

What Architects Need to Know About:

Radiant Hot Water Heating Systems

Overview

In a radiant floor heating system, warm water flows through flexible plastic tubing called PEX that is located underneath or within the floors. (PEX is an acronym for crosslinked polyethylene.) The PEX tubing carries the warm water into specific rooms or “zones” to effectively heat people and objects in every corner of the room.

In addition to the PEX tubing, the other main components in a radiant heating system include a heat source, pumps, manifolds and controls. The heat source in a hydronic radiant floor heating system is typically a boiler or a hot-water heater.



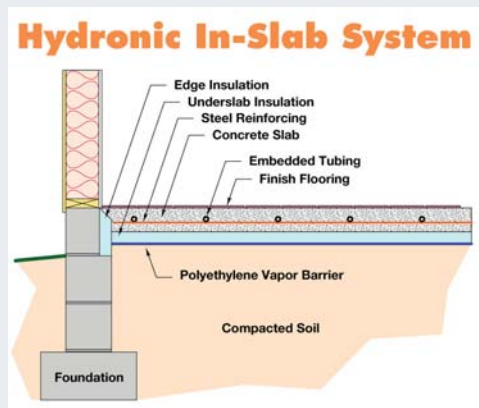
Underfloor Piping System and Manifold

Radiant heating has a number of advantages. It is more efficient than baseboard heating and usually more efficient than forced-air heating because it eliminates duct losses. People with allergies often prefer radiant heat because it doesn't distribute allergens like forced air systems can.

Radiant Floor Installations

So-called "wet" installations embed the cables or tubing in a solid floor and are the oldest form of modern radiant floor systems. The tubing can be embedded in a floor slab or in a thin layer of concrete, gypsum, or other material installed on top of a subfloor. If concrete is used and the new floor is not on solid earth, additional floor support may be necessary because of the added weight.

Thick concrete slabs are ideal for storing heat from solar energy systems, which have a fluctuating heat output. The downside of thick slabs is their slow thermal response time, which makes strategies such as night or daytime set-backs challenging.



Concrete Floor Slab System

On wood flooring systems, a 5/8" subfloor that is pre-engineered for the radiant tubing can be employed.

In all cases, the final floor finish needs to be coordinated with the design engineer. Certain types of flooring, such as hardwood, may not be ideal for this application. The heating and cooling of the radiant heating system can have a negative effect on certain types of finishes.



Wood Floor System

Specific Architectural Issues

There are a number of architectural considerations for radiant hot water heating systems which should be discussed with your engineer. Under-slab and underfloor insulation may be required. In the case of concrete slab installation, a topping slab may be a viable option for installation of the tubing. This would need to be reviewed with the structural engineer.

Certain floor finishes do not work well with radiant floor systems. The heating and cooling of the flooring can cause problems for certain finishes.

The coordination of the over-all flooring system design is critical to a successful project.

The boiler may require a mechanical room, or shared space with the domestic hot water heater.

Radiant Heat System Advantages

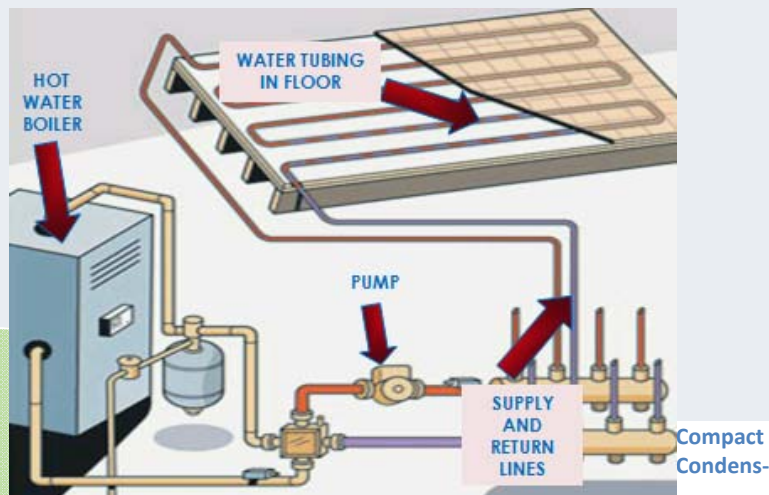
1. In heating only applications, radiant heat systems may be cheaper than a forced air system. The savings is negated where air conditioning is also required.
2. Relatively inexpensive to add additional zoning for individual heating control.
3. Eliminates drafts typical of forced air systems.
4. Very high energy efficiency.

Radiant Heat System Disadvantages

1. A poorly executed design or installation can lead to long term problems. Good engineering and a good contractor can eliminate this concern.
2. The radiant floor systems are slow to react to changes in temperature settings. The thermal mass affect makes the system much less responsive to changes in thermostat settings and make take hours to achieve new temperature settings.



Instantaneous Boiler and Manifold



Radiant Heat System Components

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