

Chapter 5: *Economy of design*

Technology is constantly evolving. What was once considered innovative, or even far-fetched, becomes the norm. For example, the earliest pioneers of computers did not anticipate that people would want or even need a computer in their homes. Now, they're as common as television sets, mobile phones and iPads.

So, too, have things evolved in the heating industry. Just two decades ago, few people were aware of radiant floor heating, and even fewer seriously considered installing it in their homes. Now, radiant floor heating is the fastest growing segment of the heating industry in North America.

In today's world, if contractors are not accessible by e-mail or at least a cell phone, customers wonder about the contractor's ability to provide current technologies for their home. As technology evolves, so must heating and cooling solutions. The days of manual mixing valves and single thermostats in a radiant floor system are almost obsolete. Contractors must continually train and become educated about newer technologies.

This chapter highlights some of the newer technologies in radiant floor heating that are available to heating professionals from Uponor.



Figure 5-1: Uponor EP heating manifold

Manifolds

A contractor no longer needs to consider zoning by manifold throughout the structure. It is more economical to install multiple zones per manifold location than to install multiple manifold locations. Consider the amount of time it takes to install several manifold locations compared to just a few.

Another factor to consider is the lack of zoning in a structure. For example, forced-air systems typically only use one thermostat for the entire building. Radiant floors, however, allow customized zoning for different rooms. Remember, a radiant floor heats only the space above it and does not migrate to other rooms. Too often, large homes are installed with minimal zoning, so the customer is forced to compromise on comfort.

Manufacturers are responding to the market's desire for speed and simplicity. Earlier versions of manifolds left the contractor assembling the manifold sections. Now, the contractor simply pulls an assembled manifold set out of the box and mounts it in the proper location. The only requirement for the contractor is to install the different options ordered with the manifold.



Figure 5-2: Uponor wireless digital thermostat (left) and heat-only thermostat with touchscreen (right)

Thermostats

The customer's point of interface with the heating system is the thermostat. Some contractors feel that a thermostat is a thermostat — any one will work as well as another. That's like saying a car is just a car. Along with other hydronic controls, thermostats have also evolved to provide a sophisticated control interface.

In the past, the only function of a thermostat was activating one appliance on a call for heat. That simplicity required a basic design. Lifestyles have changed, and heating equipment offers greater diversity. Using an old thermostat designed in the 1950s is like putting a single-barrel carburetor on a Ferrari®. It will run, but it will come nowhere near providing the performance the customer expects.

Uponor thermostats are specifically designed to support radiant floor applications. Anticipation of radiant mass is different than that of air mass. Also, radiant floor systems have a number of voltage load changes across the circuit due to the opening and closing of zone valves or actuators. Most forced-air thermostats do not consider these options in their design. Do not limit the customer's control of their system by using thermostats not designed for radiant applications.

Reset controls

Reset controls, used in baseboard systems for years, have a proven track record for saving money by reducing fuel utilization. Using reset with radiant system also makes sense. Reset allows the supply water temperature to adjust as the outdoor temperature fluctuates. In turn, this helps eliminate short cycling of the boiler.

Note that modulating-condensing (mod-con) boilers can provide reset to a radiant system. Accordingly, it isn't necessary to include additional mixing controls in the radiant system when a mod-con boiler is providing that control.

Design software

Design software provides three primary advantages: speed, accuracy and documentation. The computer printout provides documentation of the design at the time of design. Should the customer change any of the structural design, the heating system designer can document the requirement for a change order. The documentation protects both the designer and the customer. The designer documents the system, and the customer receives documentation of their project. See **Chapter 7** for more information about Uponor design software.



Figure 5-3: Wirsbo hePEX distribution piping

Distribution piping

Consider the speed of installation using PEX piping for distribution piping between manifolds and the mechanical room. The piping is woven through the truss or joist at a fraction of the time needed to install copper piping. And no joints means a straight, seamless run.

Optimal spacing

Typical piping spacing for radiant systems in concrete slabs is 12 inches on center when used to heat living spaces (unless the design dictates otherwise). In areas — such as storage areas and garages — that are not considered living spaces, piping spacing may be increased to 18 or 24 inches on center. The key is meeting the heat loss, which determines the appropriate piping spacing along with other design elements. Use the Uponor radiant design software to gauge the impact on water temperatures.

Do not install piping where it is not required. An area that will be used for cold storage would not require piping as the contents of the room do not require a conditioned space. Interior rooms with no exposed walls or ceiling loss are also areas where piping may not be needed. An exception may be an interior bathroom with tile flooring. Installing piping will provide comfort where the floor might otherwise be unpleasantly cool.



Figure 5-4: Uponor LoopCAD® radiant design software



Figure 5-5: Uponor Radiant Rollout Mat

Radiant Rollout™ Mat

Uponor has introduced several products that can significantly lower total installed cost for a radiant heating system. The Radiant Rollout™ Mat is a custom-designed, prefabricated network of Uponor PEX-a piping (Wirsbo hePEX barrier piping or Uponor AquaPEX non-barrier piping) connected with ProPEX engineered plastic (EP) fittings, which are safe for direct burial in a slab. The product comes from the factory pre-pressurized to protect against damage during shipping. The mats are constructed with an in-slab, reverse-return header assembly so each mat only has one supply-and-return line. This construction significantly reduces the required number of wall-mounted manifolds. As the mats are custom-designed for each project, the installer simply anchors the header in place and rolls the mat out into its designed location — providing a fast, efficient, and consistent method for installing radiant piping in large areas. The faster installation time reduces installation labor costs and helps contractors stay on schedule — so projects are completed and building open on time.

Fast Trak™

Fast Trak™ is a product line offered by Uponor that removes complexity from radiant installations, yielding reductions in installation time and system cost.

Fast Trak 0.5 is offered as a solution for applications where ceiling height is at a premium. Fast Trak 0.5 requires a total flooring height increase of less than 1 inch, which is unprecedented for

poured underlayment applications. This minimal total flooring height minimizes adjustments needed to stairs and door frames, reducing extra work after the radiant installation is complete. Fast Trak 0.5 is very easy to install because it comes with an adhesive backing that sticks to the existing slab — eliminating any sliding that might otherwise occur.

Fast Trak 1.3i is offered for applications where a thermal break is recommended — for example, with an uninsulated slab over a high water table. Fast Trak 1.3i comes with a layer of expanded polystyrene directly below the knobbed area, providing a layer of insulation and a method to fasten the piping in one package. This product not only reduces installation time for the contractor, but also saves the property owner money through reduced monthly energy bills.

Both Fast Trak panels are easy to cut and fit into any floor geometry; simply snap the panels together to make a continuous mat. Also, since the piping snaps between the knobs on the panel, it is easy to achieve a variation of on-center tube spacing as well as a multitude of layout options.



Figure 5-6: Uponor Fast Trak knobbed mats

Ecoflex

Ecoflex is yet another Uponor product that reduces total installation time and delivers cost savings. Ecoflex is a flexible, pre-insulated and jacketed PEX-a product that is typically buried underground. Ecoflex can be buried in unlevel and serpentine trenches — making it a viable solution for potable, hydronic or chilled-water distribution applications. It offers significant advantages over rigid piping: eliminates expansion joints, reduces trenching time, is available in continuous lengths up to 600 feet, uses high-flow ProPEX fitting technology and offers more than 25 years of success. Ecoflex can reduce installation time by up to 70% while reducing risk to the contractor and property owner by removing unnecessary fittings and connection points in the ground.



Figure 5-7: Uponor Ecoflex pre-insulated pipe



Figure 5-8: Ecoflex connection vault