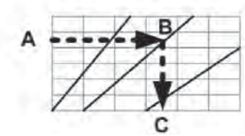
**CONSTRUCTION NOTE:** This chart assumes tubing installed in a 4"-6" slab. R-values represent all layers installed on top of the slab. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; slab installations without insulation below, with highly conductive soil or high water table. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

# HEAT OUTPUT FOR SLAB ON OR BELOW GRADE 12" O.C.




**Using the Chart:**

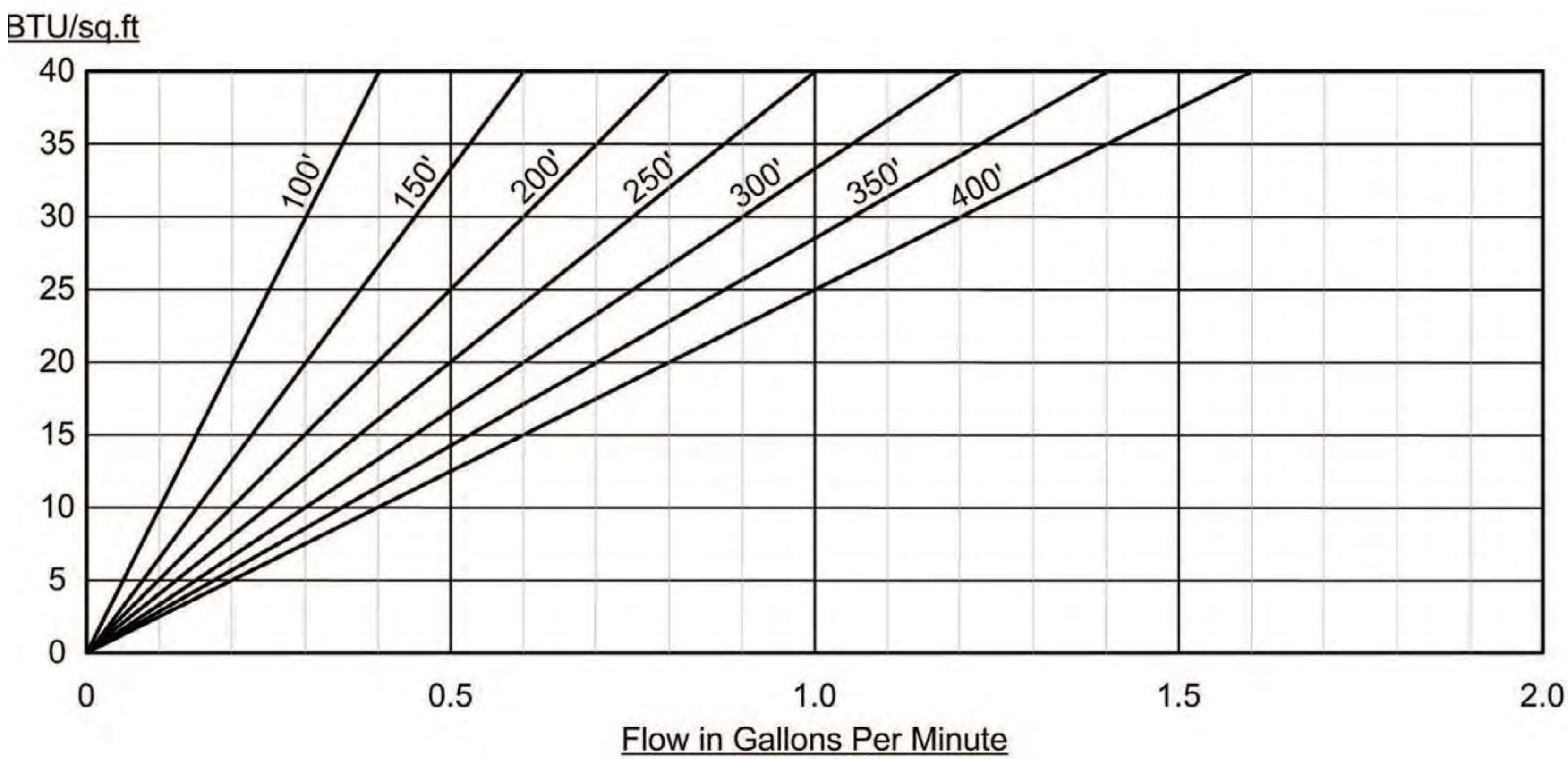
- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with floor covering r-value
- Go down vertically and read the supply water temperature




**NOTE:** Chart output requirements based on 68°F room setpoint

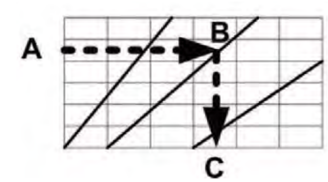
**CONSTRUCTION NOTE:** This chart assumes tubing installed in a 4"-6" slab. R-values represent all layers installed on top of the slab. Verify heat-loss and construction prior to installation. Performance may be greatly reduced for; slab installations without insulation below, with highly conductive soil or high water table. This chart is to be used as a guide. Mr PEX does not take responsibility for inaccurate design calculations.

