

## Radiant Heating and The Super Insulated House

In the last couple of decades, one of the hallmarks of a fine custom home has often been a radiant floor heating system. After all, what's not to like about toasty toes when it's cold outdoors? But there have been some definite changes in how homes are built that make radiant floor heat less of a clear choice.

The principal change in the houses themselves is that they require a LOT less heat than they used to. South Mountain has always built energy-conserving homes, but in recent years we've really taken the thermal integrity of our homes to an exceptional level. The insulation levels are roughly double that of the typical home; the windows are triple glazed with high performance coatings and inert gas fill; and we're building homes that are truly draft-free, several times tighter than most homes (with a ventilation system to assure great air quality). The result is a significantly reduced heat load.

Radiant floors heat the house by being warmer than the desired air temperature. As the heat load drops, the floor surface temperature required to heat the house also drops. It's typical that the floor temperature needed to heat the house to 70°F on the coldest night of the year in a South Mountain house is around 75°F, which in most cases is cooler than skin temperature. On a more typical winter day, the required floor temperature is 72-73°F, which won't feel warm, even as the floor heats the house. The fact of the matter is that to feel the toasty toes benefit of a radiant floor you need an inefficient home!

There are other reasons we prefer alternatives to radiant floors. Radiant systems, with the boiler, piping in the floors, and pumps and controls, are one of the costlier heating systems. If there is a desire for air conditioning as well as heating, it is installed as a wholly separate mechanical system, adding another significant cost. Over the past several years, South Mountain has transitioned to heating and cooling our homes with electrically-powered air source minisplit heat pumps. These systems have proven to be highly reliable and deliver heat at roughly half the cost of an oil or propane-fired system. They cost less to install than the traditional systems.

We see other benefits of the heat pumps:

- They eliminate combustion, and therefore carbon monoxide, from the home
- There is no chance of a fuel spill
- We can provide the energy they use with renewable solar electric systems

In summary, we see no compelling reason for radiant floor heat in the 21<sup>st</sup> century home. The installed cost savings of the heat pump go towards paying for increased energy conservation in the home and the solar electric system, delivering comfort, health, low operating cost, and lower carbon emissions.