Chapter 15:

Uponor distribution piping

Uponor distribution piping uses Wirsbo hePEX or Ecoflex in lieu of copper or steel piping in traditional hydronic distribution systems. Uponor distribution piping systems can be installed overhead, in a traditional manner, or below-grade — providing design flexibility to the contractor, designer and/or engineer.

Uponor distribution piping is ideal in new construction, and it also has tremendous benefits in both retrofit and remodel applications where piping may be installed without having to cut into walls and ceilings, or without necessitating soldering in potentially dangerous areas.

Distribution solution for any application

Uponor PEX-a straight lengths are available in 20-foot sections up to 3" diameters, enabling contractors to provide an ideal solution for any hydronic distribution heating and/or cooling application. Uponor PEX-a straight lengths offer the finished appearance of rigid piping with all the benefits of PEX-a piping.

For longer continuous runs or other applications in which piping is embedded in a slab, Uponor offers a wide variety of coil lengths in various diameters. See the Uponor Product Catalog for more information.

Ecoflex is a pre-insulated, jacketed product that uses Wirsbo hePEX or Uponor AquaPEX designed for direct burial. Ecoflex is ideal for applications where traditional overhung pipe is expensive or space is at a premium.

PEX piping operating limits

The following tables detail the upper and lower limits for PEX piping of various diameters.

Precise pipe sizing information

For precise sizing data, please refer to the steps below for gpm, velocity and feet of head loss per foot.

1. Determine the BTU/h for the desired zone.
2. Determine the gpm flow rate required to supply the BTU/h to that zone by using the following equation where Delta T (ΔT) is the supply/return temperature differential.

gpm = BTU/h ÷ (ΔT x 500)

PEX piping operating limits

The following tables detail the upper and lower limits for PEX piping of various diameters.

Piping size	Operating limit	BTU/h	Gallons per minute (gpm)	Velocity (feet per second)	Head-loss (per 100 ft)
5⁄16"	Lower Limit	4,000	0.4	1.86	6.185
	Upper Limit	15,000	1.5	7.44	71.30
3⁄8"	Lower Limit	6,000	0.6	1.81	2.08
	Upper Limit	20,000	2.0"	7.71	30.19
½"	Lower Limit	10,000	1.0	1.92	1.73
	Upper Limit	40,000	4.0	7.70	22.46
5⁄8"	Lower Limit	15,000	1.5	1.86	2.61
	Upper Limit	60,000	6.0	7.44	33.88
¾"	Lower Limit	20,000	2.0	1.81	2.08
	Upper Limit	85,000	8.5	7.71	30.19
1"	Lower Limit	35,000	3.5	1.92	1.73
	Upper Limit	140,000	14.0	7.70	22.46
1¼"	Lower Limit	50,000	5.0	1.84	1.26
	Upper Limit	210,000	21.0	7.72	17.88
1½"	Lower Limit	70,000	7.0	1.85	1.05
	Upper Limit	300,000	30.0	7.92	15.44
2"	Lower Limit	120,000	12.0	1.85	0.76
	Upper Limit	520,000	52.0	8.00	11.50
2½"	Lower Limit	180,000	18.0	1.82	0.58
	Upper Limit	780,000	78.0	7.88	8.74
3"	Lower Limit	260,000	26.0	1.85	0.49
	Upper Limit	1,120,000	112.0	7.96	7.25
3½"	Lower Limit	350,000	35.0	1.84	0.41
	Upper Limit	1,500,000	150.0	7.91	6.02
4"	Lower Limit	450,000	45.0	1.83	0.35
	Upper Limit	1,950,000	195.0	7.93	5.21

Note: The values above assume a 160°F supply water temperature, a 20°F supply/return temperature difference, and velocity between 1.75 and 8.0 ft/sec.

Table 15-1: Recommended PEX-a piping size limits

3. Determine the velocity of the fluid in the piping using the calculated gpm and the pipe interior diameter (i.d.) in inches by using the following equation.

   $V = 0.408496 \times (gpm \div i.d.^2)$

   Note: In most applications, keep velocity between 1.75 and 8.0 ft/sec.

4. Determine the feet of head loss per foot, with 160°F supply water temperature, using the gpm and the piping i.d., by using the following equation.