## FLOW CHART FOR 6" O.C. @ 10°F DELTA-T

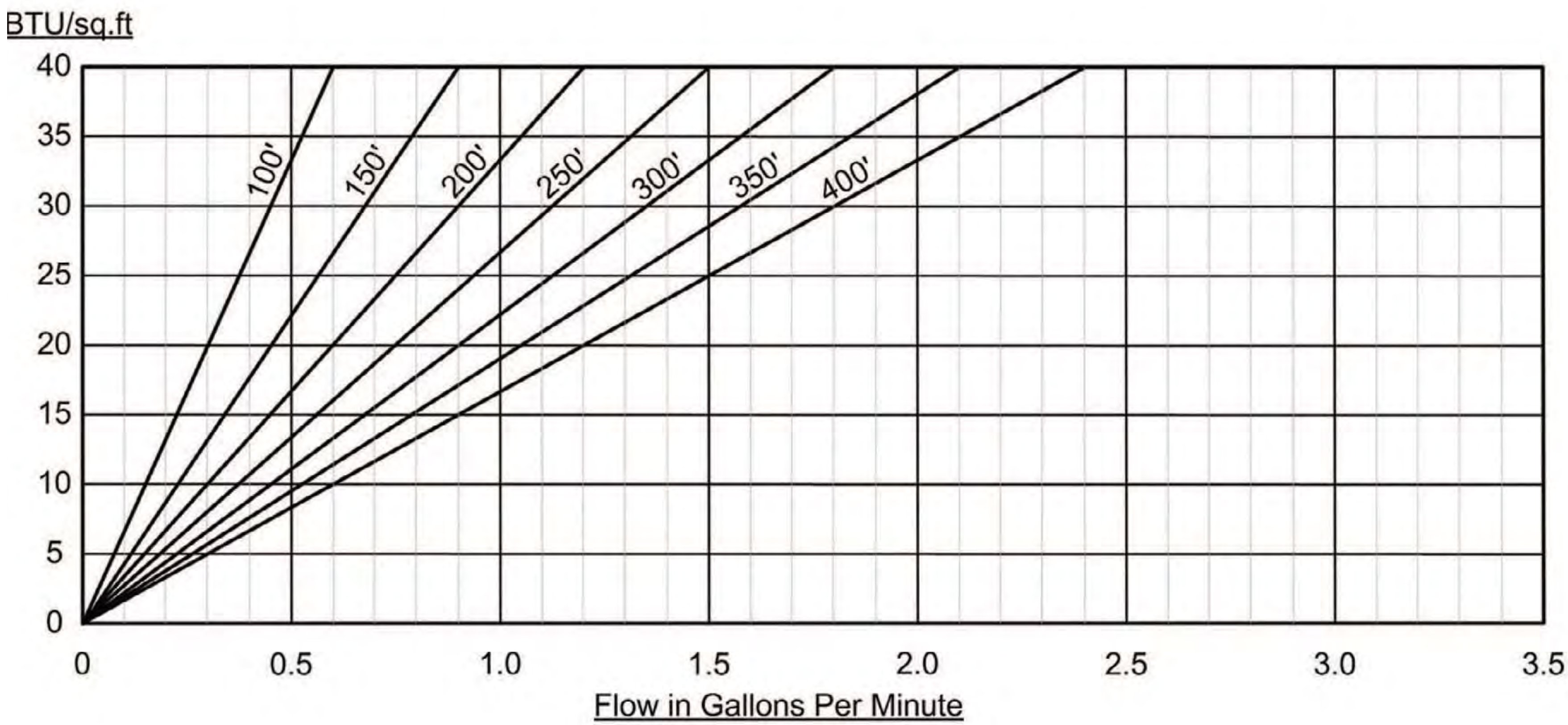



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop

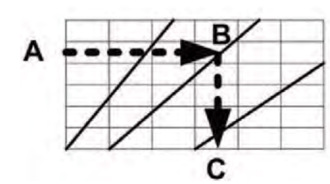


# FLOW CHART FOR 9" O.C. @ 10°F DELTA-T

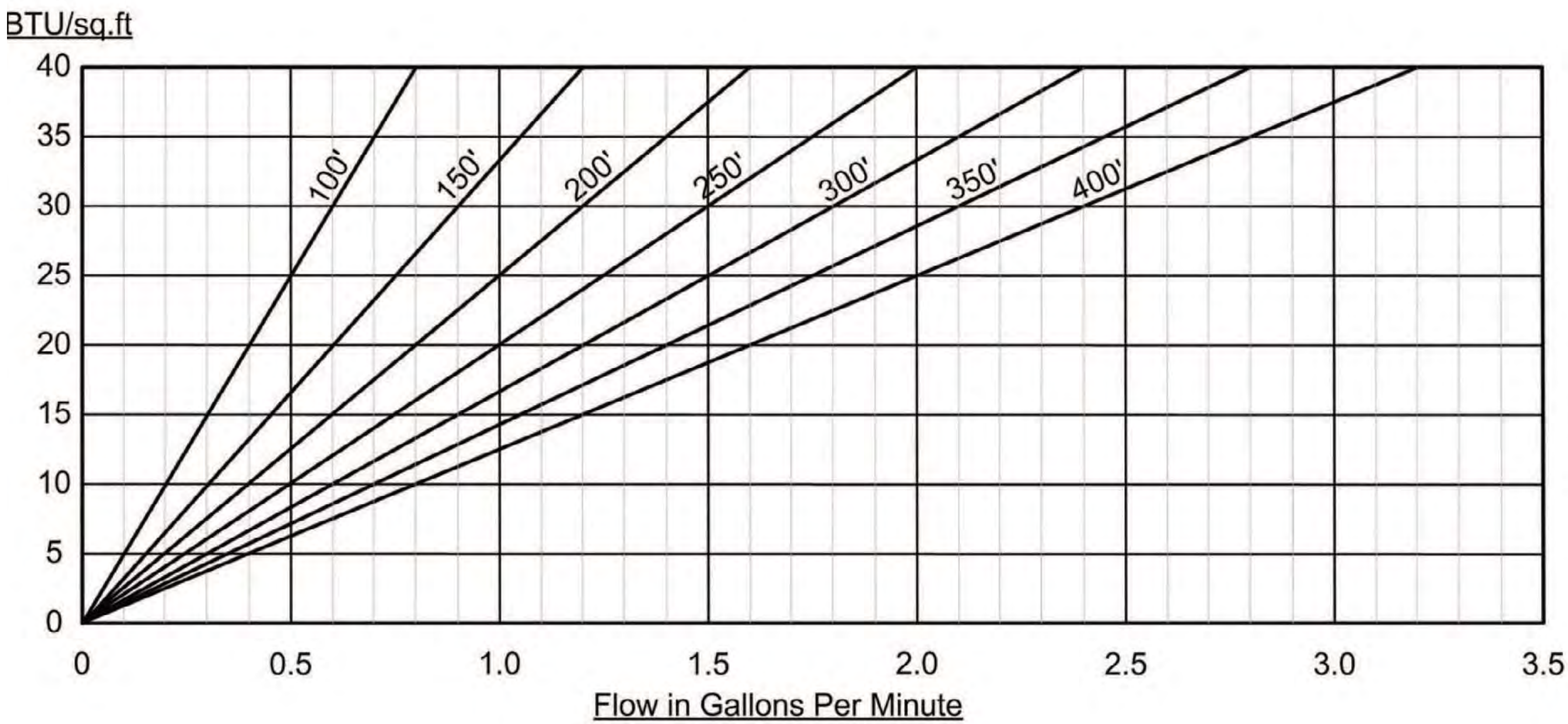



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop

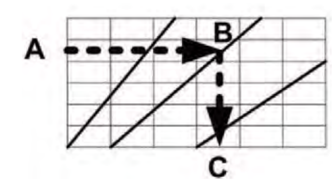


# FLOW CHART FOR 12" O.C. @ 10°F DELTA-T

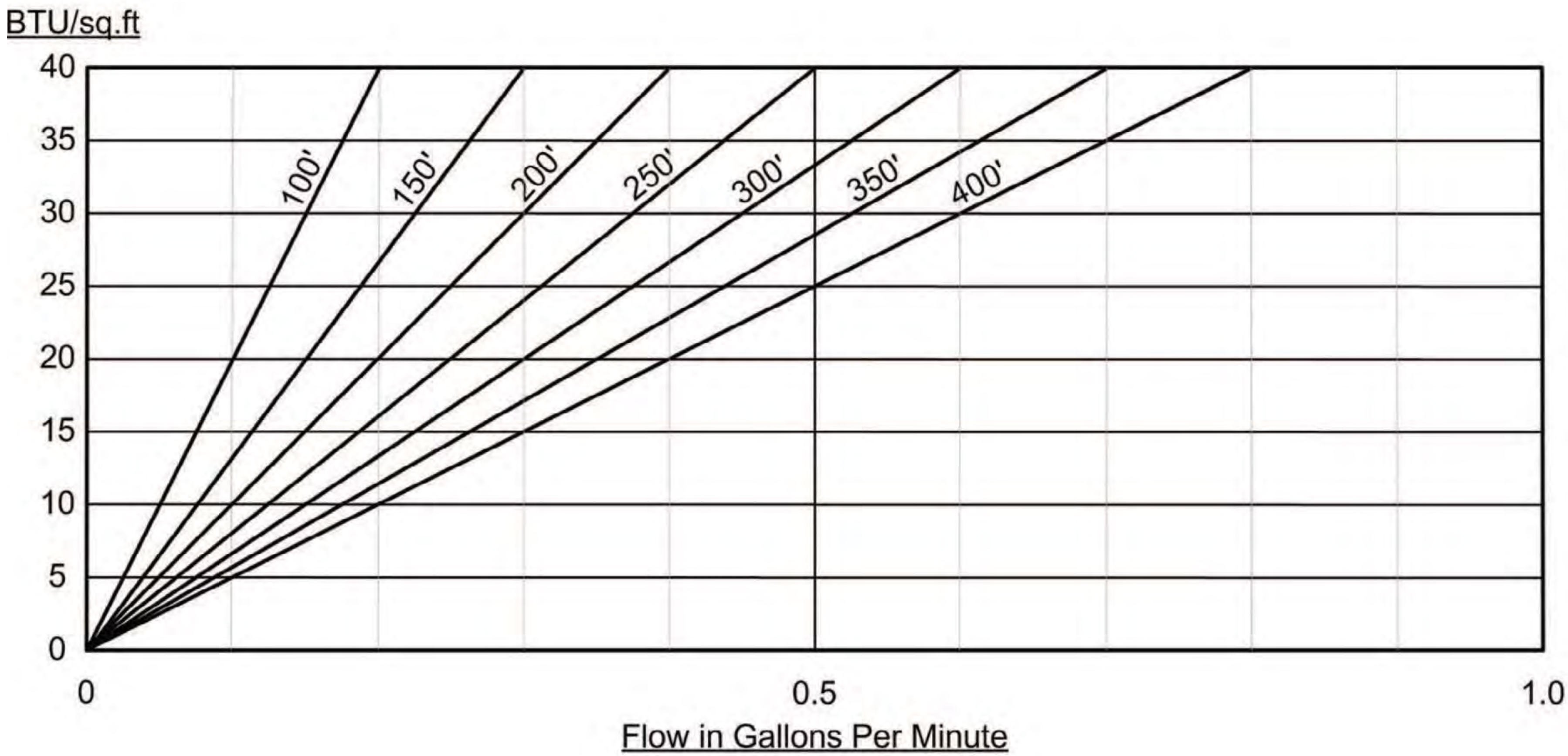



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop

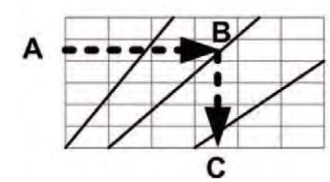


# FLOW CHART FOR 6" O.C. @ 20°F DELTA-T

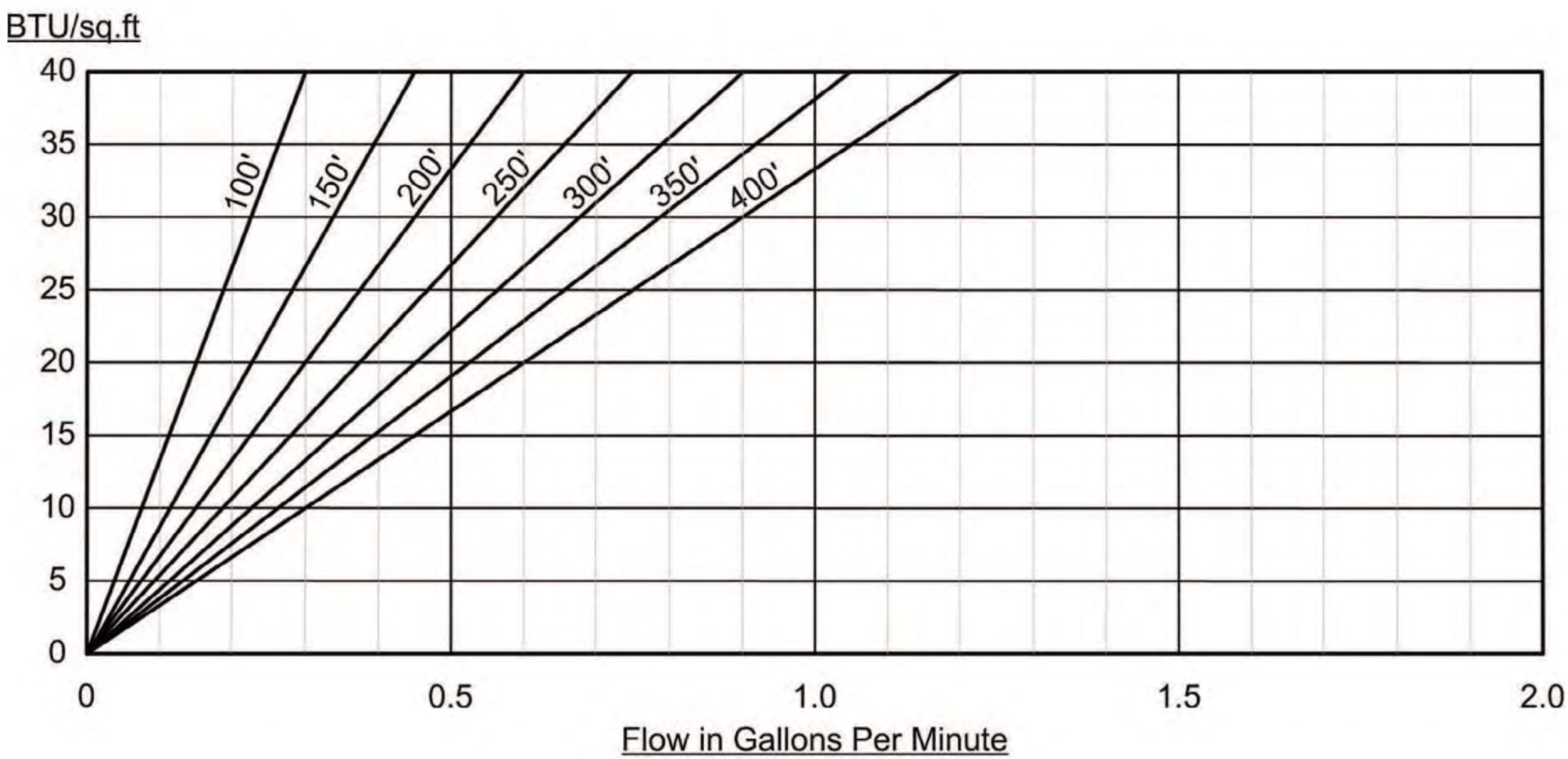



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop

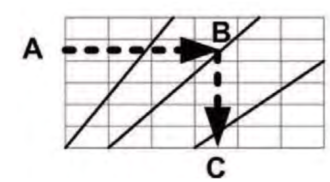


## FLOW CHART FOR 9" O.C. @ 20°F DELTA-T

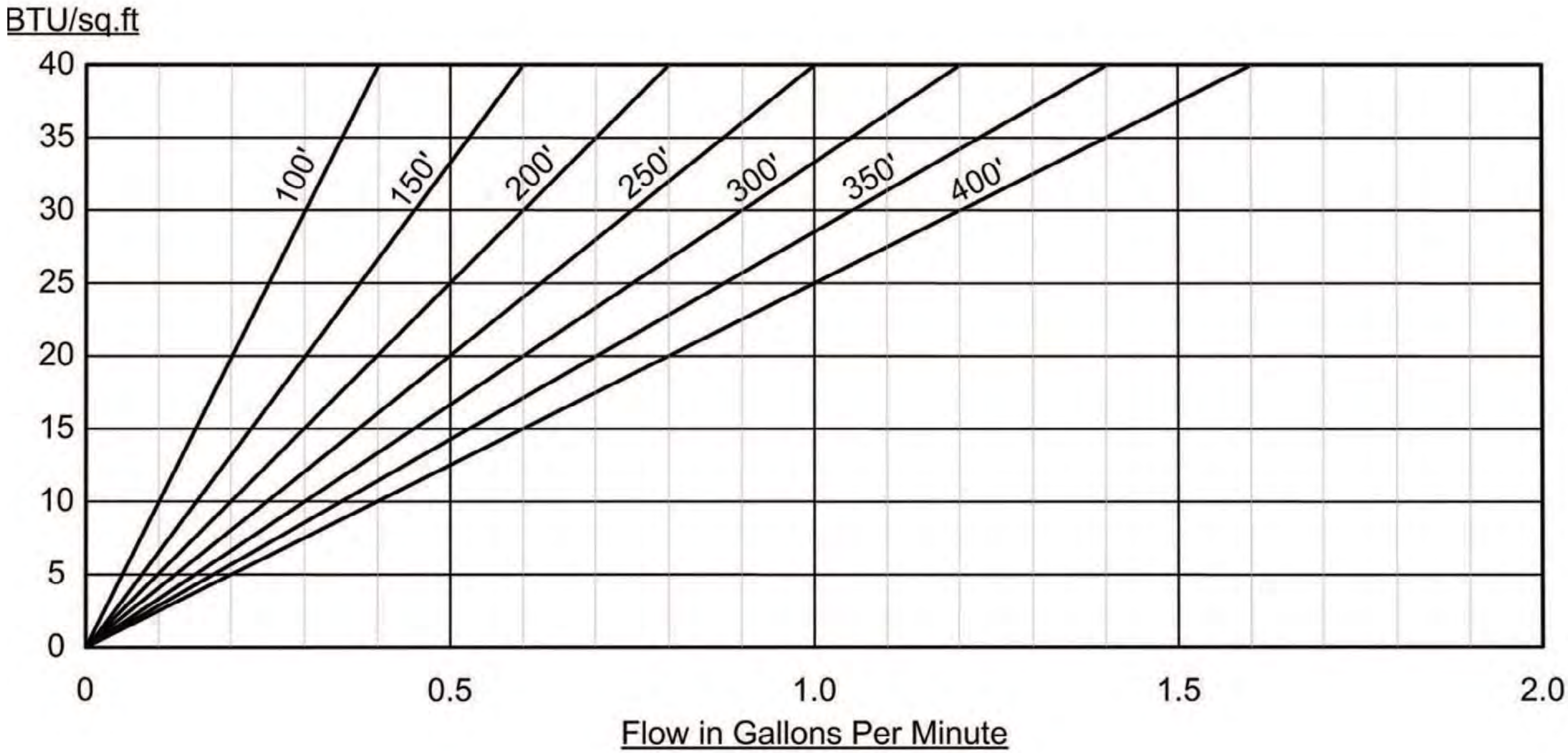



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop

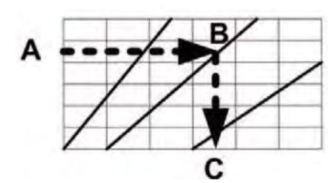


# FLOW CHART FOR 12" O.C. @ 20°F DELTA-T

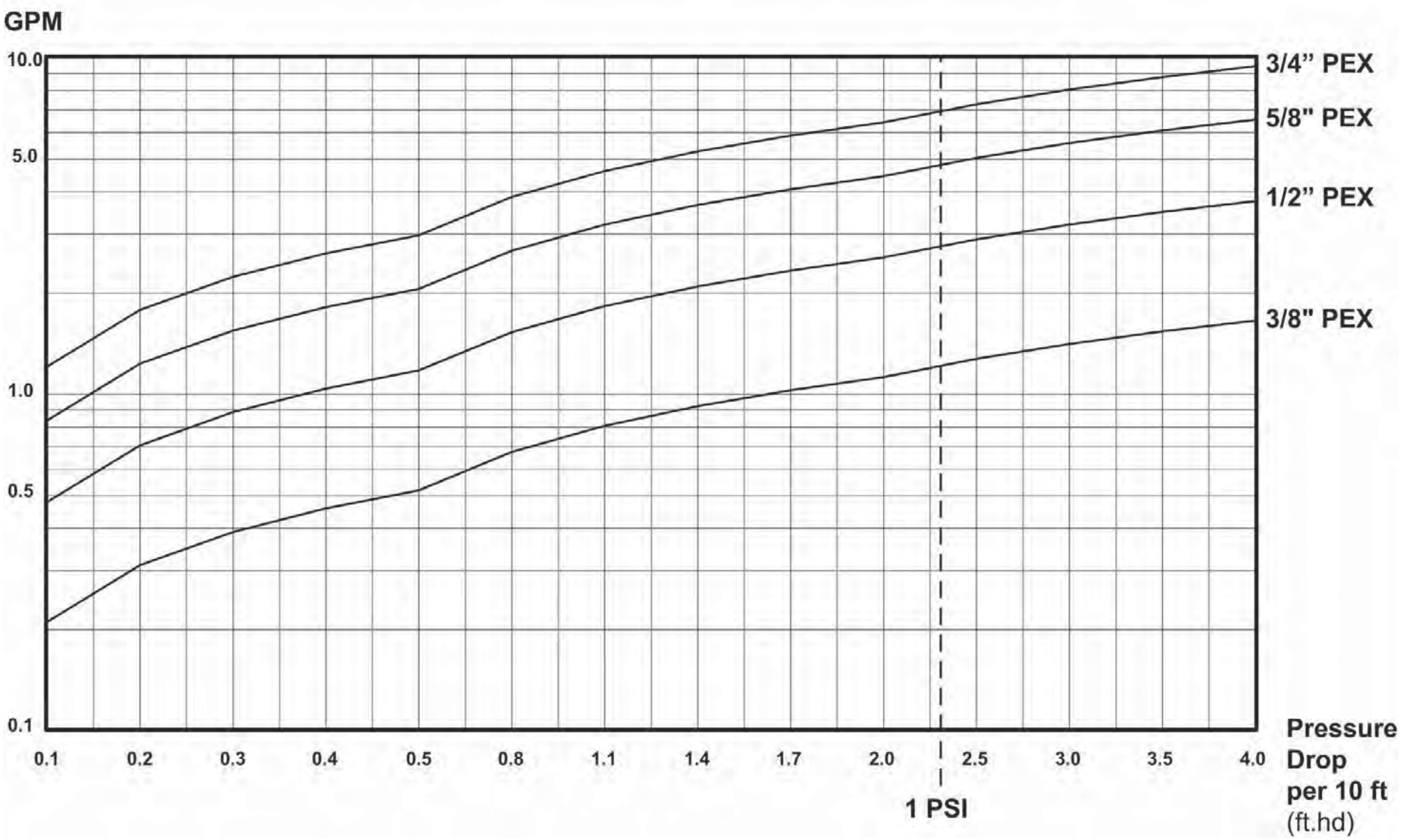



**Using the Chart:**

- Find the btu/sq ft to the left
- Move horizontally to the right until the intersection with correct loop length
- Go down vertically and read the flow for the loop



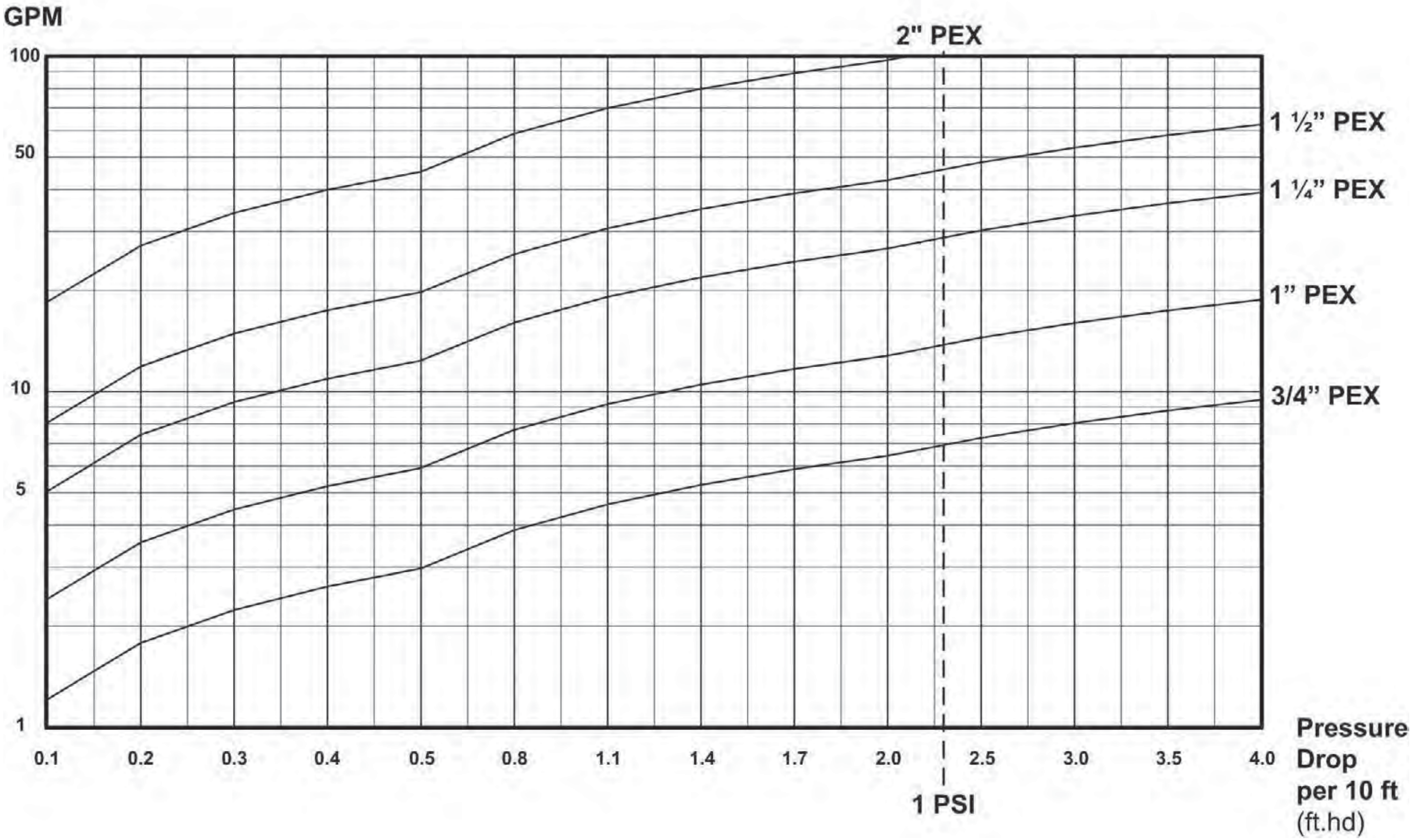
## PRESSURE DROP FOR SMALL PEX TUBING AT 100 F




- Take the total heat load (BTUH) for the area that the loop is covering and divide it by 501.
- Divide the result with the Delta-T to find GPM for the loop.
- Find the closest flow for the loop in the left GPM column of the chart.
- Move to the right to the correct pipe size intersecting line.
- Move down to read to read the pressure drop per 10 feet of pipe.
- Divide the loop length by 10, then multiply the result with the given pressure drop for 10 feet to get the total pressure drop for the loop.

*NOTE: This chart is for 100% water, and only includes the pressure drop for the PEX pipe itself. You need to add the drop for other equipment. For the manifold, add about 2 ft/hd. If glycol is used, use the correction charts on pages 92–93.*

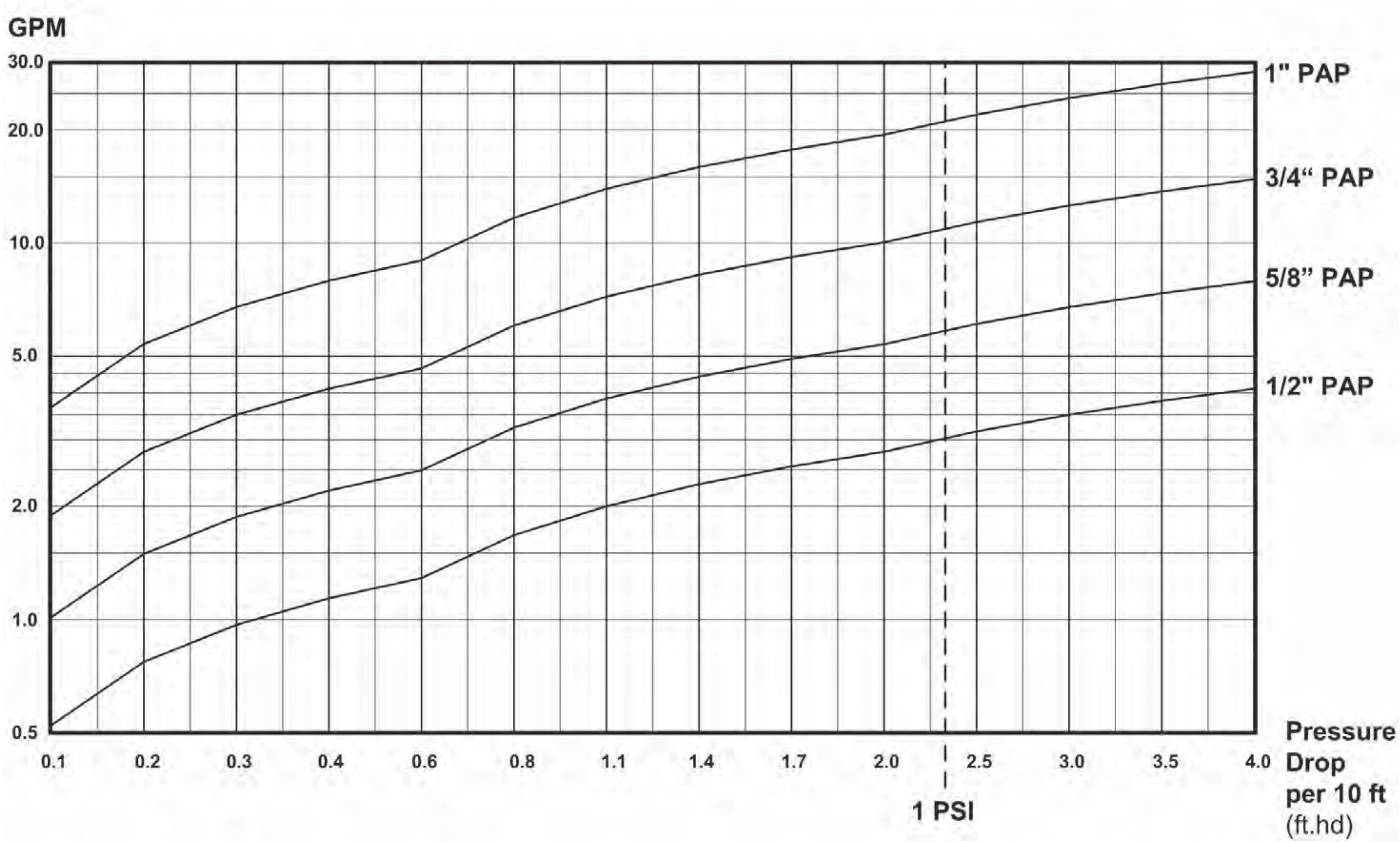
# PRESSURE DROP FOR LARGE PEX TUBING AT 100 F




- Find the closest flow for the loop in the left GPM column of the chart.
- Step 2, Move to the right to the correct pipe size intersecting line.
- Step 3, Move down to read to read the pressure drop per 10 feet of pipe.
- Step 4, Divide the pipe length by 10, then multiply the result with the given pressure drop for 10 feet to get the total pressure drop for the pipe length.

