



**MrPEX**<sup>®</sup>  
SYSTEMS



# Installation Guide



H E A T I N G



**Heating Installation Guide**

published by

**MrPEX® Systems**

2613 87th Court W.  
Northfield, MN 55057

800-716-3406  
mrpexsystems.com  
mrpex@mrpexsystems.com

©2014 MrPEX® Systems  
All rights reserved

Printed September 2014 in the United States of America

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.

## **70 HEAT OUTPUT CHARTS**

- 70 Heat Output for RetroPanel on Subfloor or Concrete 8" O.C.
- 71 Heat Output for Heat Transfer Plates Below Subfloor 8" O.C.
- 72 Heat Output for Radiant Ceiling Using Aluminum Heat Transfer Plates 8" O.C.
- 73 Heat Output for Aluminum Heat Transfer Plates on Subfloor 8" O.C.
- 74 Heat Output for Aluminum Heat Transfer Plates Below Subfloor 8" O.C.
- 75 Heat Output for Suspended Poured Underlayment 6" O.C.
- 76 Heat Output for Suspended Poured Underlayment 9" O.C.
- 77 Heat Output for Suspended Poured Underlayment 12" O.C.
- 78 Heat Output for Slab On or Below Grade 6" O.C.
- 79 Heat Output for Slab On or Below Grade 9" O.C.
- 80 Heat Output for Slab On or Below Grade 12" O.C.

## **81 FLOW CHARTS**

- 81 Flow Chart for 6" O.C. @ 10°F Delta-T
- 82 Flow Chart for 9" O.C. @ 10°F Delta-T
- 83 Flow Chart for 12" O.C. @ 10°F Delta-T
- 84 Flow Chart for 6" O.C. @ 20°F Delta-T
- 85 Flow Chart for 9" O.C. @ 20°F Delta-T
- 86 Flow Chart for 12" O.C. @ 20°F Delta-T

## **87 PRESSURE DROP CHARTS**

- 87 Pressure Drop For Small PEX Tubing at 100 F
- 88 Pressure Drop For Large PEX Tubing at 100 F
- 89 Pressure Drop For PAP Tubing at 100 F
- 90 Pressure Drop For Copper Tubing at 100 F
- 91 C<sub>v</sub> Values
- 92 Pressure Head Correction Factor for Temperatures and Propylene Glycol
- 93 Flow Correction Factor for Temperatures and Propylene Glycol

## **94 THERMOSTAT INSTALLATION**

- 94 Installation Instructions for Digital Thermostat #5110740

96	Installation Instructions for Digital Thermostat #5110741
<b>100</b>	<b>ELECTRICAL SCHEMATICS</b>
100	Simple 4 Zone Controller MrPEX® #5130704
101	6 Zone Controller MrPEX® #5130706
102	Single Zone Controller Using Single Zone Pump Relay with Floor Sensing Thermostat #5110741
103	Single Zone Simple Wiring Using MrPEX® #5110741 and #5120700
104	Single Zone Simple Wiring Using MrPEX® #5110741 and #5120701
<b>105</b>	<b>MECHANICAL SCHEMATICS</b>
105	Condensing Boiler or Water Heater – No Mixing
106	Conventional Boiler with 4-Way Mixing Valve
107	Conventional Boiler With 3-Way Mixing Valve
108	Conventional Boiler with Variable Speed Injection Pump
109	Conventional Boiler with 3-Way Tempering Valve
110	Conventional Boiler with Heat Exchanger 1
111	Conventional Boiler with Heat Exchanger 2
112	Conventional Boiler with Heat Exchanger 3
113	Wall Hung Boiler – No Mixing
114	Conventional Boiler with DHW, Heat Exchanger, 1 Temp Mixing
115	Conventional Boiler with DHW, Baseboard, 2 Temp Mixing
116	Conventional Boiler with DHW, 1 Temp Mixing
117	Conventional Boiler with DHW, Air Handler, 1 Temp Mixing
118	Conventional Boiler with DHW, 1 Temp Mixing, Zone Valves
119	2 Conventional Boilers with DHW, Air Handler, 1 Temp Mixing
<b>120</b>	<b>LIMITED WARRANTY</b>
<b>121</b>	<b>LOOP CAD</b>

# 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 knowledgeable 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/ (m<sup>3</sup> d) equivalent to 0.32 mg/ (m<sup>2</sup> 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.