   $\text{Feet of Head Loss/Foot} = 0.0008436 \times (gpm^{1.85} \div i.d.^{4.8655})$

5. For a supply water temperature not equal to 160°F, multiply the head loss (from step 4) by the appropriate temperature correction factor from **Table 15-3** to yield the correct head loss per foot for systems using 100% water.

6. For systems that use a glycol mixture, multiply the head loss (from step 5) by the appropriate glycol correction factor from the table below to yield the correct result.

100% Water	30% Glycol	40% Glycol	50% Glycol
1.00	1.24	1.33	1.40

Table 15-2: Glycol correction factors

See **Appendix G** for pressure loss and velocity tables.

Distribution pipe heat loss

Heat loss in distribution systems is also a very important parameter. For example, a zone may need 40,000 BTU/h to be satisfied, but that does not include the heat loss that occurs when transporting the energy to the zone. **Figure 15-1** illustrates the heat loss per foot when using PEX-a as a distribution system.

200°F	180°F	160°F	140°F	120°F	100°F	80°F	60°F	40°F
0.96	0.98	1	1.02	1.05	1.1	1.14	1.2	1.3

Table 15-3: Temperature correction factor

Figure 15-1: Pre-insulated Uponor PEX piping

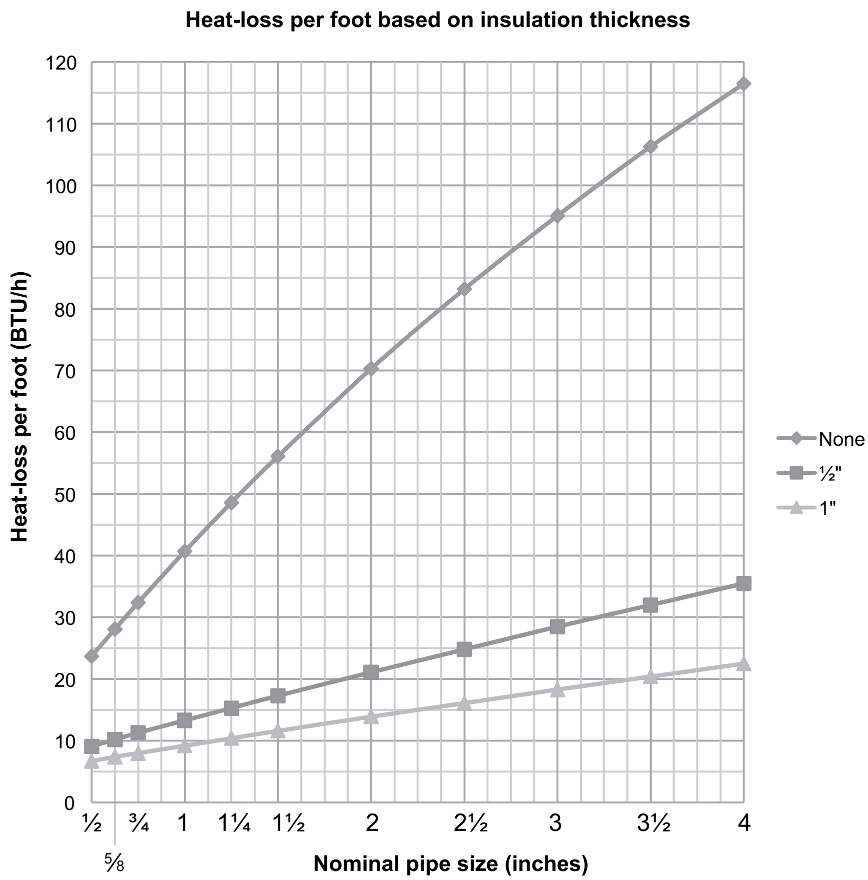

Figure 15-2: Distribution pipe heat-loss per foot

Figure 15-2 is based on the following set of parameters: a temperature differential between the ambient air and the water flowing in the pipe of 90°F, turbulent flow at 8 ft/sec, insulation conductivity is constant at 0.021 BTU/hr/ft/°F heat transfer coefficient off the outer surface of 2.2 BTU/hr/ft²/°F.