*NOTE: This chart is for 100% water, and only includes the pressure drop for the PEX pipe itself. You need to add the drop for other equipment. If glycol is used, use the correction charts on pages 92–93.*

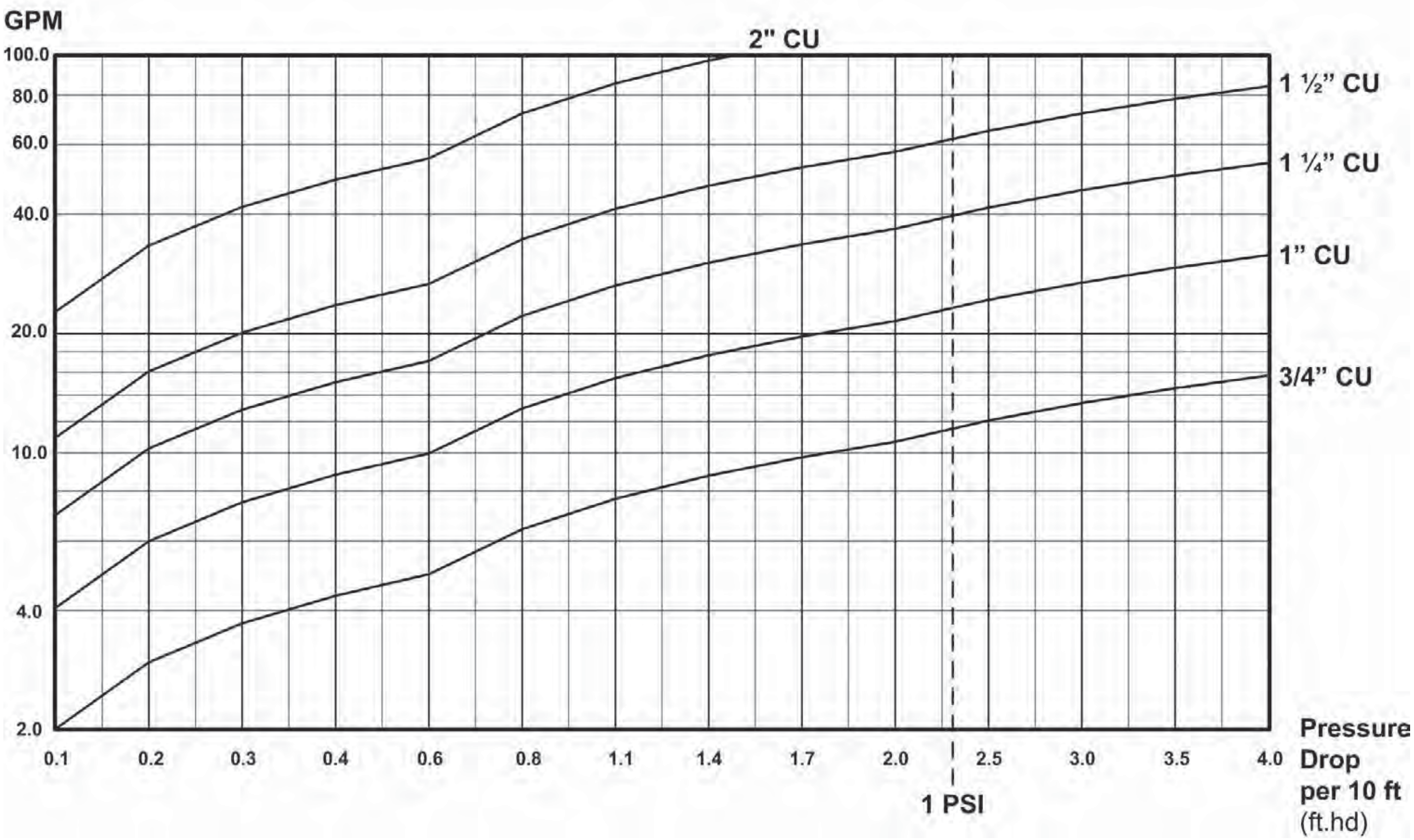
# PRESSURE DROP FOR PAP TUBING AT 100 F




- Take the total heat load (BTUH) for the area that the loop is covering and divide it by 501.
- Step 2, Divide the result with the Delta-T to find GPM for the loop.
- Step 3, Find the closest flow for the loop in the left GPM column of the chart.
- Step 4, Move to the right to the correct pipe size intersecting line.
- Step 5, Move down to read to read the pressure drop per 10 feet of pipe.
- Step 5, Divide the loop length by 10, then multiply the result with the given pressure drop for 10 feet to get the total pressure drop for the loop.

*NOTE: This chart is for 100% water, and only includes the pressure drop for the PAP pipe itself. You need to add the drop for other equipment. For the manifold, add about 2 ft/hd. If glycol is used, use the correction charts on pages 92–93.*

# PRESSURE DROP FOR COPPER TUBING AT 100 F



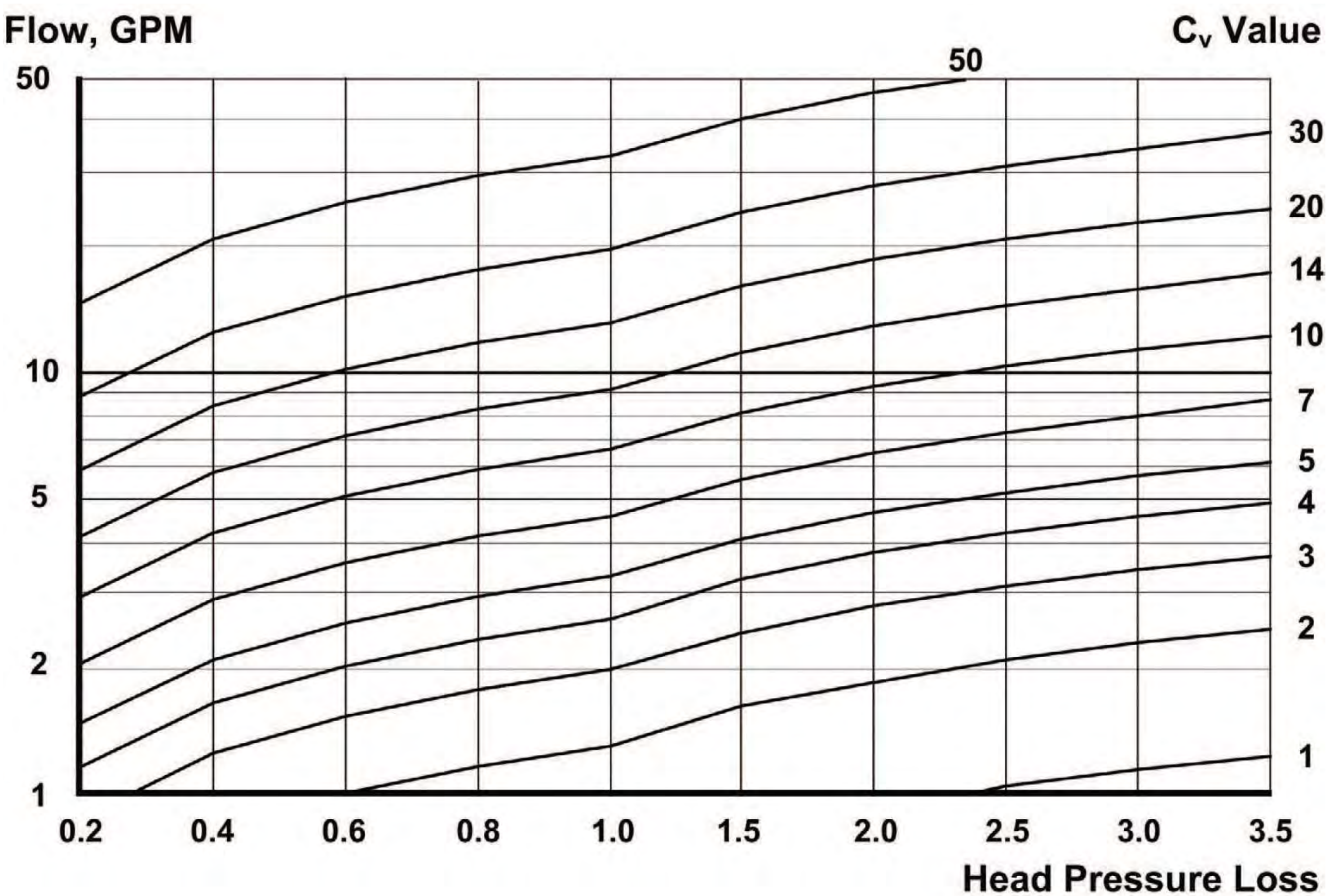

- Find the closest flow for the loop in the left GPM column of the chart.
- Step 2, Move to the right to the correct pipe size intersecting line.
- Step 3, Move down to read to read the pressure drop per 10 feet of pipe.
- Step 4, Divide the pipe length by 10, then multiply the result with the given pressure drop for 10 feet to get the total pressure drop for the pipe length.

*NOTE: This chart is for 100% water, and only includes the pressure drop for the copper pipe itself. You need to add the drop for other equipment. If glycol is used, use the correction charts on pages 92–93.*

## $C_v$ VALUES

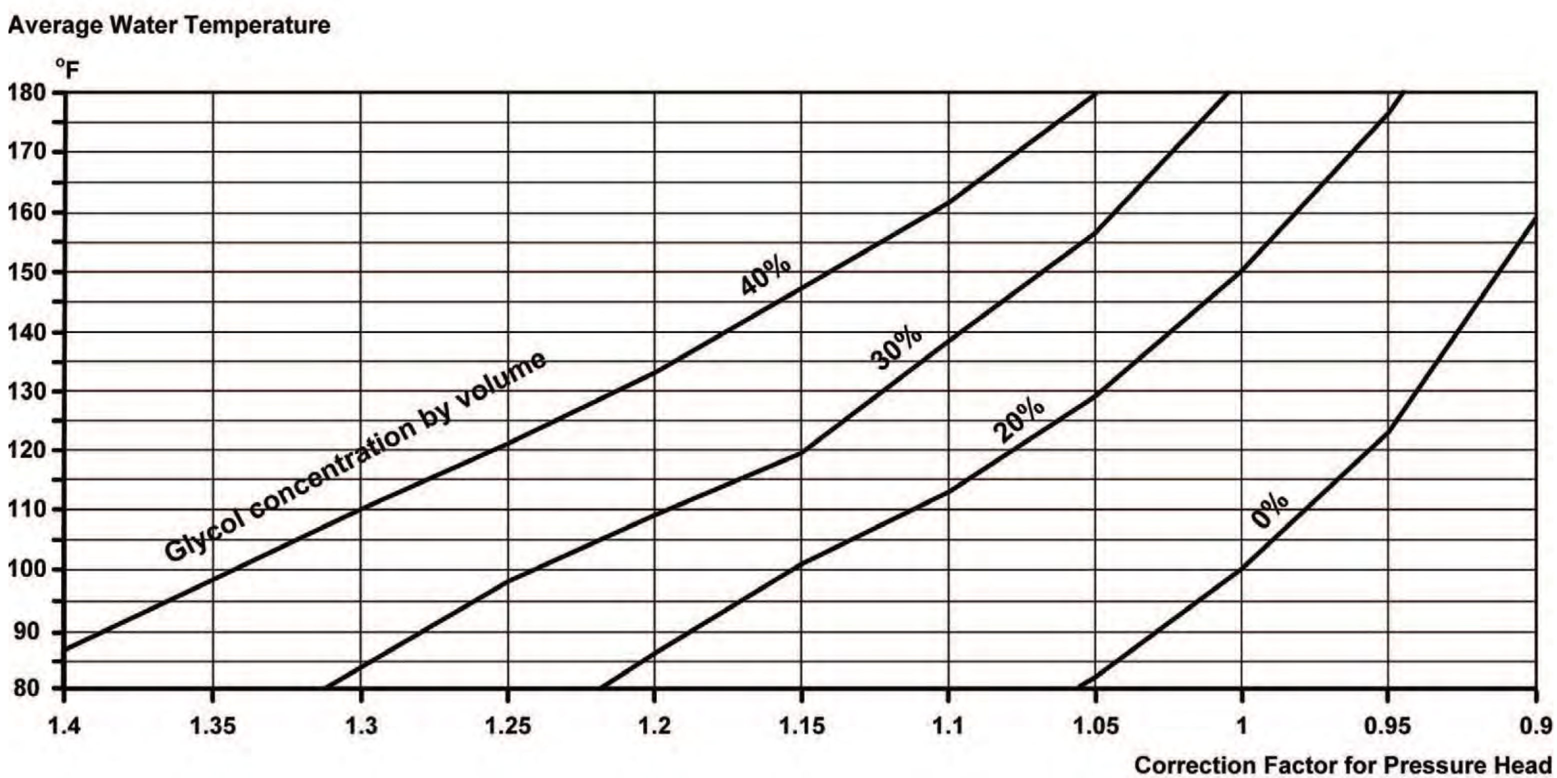
The pressure drop for hydronic heating components are normally described by their $C_v$ value. The $C_v$ value describes at what flow (in gpm) the pressure drop over the component will be 1 psi (equal to 2.31 ft/hd). Check with the manufacturer for the $C_v$ value of the component and then use formula below to establish the head loss (ft/hd).

*HEAD LOSS (FT.HD.) OVER VALVES ETC.: (1.52 x GPM / Cv)2 (GPM is the flow, and Cv is the valve parameter)*
*(Multiply the flow by 1.52 and then divide by the Cv value. Multiply the result by itself)*



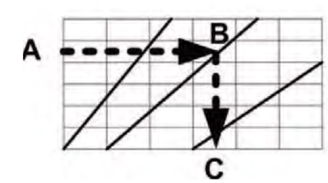
# PRESSURE HEAD CORRECTION FACTOR FOR TEMPERATURES AND PROPYLENE GLYCOL

Pressure head correction factor (multiplier) as a function of average fluid temperature (°F) and propylene glycol concentration (Volume %).



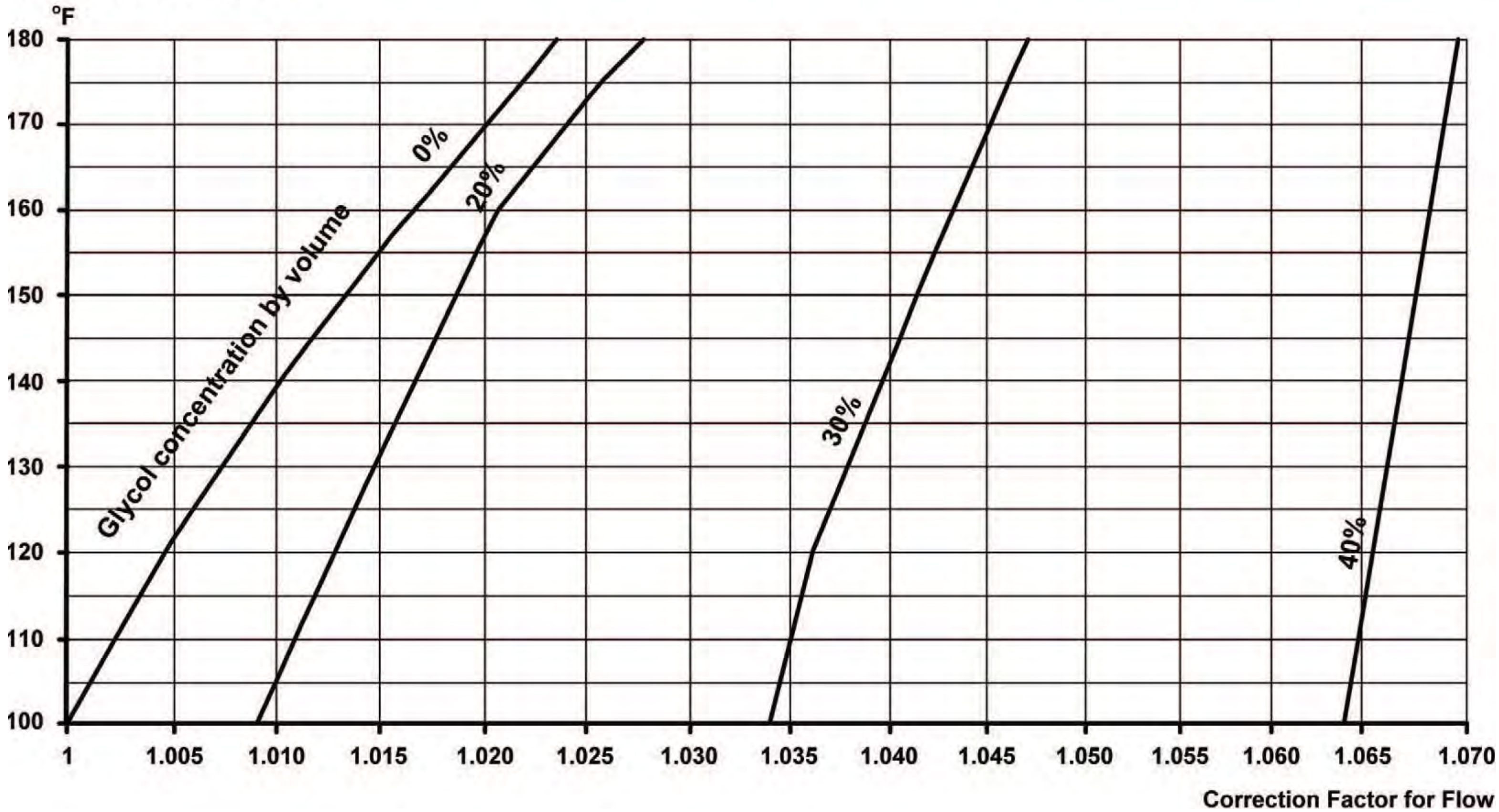

**Using the Chart:**

- Find the average water temperature to the left
- Move horizontally to the right until the intersection with actual glycol concentration
- Go down vertically and read the flow correction factor
- Multiply the head loss (ft/hd) with the correction factor for correct result



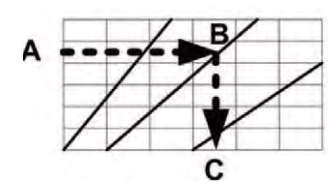
# FLOW CORRECTION FACTOR FOR TEMPERATURES AND PROPYLENE GLYCOL

Flow correction factor (multiplier) as a function of average fluid temperature (°F) and propylene glycol concentration (Volume %).




**Using the Chart:**

- Find the average water temperature to the left
- Move horizontally to the right until the intersection with actual glycol concentration
- Go down vertically and read the flow correction factor
- Multiply the flow (GPM) with the correction factor for correct result



# THERMOSTAT INSTALLATION

## INSTALLATION INSTRUCTIONS FOR DIGITAL THERMOSTAT #5110740

*PREPARATION: This is a Low Voltage Thermostat. Before installing this thermostat, verify that the system is a low voltage heating system. If necessary, check with your local dealer.*

*NOTE: Leave these instructions with the homeowner for future reference.*

- Find a location about 5 ft above the floor that has a constant temperature, and is not subject to big swings in temperature. Avoid mounting close to; oven, fireplace, outside door, air conditioning register, TV, or full sun.
- WARNING!!! Turn off the main power switch before installing the thermostat.
- Release the front cover by pressing the tab on the top of the front cover with a screwdriver (see figure 1).
- Remove the front cover with your hand holding both sides of the cover (see figure 2).
- Remove the terminal cover to get access to the terminals by pushing a small flat screwdriver into the gap from the front and push the tab toward the center to open the cover.
  Pull the cover straight up (see figure 3).
- Route the wires through the cutout in the base and mount the thermostat to the wall with two screws (see figure 4).
- Install the thermostat wire as necessary following the guide in Fig. 5. And tighten the screws.
  - For heating applications, use terminals #1 & #5
- Install the two AAA batteries as shown in Fig. 5.
- Replace the terminal cover. Replace the front cover onto the base.
- Turn on power to the system for operation.


Fig. 1


Fig. 2


Fig. 3


Fig. 4

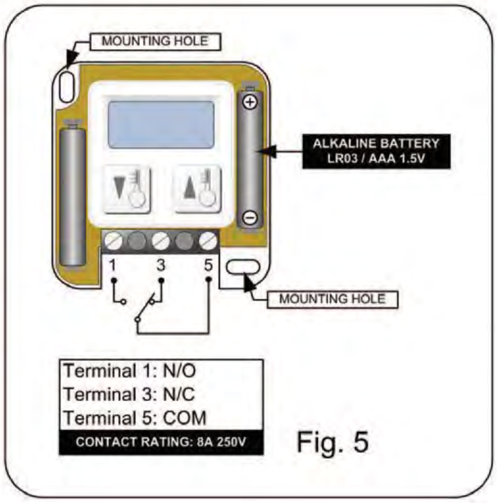
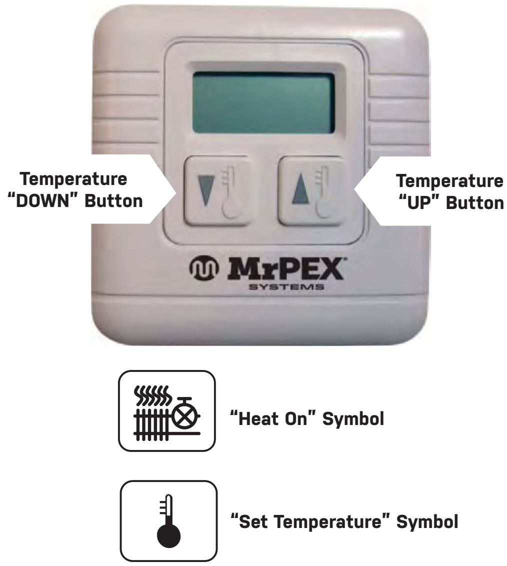


Fig. 5

*NOTE: See pages 89-91 for electrical sample schematics..*

## TESTING THE OPERATION

- Start by briefly pressing either the "UP" or "DOWN" button. The setpoint temperature will start flashing with "Heat On" and "temperature set" symbols.
- While still flashing, push the "UP" or "DOWN" buttons to set the temperature at least 2 degrees above current ambient temperature. Each push of the button moves the set-point 1 degree F. Wait 15 seconds until the display stops flashing. The "Heat On" symbol should now stay on and a faint click should be heard indicating that the heatdemand relay has engaged. If this does not occur, wait for another 3 minutes. It is possible that the thermostat is in "Short cycle elimination mode". This means that if the setpoint is changed more than once within a 3 minute period, the thermostat will wait another 3 minutes to make sure that any appliance that is connected will not short cycle. If the thermostat still does not engage "Heat On" mode. Check wiring to make sure both the thermostat and associated wiring is connected correctly.




*NOTE: If the LCD changes from displaying the ambient temperature to "Lo", install new AAA size alkaline batteries.*

# INSTALLATION INSTRUCTIONS FOR DIGITAL THERMOSTAT #5110741

## BEFORE YOU START

### CAUTION:

- For a new installation, choose a location about 1.5 m (5 ft.) above the floor.
- The thermostat must be installed on an inside wall facing the heating system (except for floor heating systems).
- Avoid locations where there are air drafts (top of staircase, air outlet), dead air spots (behind a door), direct sunlight or concealed chimney or stove pipes (except for floor heating systems).
- Do NOT install the thermostat in an area where it can be exposed to water or rain.
- Keep the thermostat's top and bottom air vents (openings) clean and unobstructed at all times.

## ABOUT YOUR THERMOSTAT

### THE 5110741 NON-PROGRAMMABLE THERMOSTAT HAS THREE TEMPERATURE CONTROL MODES:

**A mode:** • controls the ambient air temperature

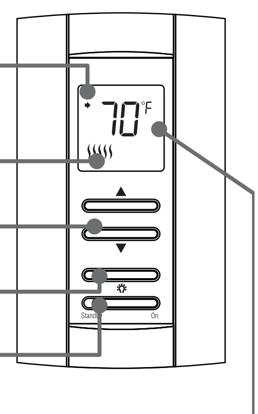
**F mode:** • controls the floor temperature

**AF mode:** • controls the ambient air temperature
• maintains the floor temperature within desired limits

### Supplied Parts

- One (1) thermostat
- Two (2) mounting screws
- Two (2) plastic anchors
- One (1) floor sensor
- One (1) flat-tip screwdriver

## CONTROLS AND DISPLAY




### Temperature Display and Setting

The thermostat usually displays the room temperature. To view the set (desired) temperature, press either of the ▲▼ buttons once. The set temperature is displayed for 5 seconds.

To set a new temperature, press one of the ▲▼ buttons repeatedly until the desired temperature is displayed. To scroll faster, press and hold the button.

### Backlight

The display illuminates for 5 seconds when the backlight button is pressed. When either of the ▲▼ buttons is pressed, the display illuminates for 10 seconds. The set-point temperature appears for the first 5 seconds, then the current temperature is displayed.

### On/Standby Switch

You can set the thermostat to Standby to cut power to the heating system when it is not in use (e.g. in summer). The thermostat screen becomes blank but the settings are saved.

## INSTALLING THE THERMOSTAT

**STEP 1** Turn the heating system off at the main electrical panel.

**STEP 2** Loosen the bottom screw and remove the thermostat faceplate from its wallplate. (The screw cannot be completely removed.)

**STEP 3** Wire the thermostat. See typical wiring on pages 8-11.

**STEP 4** If the thermostat will be used in F or AF mode (see page 12), connect the floor sensor (see page 7).

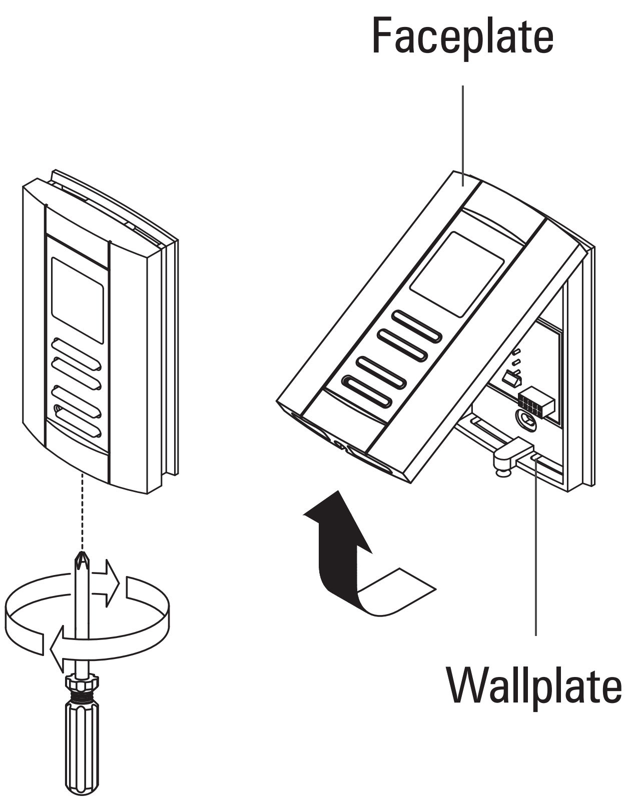
**STEP 5** Install the wallplate on the wall using the provided screws and wall anchors.

**STEP 6** Set the configuration switches (see page 12).

**STEP 7** Install the faceplate back on the wallplate and tighten the screw.

**STEP 8** If there is a sticker on the screen, peel it off.

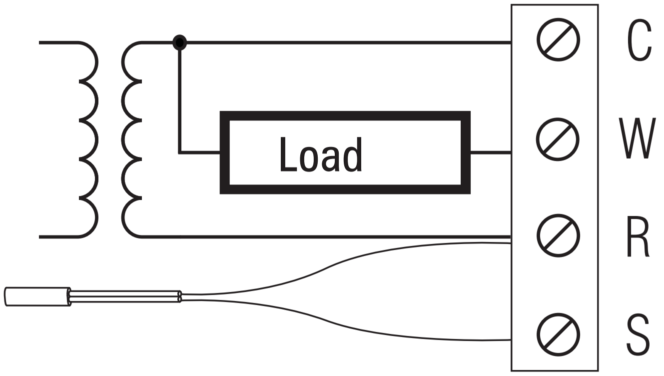
**STEP 9** You can now return power to the heating system at the main electrical panel.




## CONNECTING THE FLOOR SENSOR

*Connect the floor sensor between terminals R and S (no polarity).*

- The sensor wires should be installed in a protective sleeve and not directly in the concrete in a poured floor installation.
- Position the sensor such that it does not come in contact with the radiant floor tube. The sensor must be centered between two floor heating tubes for best temperature control.
- Do NOT staple the sensor head (the plastic end) to the floor. Doing so might damage the sensor. Any damage might not be noticeable during testing but can become apparent later.

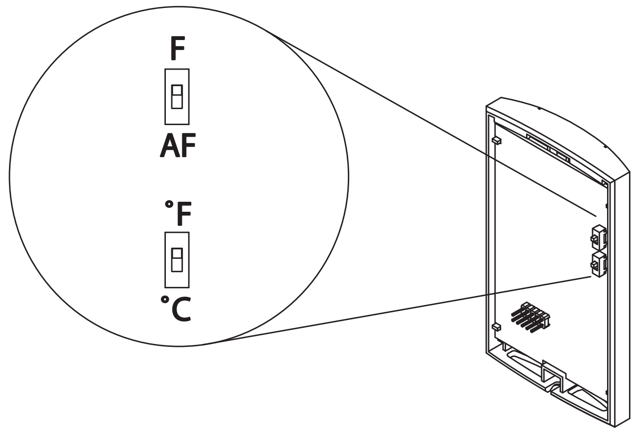


## SETTING THE CONFIGURATION SWITCHES

Configuration switches are on the back of the faceplate. Factory settings are inside grey cells.

| # | CONFIGURATIONS | UP | DOWN |
|---|---|---|---|
| S2 | Temperature control mode * | F | AF |
| S1 | Displayed temperature unit | °F | °C |

* See page 3 for definition of each mode.




- To select the F Mode, connect the floor temperature sensor (see page 8) and place the switch in the F position.
- To select the AF Mode, proceed as follows: Connect the floor temperature sensor (see page 8). Place the switch in the F position. If the thermostat displays Er, the sensor is improperly connected or damaged. If the thermostat displays a temperature reading, place the switch in the AF position.
- To select the A Mode, place the switch in the AF position but do NOT connect the floor temperature sensor.

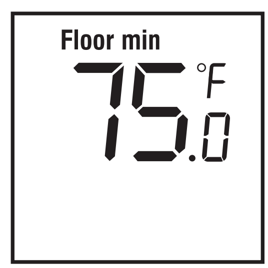
## FLOOR TEMPERATURE LIMITS (AF MODE ONLY)

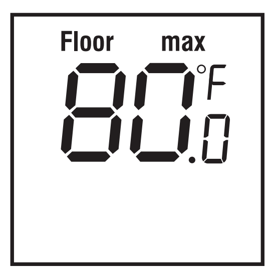
The minimum and maximum floor temperature limits are available only if the temperature control mode is AF (see page 9). If the floor temperature drops below the minimum limit or rises above the maximum limit, the thermostat will turn heating On or Off, regardless of the ambient temperature, to maintain the floor temperature within the set limits.

**NOTE:** The desired ambient temperature might not be attainable if the maximum floor temperature is set too low.

The minimum and maximum floor temperature limits are factory-set at 10 °C (50 °F) and 28 °C (82 °F) respectively. To modify the limits, proceed as follows:

**WARNING:** To avoid damaging your floor, follow your floor supplier's recommendations regarding floor temperature limits.




**STEP 1** Switch the thermostat to Standby.

**STEP 2** While pressing either button ▲▼, switch the thermostat back to On to access the floor temperature limit settings.

**STEP 3** Press the Backlight button briefly to switch between minimum and maximum floor temperature settings.

**STEP 4** Press the ▲▼ buttons to set the desired limit.

**STEP 5** Press the Backlight button for 3 seconds to save your modifications. After the data are saved, the thermostat displays the current temperature or "– –".

**NOTE:** Your modifications are automatically saved if no button is pressed for 60 seconds.

## ERROR MESSAGES

LO — The measured temperature is below the display range. Heating is activated.

HI — The measured temperature is above the display range. Heating is deactivated.

ER — Verify the thermostat and sensor connections. Heating is deactivated.

## TECHNICAL SPECIFICATIONS

**Maximum load:** 0.5 A / 24 VAC

**Wire gauge:** 14 to 22 AWG

**Heating cycle length:** 15 minutes

**Setpoint range** **F mode:** 40 °F to 104 °F (5 °C to 40 °C)
**A/AF mode:** 40 °F to 86 °F (5 °C to 30 °C)

**Floor limit range:** **AF mode):** 40 °F - 104 °F (5 °C to 40 °C)

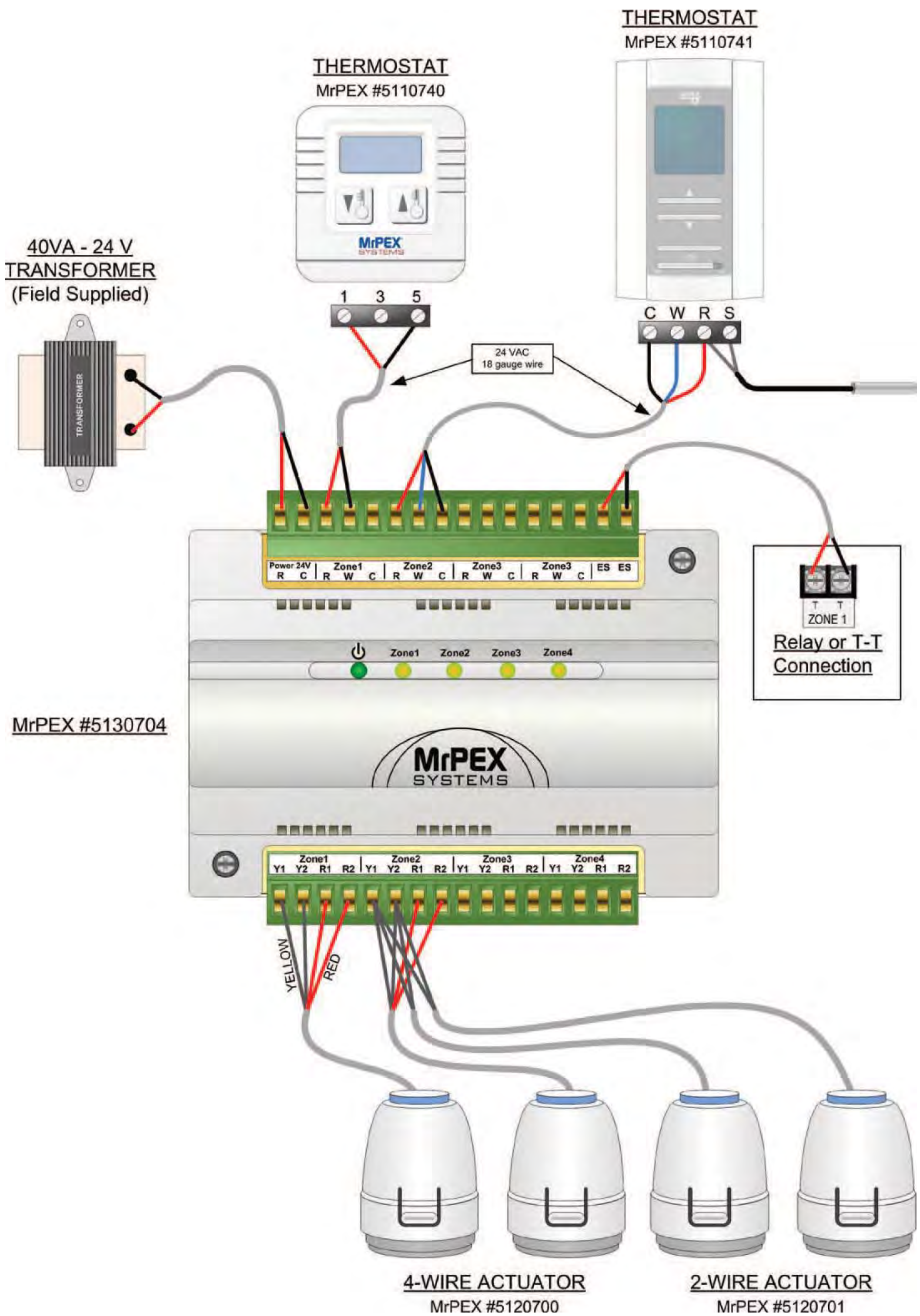
**Display range** **F mode:** 32 °F to 140 °F (0 °C to 60 °C)
**AF mode:** 32 °F to 122 °F (0 °C to 50 °C)

**Resolution:** 1 °F (0.5 °C)

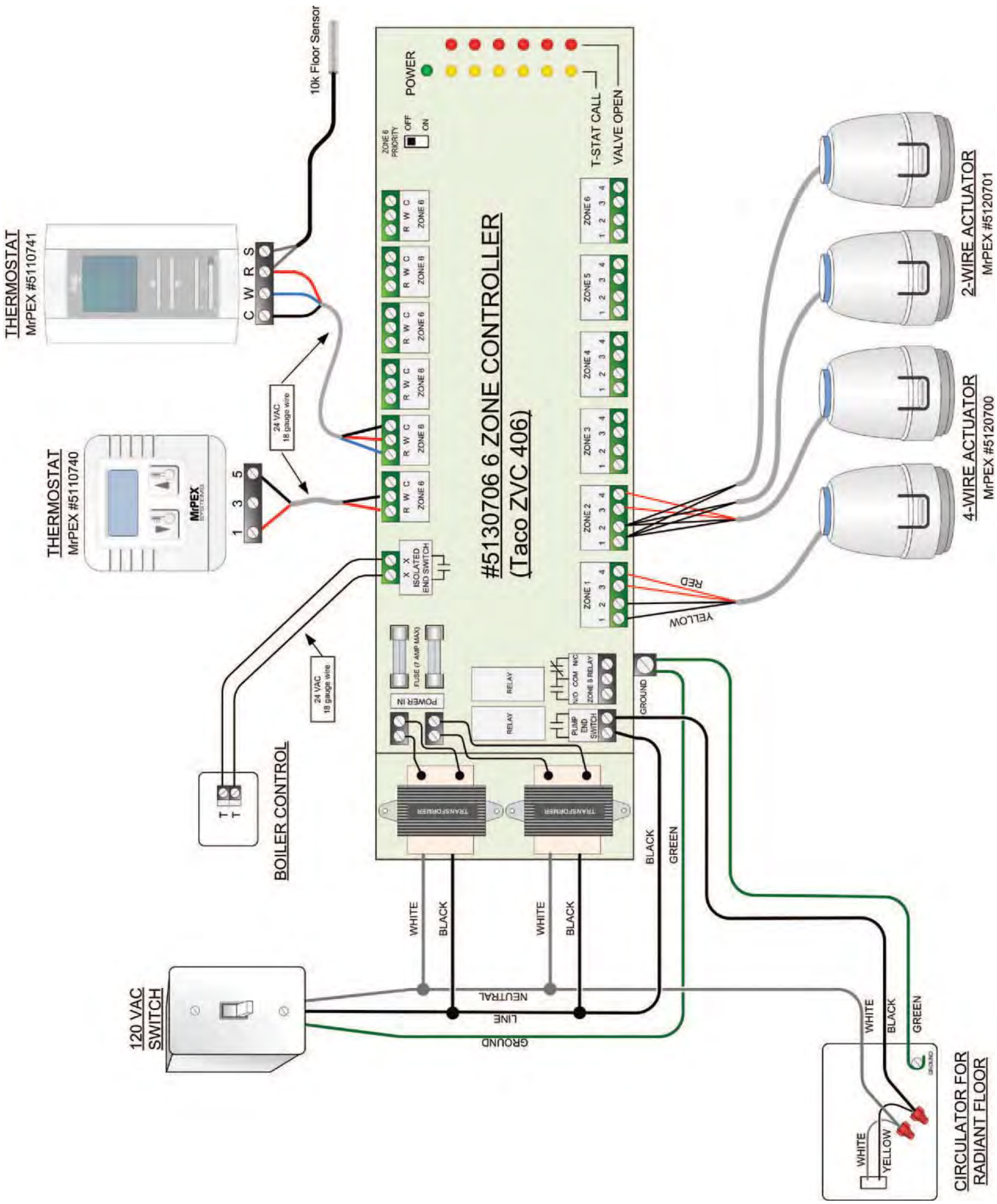
**Data protection:** All settings are saved during a power failure.

# ELECTRICAL SCHEMATICS

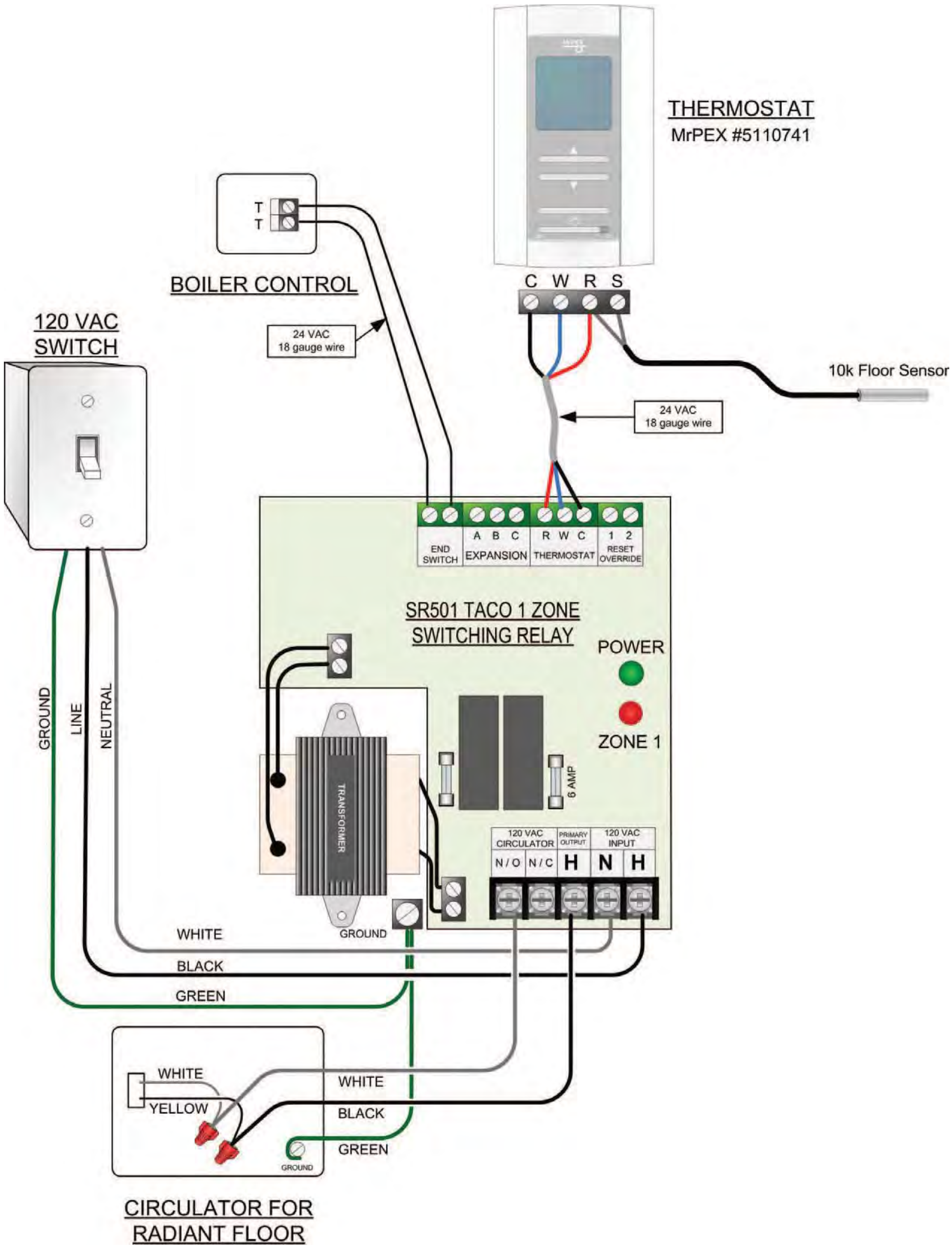
## SIMPLE 4 ZONE CONTROLLER MRPEX® #5130704



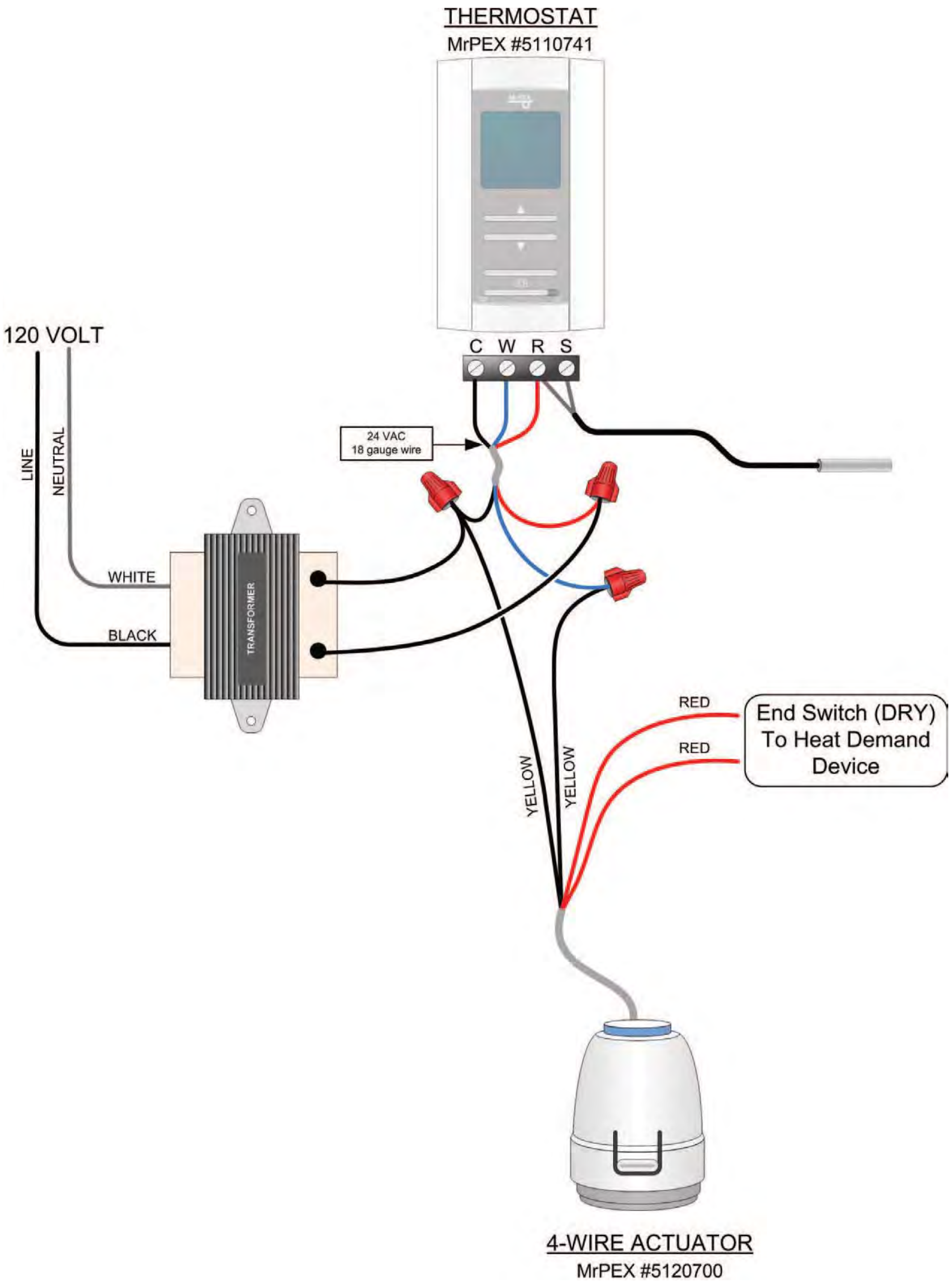
# 6 ZONE CONTROLLER MRPEX® #5130706



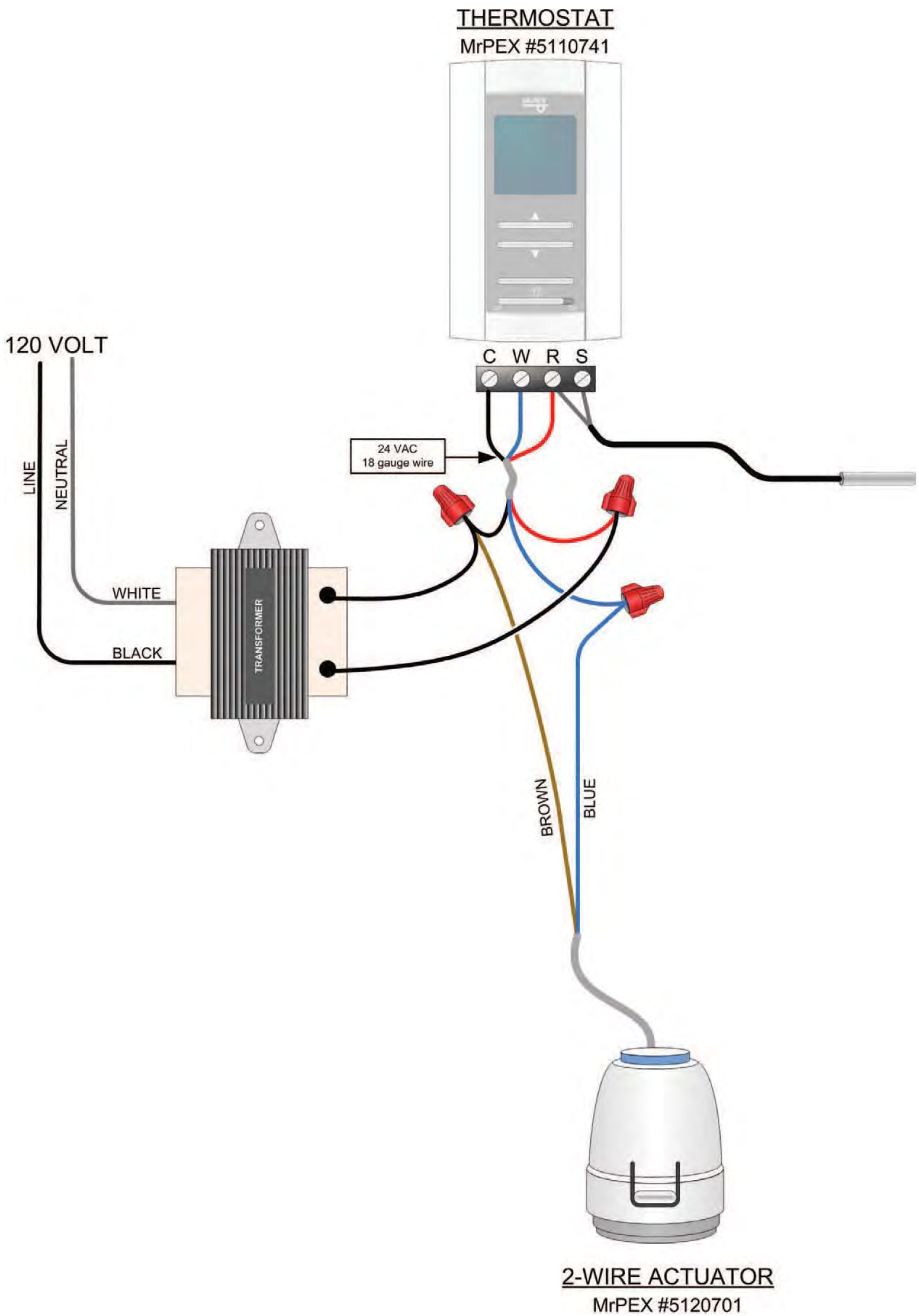
# SINGLE ZONE CONTROLLER USING SINGLE ZONE PUMP RELAY WITH FLOOR SENSING THERMOSTAT #5110741



# SINGLE ZONE SIMPLE WIRING USING MRPEX® #5110741 AND #5120700

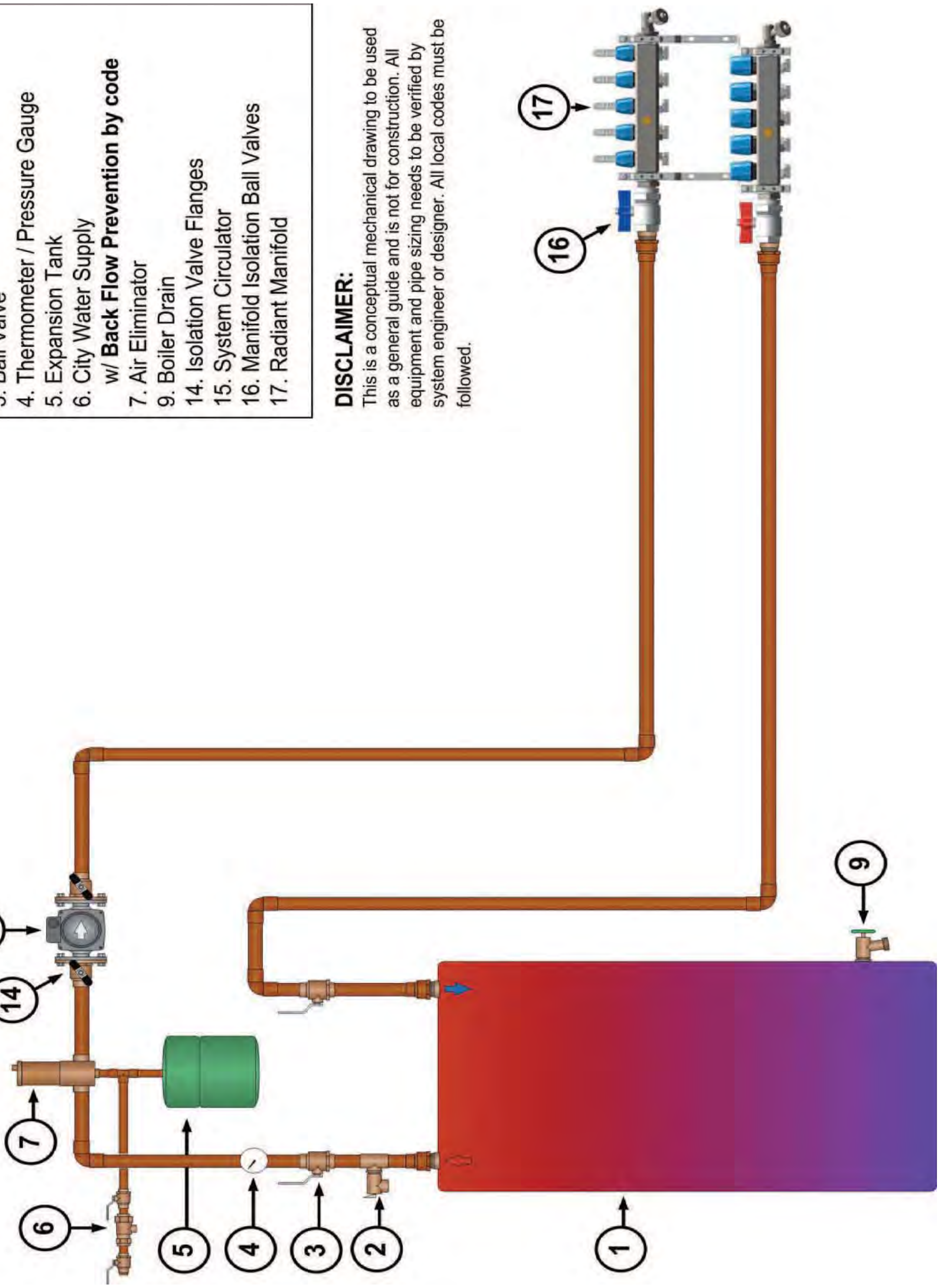


# SINGLE ZONE SIMPLE WIRING USING MRPEX® #5110741 AND #5120701



# MECHANICAL SCHEMATICS

## CONDENSING BOILER OR WATER HEATER – NO MIXING




**Component Overview**

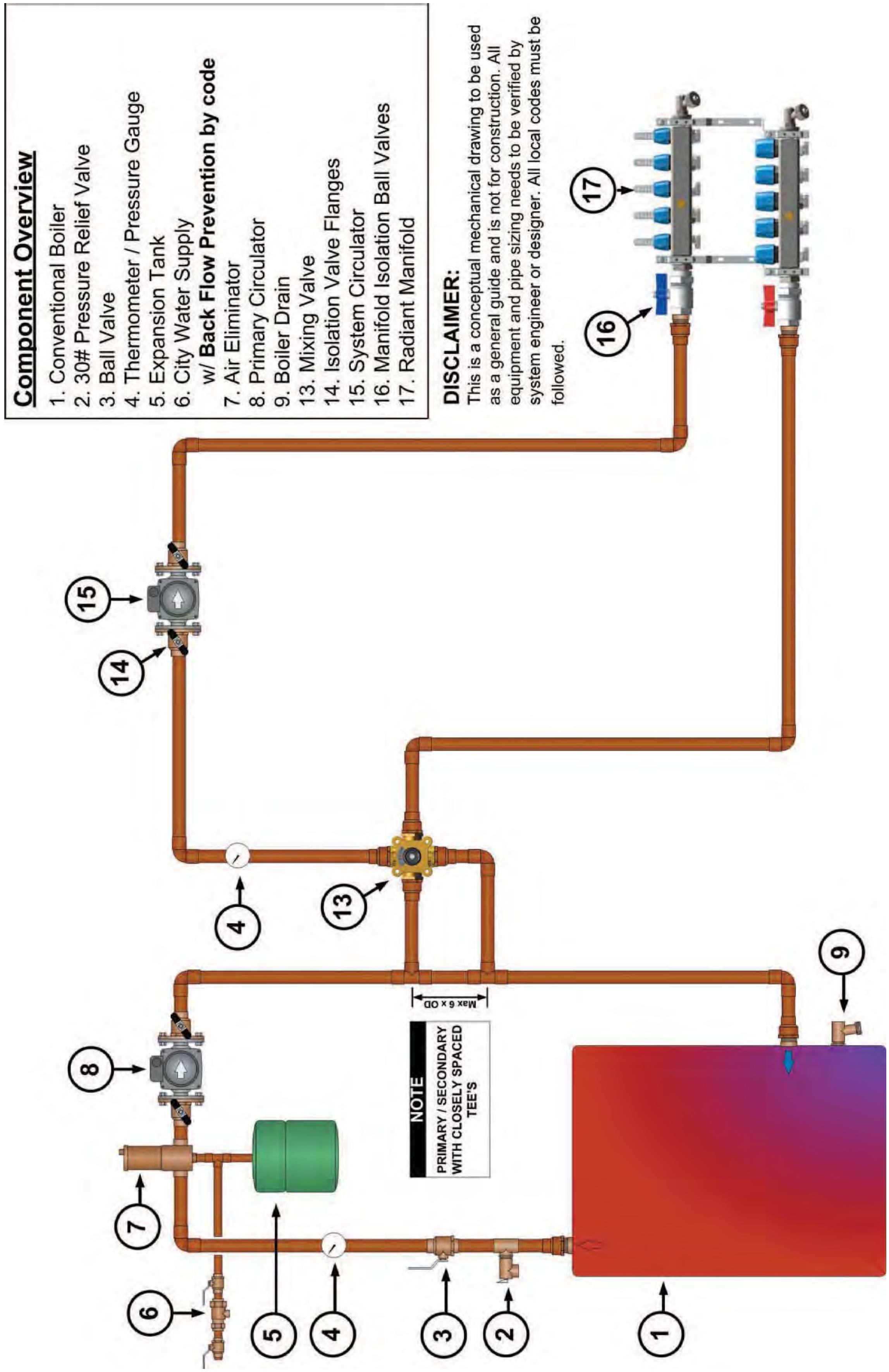
1. Condensing Boiler / Water Heater
2. 30# Pressure Relief Valve
3. Ball Valve
4. Thermometer / Pressure Gauge
5. Expansion Tank
6. City Water Supply w/ **Back Flow Prevention by code**
7. Air Eliminator
9. Boiler Drain
14. Isolation Valve Flanges
15. System Circulator
16. Manifold Isolation Ball Valves
17. Radiant Manifold

**DISCLAIMER:**
This is a conceptual mechanical drawing to be used as a general guide and is not for construction. All equipment and pipe sizing needs to be verified by system engineer or designer. All local codes must be followed.

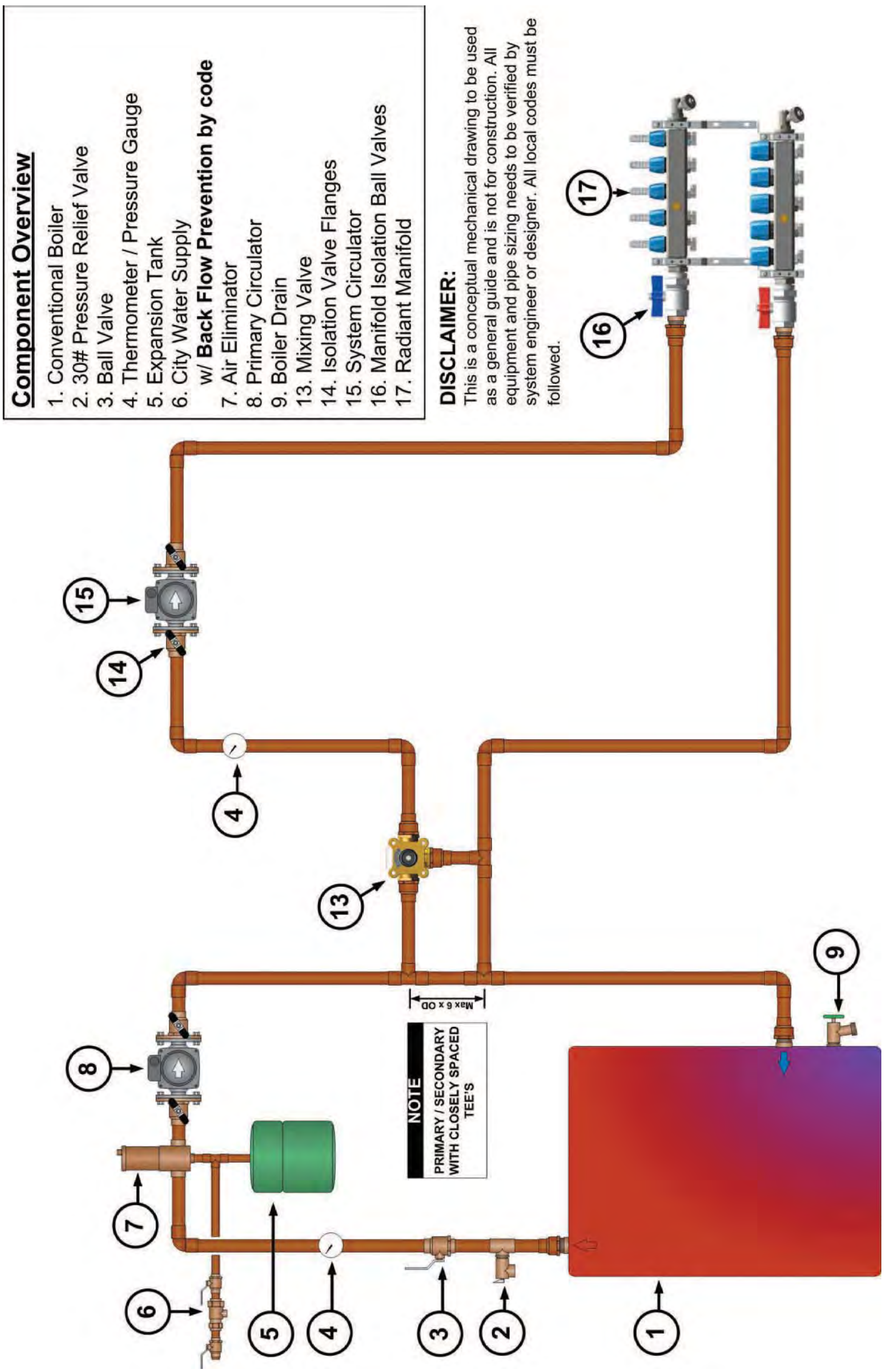
MR PEX SYSTEMS

MECHANICAL SCHEMATICS

# CONVENTIONAL BOILER WITH 4-WAY MIXING VALVE



# CONVENTIONAL BOILER WITH 3-WAY MIXING VALVE



# CONVENTIONAL BOILER WITH VARIABLE SPEED INJECTION PUMP

**Component Overview**

1. Conventional Boiler
2. 30# Pressure Relief Valve
3. Ball Valve
4. Thermometer / Pressure Gauge
5. Expansion Tank
6. City Water Supply w/ **Back Flow Prevention by code**
7. Air Eliminator
8. Primary Circulator
9. Boiler Drain
10. Variable Speed Injection Pump w/ control for secondary water temp
11. Globe Valve
14. Isolation Valve Flanges
15. System Circulator
16. Manifold Isolation Ball Valves
17. Radiant Manifold

**DISCLAIMER:**
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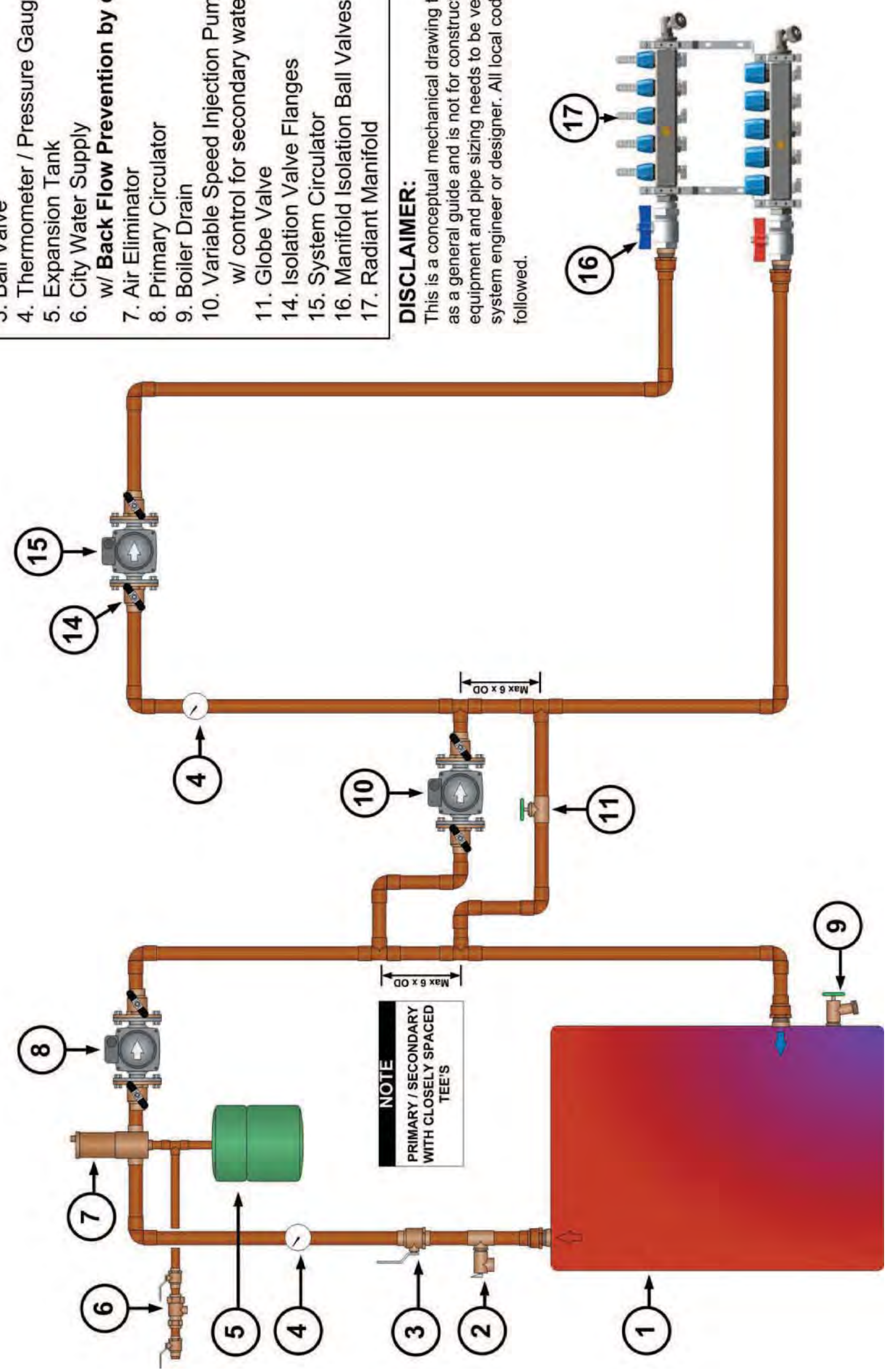
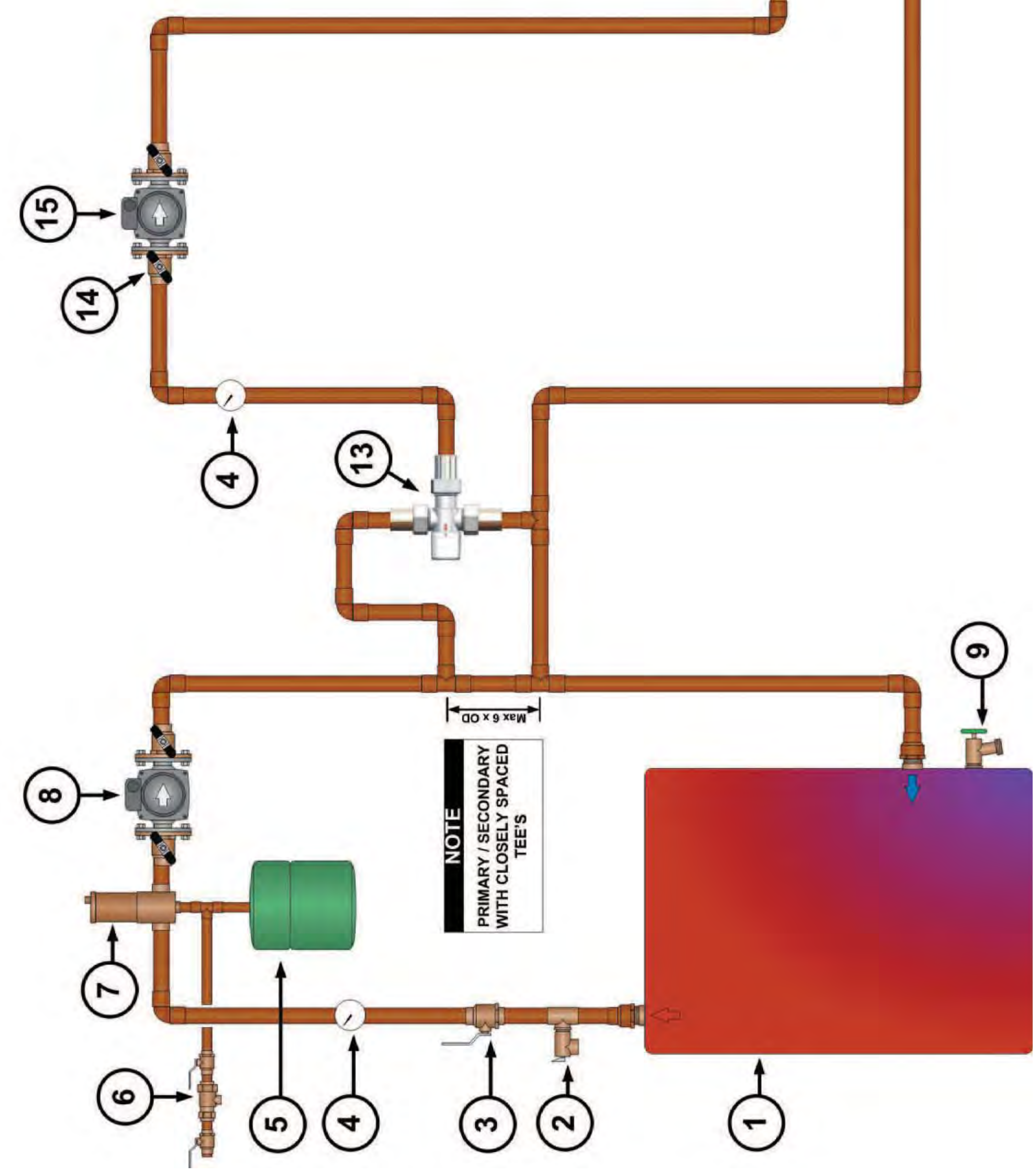


# CONVENTIONAL BOILER WITH 3-WAY TEMPERING VALVE

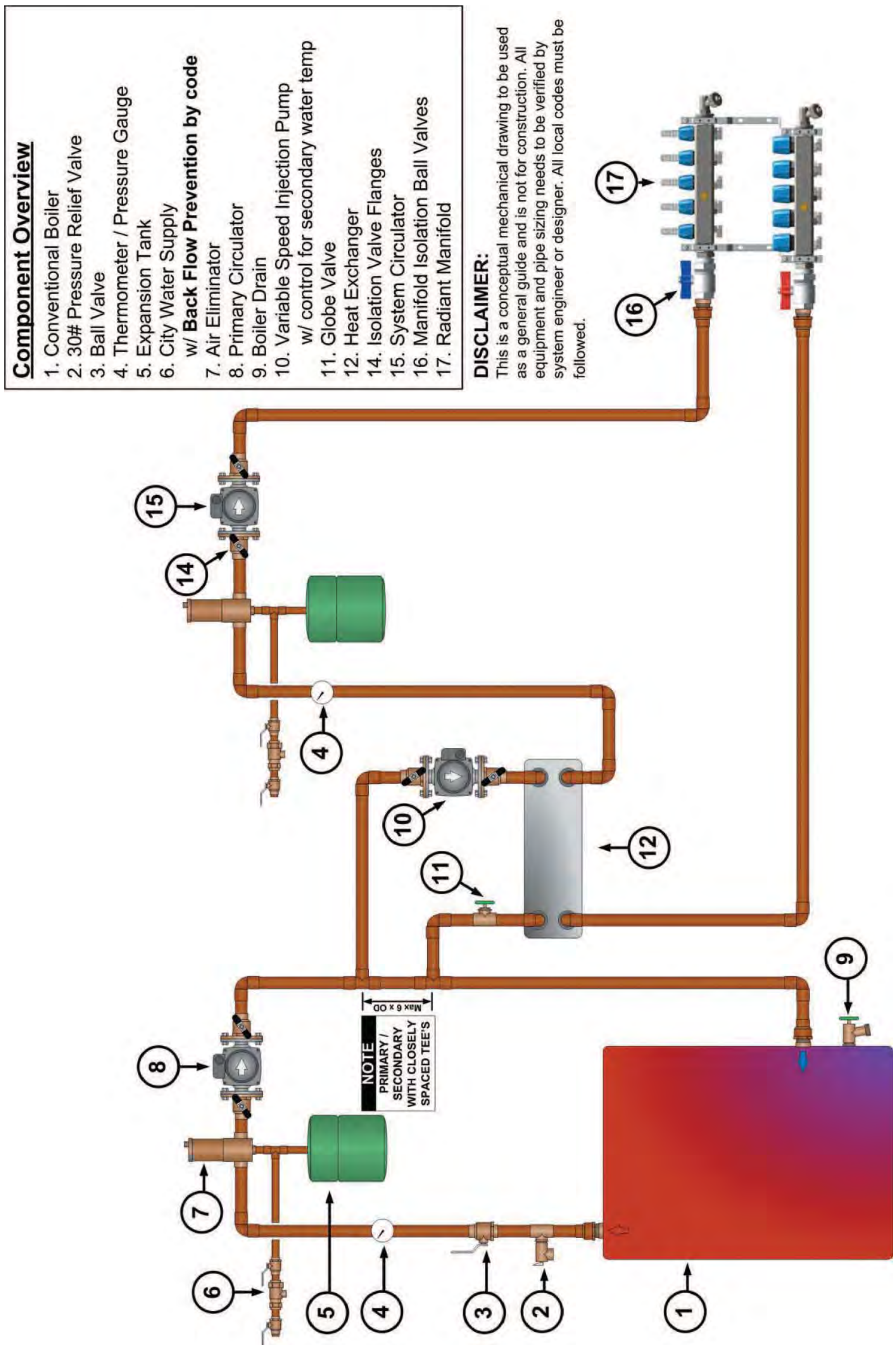
**Component Overview**

1. Conventional Boiler
2. 30# Pressure Relief Valve
3. Ball Valve
4. Thermometer / Pressure Gauge
5. Expansion Tank
6. City Water Supply w/ **Back Flow Prevention by code**
7. Air Eliminator
8. Primary Circulator
9. Boiler Drain
13. Mixing Valve
14. Isolation Valve Flanges
15. System Circulator
16. Manifold Isolation Ball Valves
17. Radiant Manifold

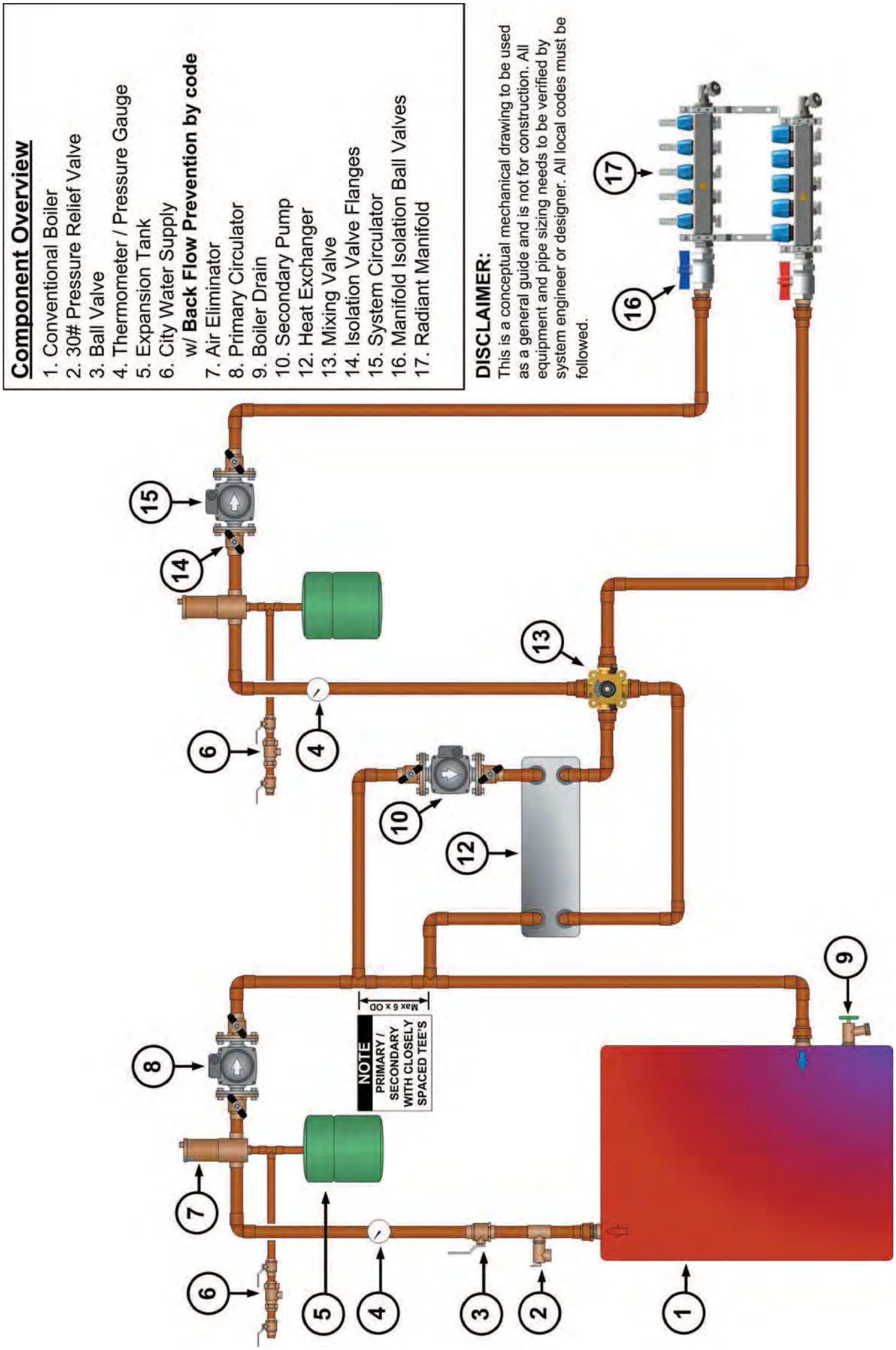
**DISCLAIMER:** This is a conceptual mechanical drawing to be used as a general guide and is not for construction. All equipment and pipe sizing needs to be verified by system engineer or designer. All local codes must be followed.



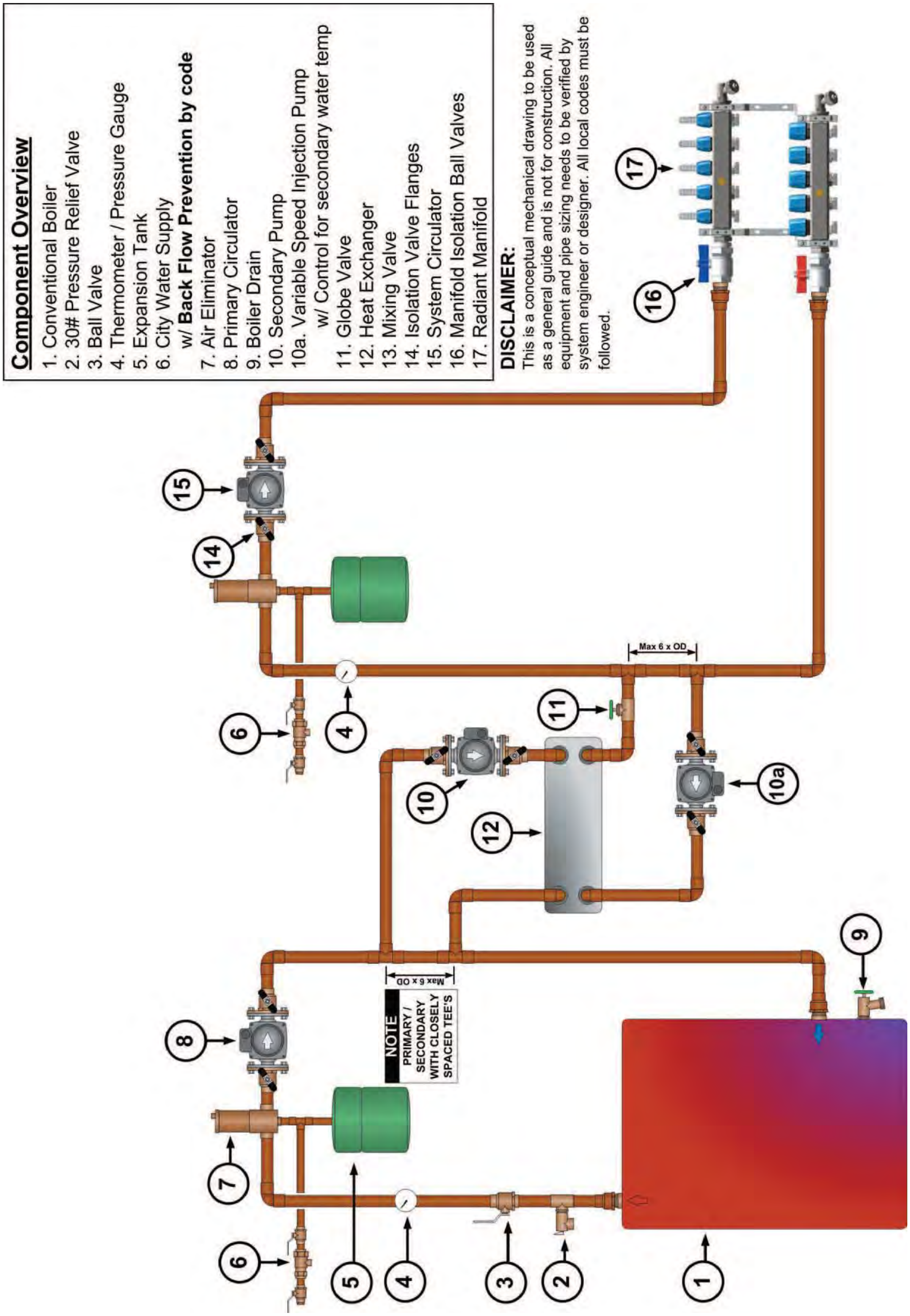
# CONVENTIONAL BOILER WITH HEAT EXCHANGER 1



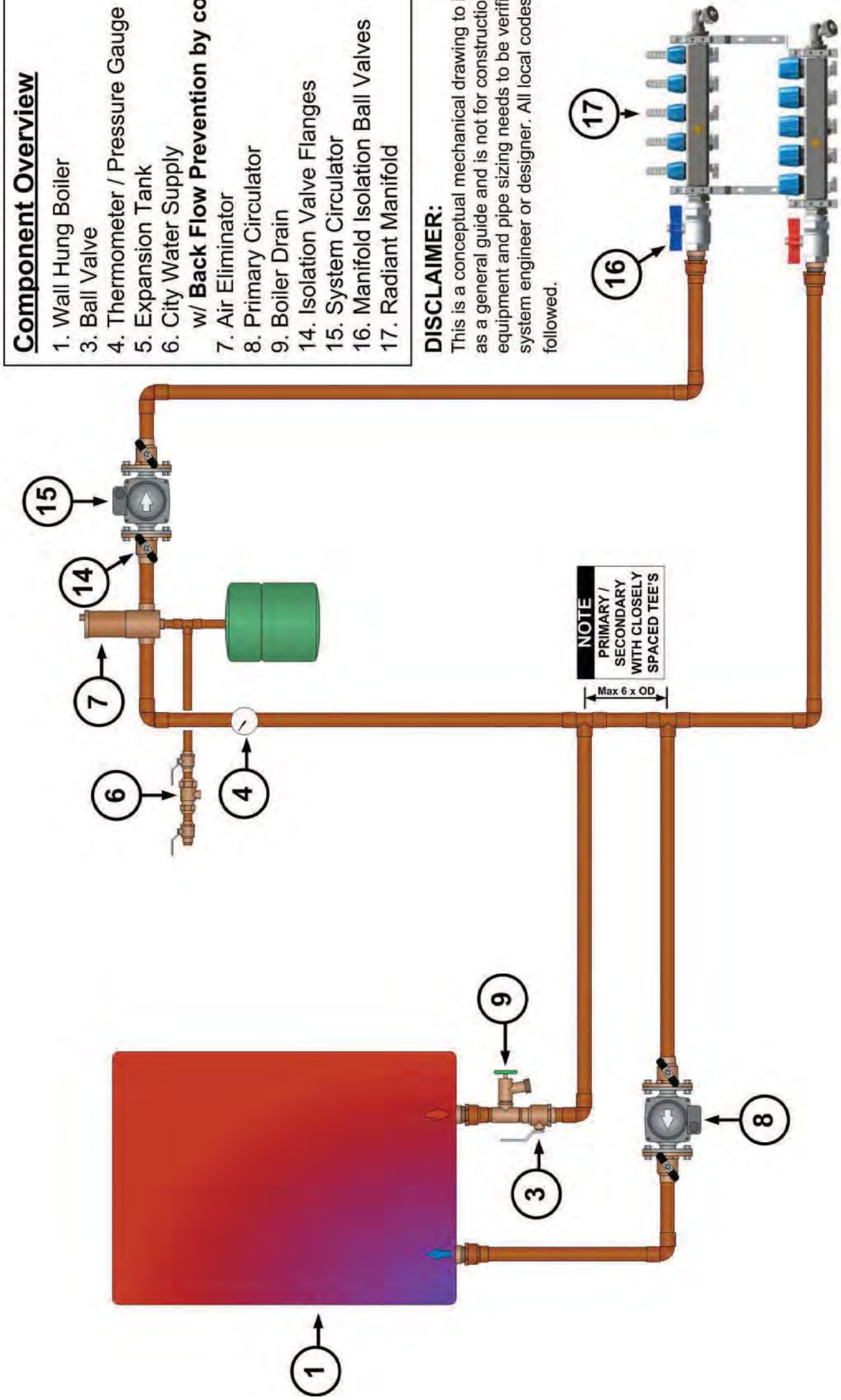
# CONVENTIONAL BOILER WITH HEAT EXCHANGER 2



# CONVENTIONAL BOILER WITH HEAT EXCHANGER 3



# WALL HUNG BOILER – NO MIXING

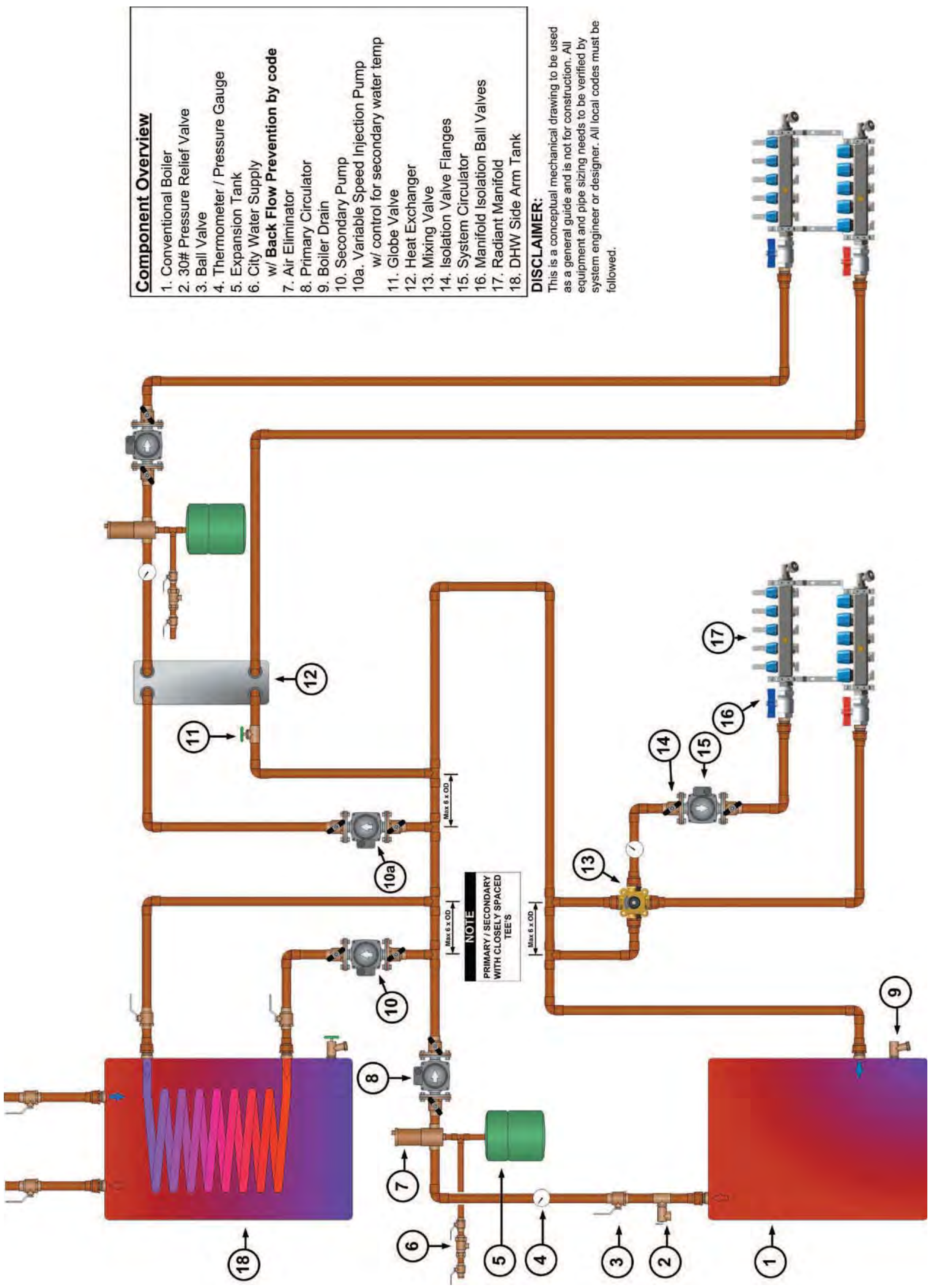



**Component Overview**

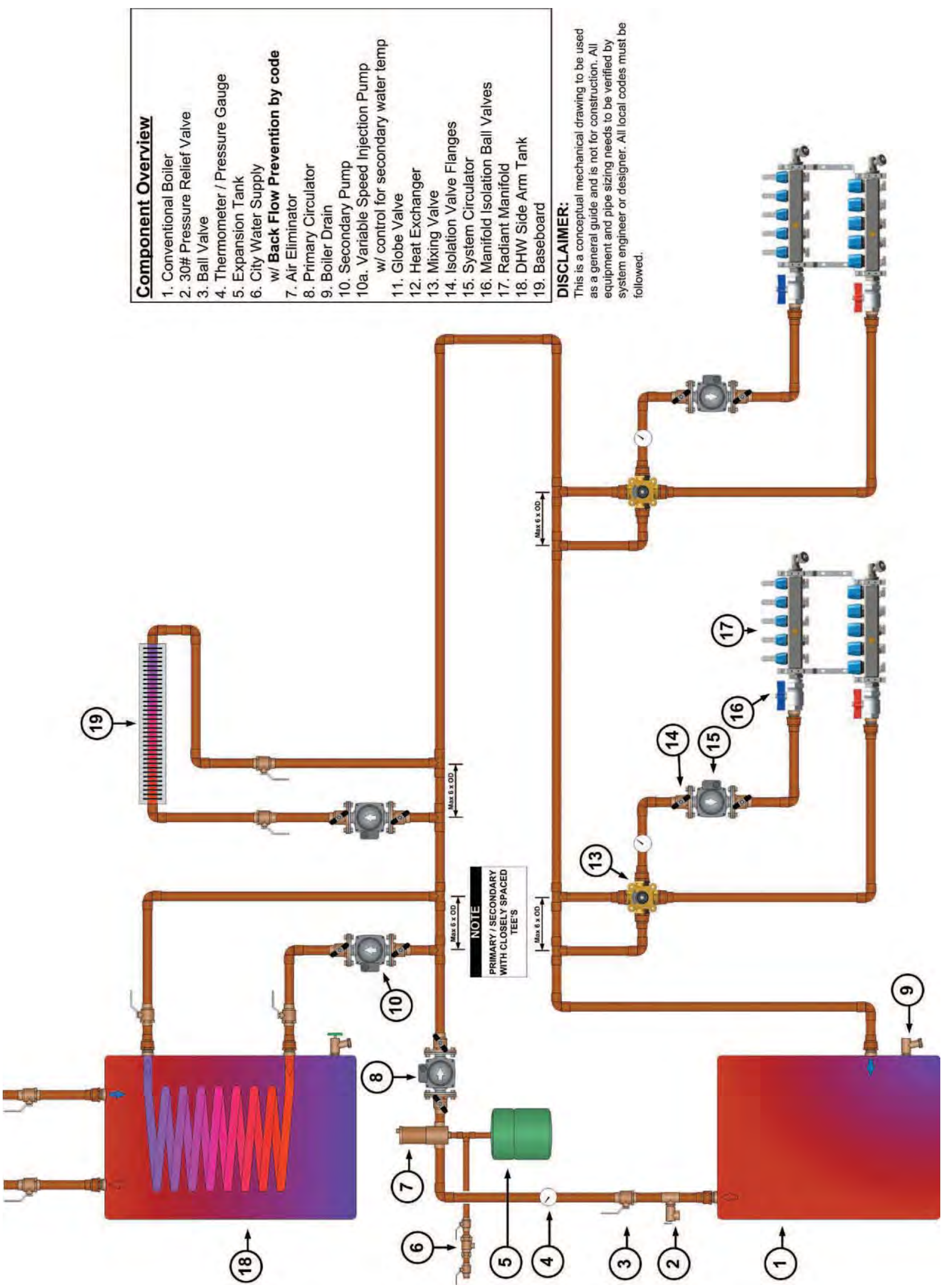
1. Wall Hung Boiler
3. Ball Valve
4. Thermometer / Pressure Gauge
5. Expansion Tank
6. City Water Supply w/ **Back Flow Prevention by code**
7. Air Eliminator
8. Primary Circulator
9. Boiler Drain
14. Isolation Valve Flanges
15. System Circulator
16. Manifold Isolation Ball Valves
17. Radiant Manifold

**DISCLAIMER:**
This is a conceptual mechanical drawing to be used as a general guide and is not for construction. All equipment and pipe sizing needs to be verified by system engineer or designer. All local codes must be followed.

# CONVENTIONAL BOILER WITH DHW, HEAT EXCHANGER, 1 TEMP MIXING



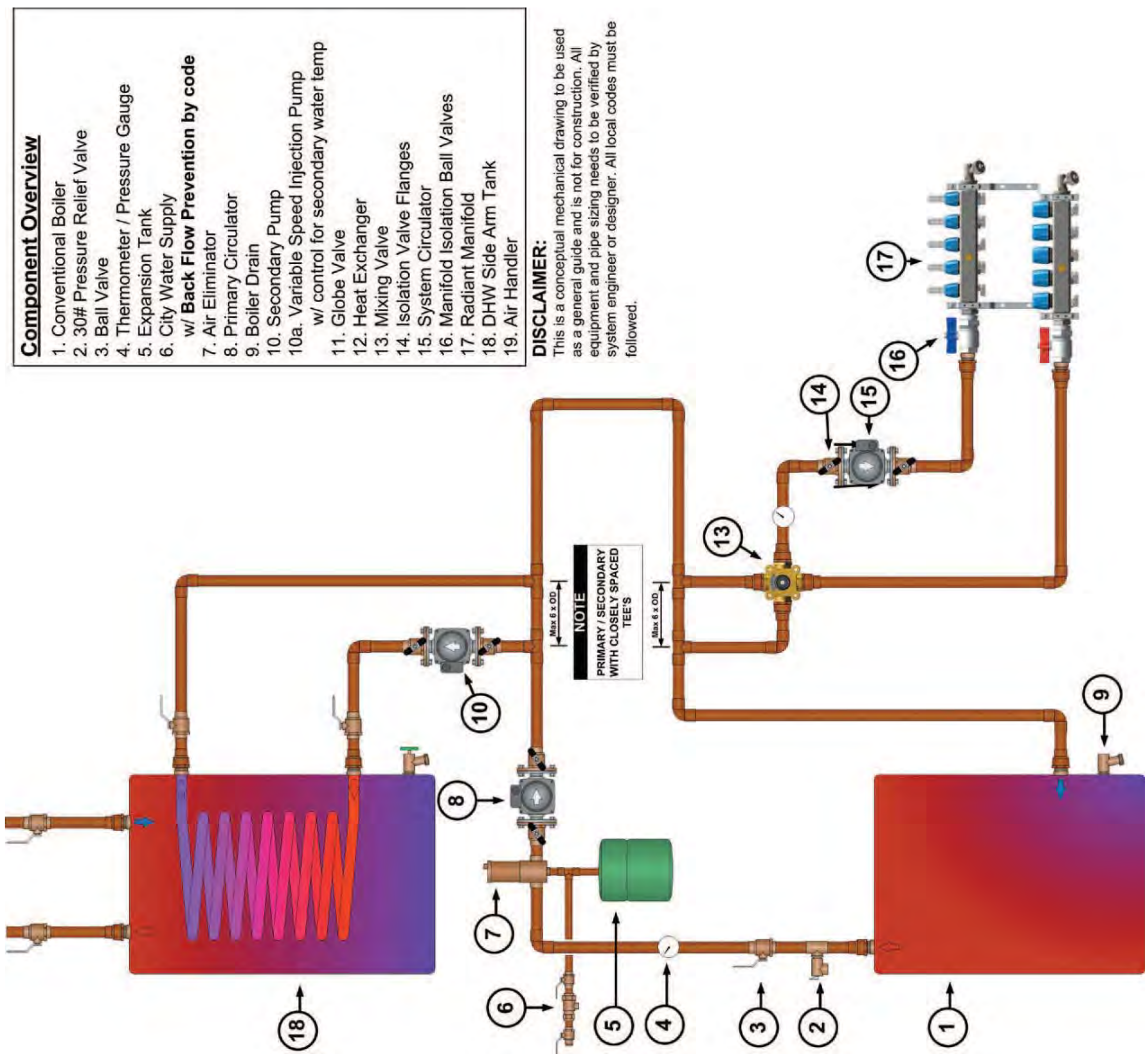
# CONVENTIONAL BOILER WITH DHW, BASEBOARD, 2 TEMP MIXING




MECHANICAL SCHEMATICS

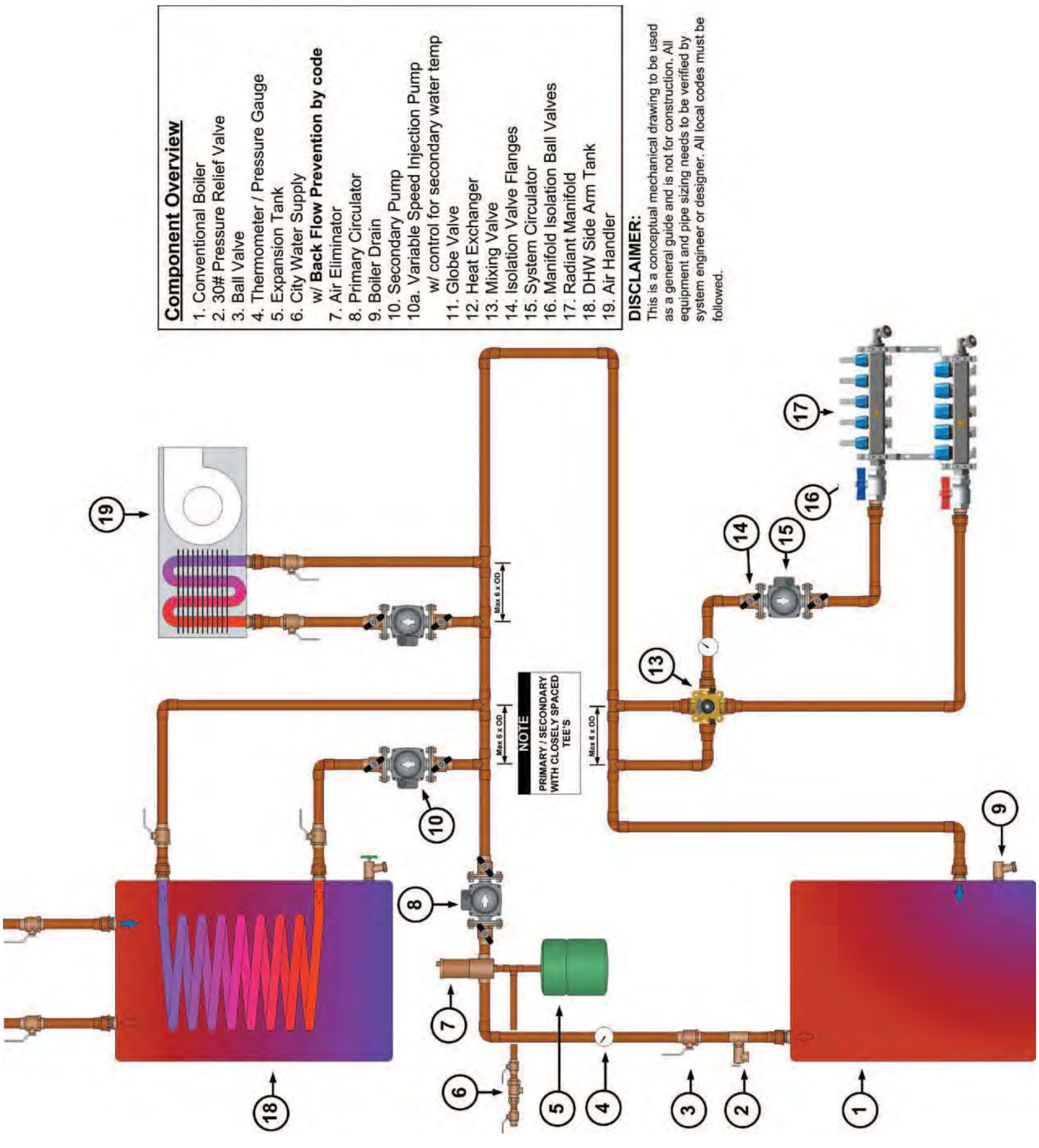
# CONVENTIONAL BOILER WITH DHW, 1 TEMP MIXING



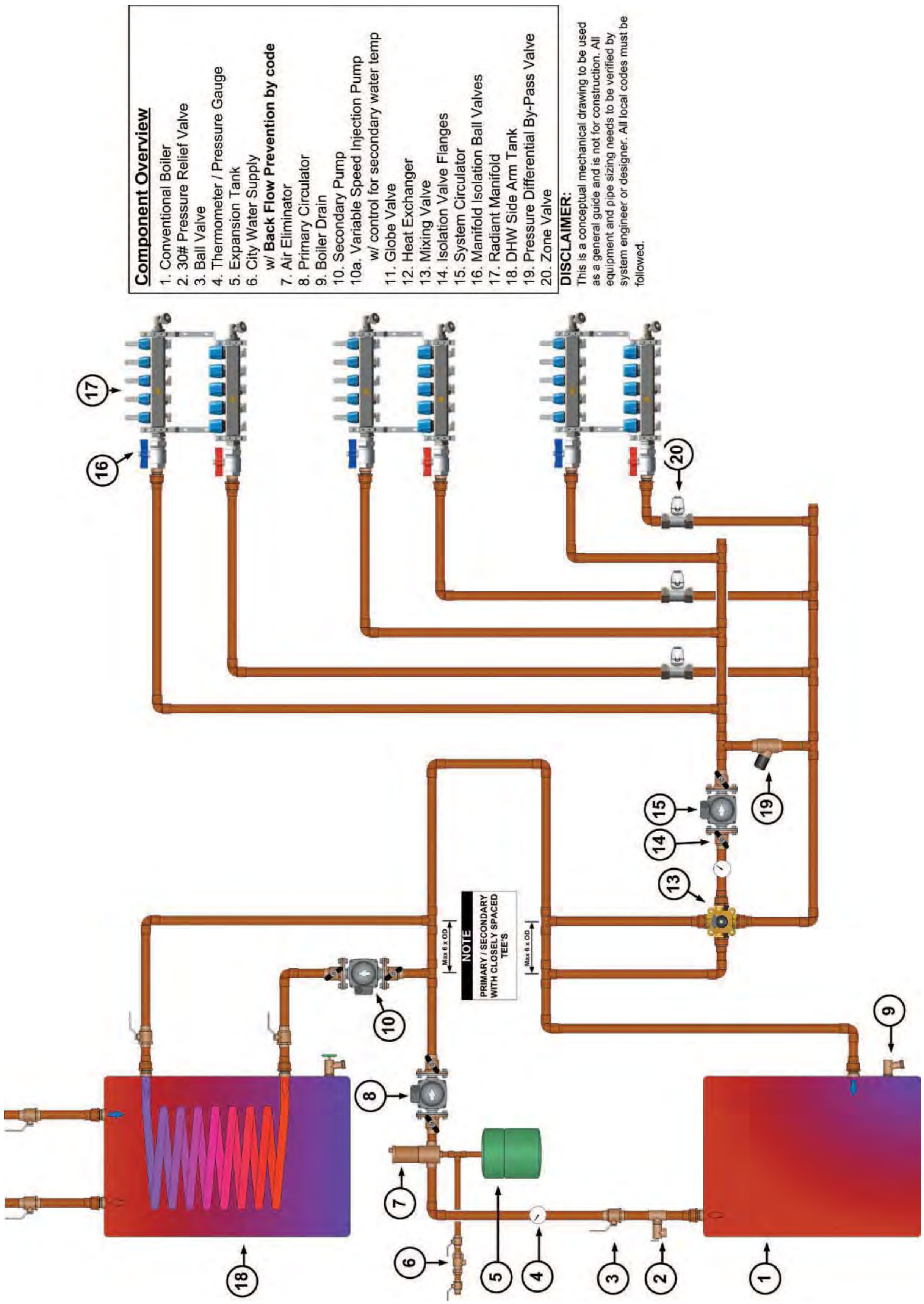


# CONVENTIONAL BOILER WITH DHW, AIR HANDLER, 1 TEMP MIXING

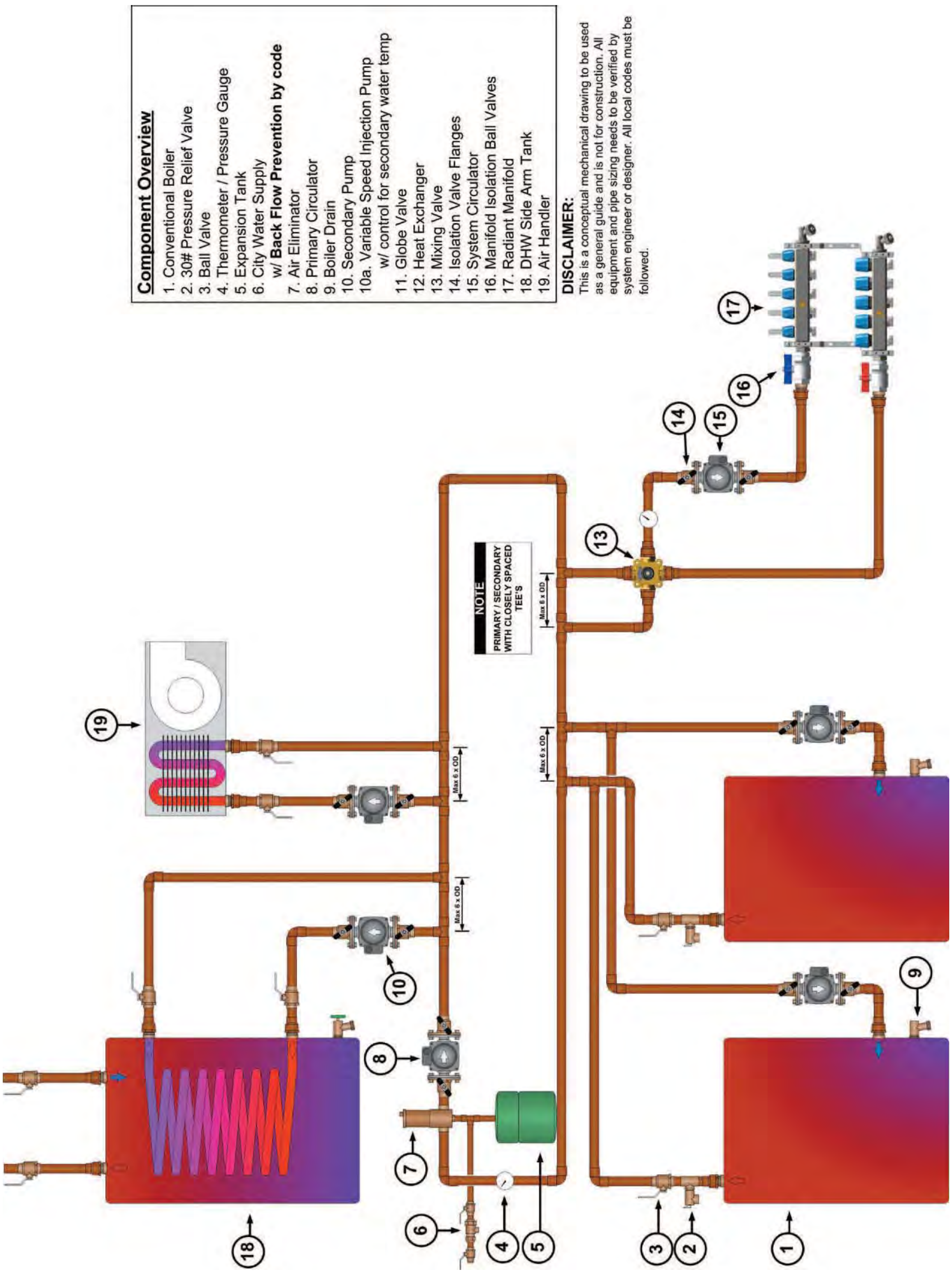




# CONVENTIONAL BOILER WITH DHW, 1 TEMP MIXING, ZONE VALVES



# 2 CONVENTIONAL BOILERS WITH DHW, AIR HANDLER, 1 TEMP MIXING



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**EFFCTIVE MAY 1, 2014**

**VALID FOR MRPEX® TUBING AND PANEL HEATING COMPONENTS**

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Below you can download LoopCAD with the MrPEX® Add-on already preloaded. Initially this will be in trial mode, giving you 30-days to evaluate the software for free. If you are downloading this as an update and you have already entered an Activation Code, the program automatically switch to the full version for you.

Download of this release is available at: **www.LoopCAD.com/mrpex**

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