

## Types of Radiant Heating We Offer

- **Plated Staple Up**
- **Above Sub-Floor Tube & Plate (Sandwich)**
- **Slab on Grade**
- **Radiant Wall Heat**
- **Warmboard**
- **Radiators/Panel Radiators**

## Heat Delivery

- **High Efficiency Hot Water Boiler**
- **Geothermal**
- **Solar Hot Water**
- **Heat Pump**
- **Reverse Cycle Chiller**

## Plated Staple-Up with Heat Transfer Plates

We typically will use aluminum heat transfer plates that are stapled up with radiant heat tubing under your sub-floor. The plates are highly conductive and provide a large surface area that will absorb heat more quickly and keep it warm longer. Using heat transfer plates will disburse heat more evenly throughout the floor than other under-floor methods. The idea is to maximize the radiation potential of the tubing by making sure it is suspended rather than lying next to a surface. Aluminum is highly conductive and delivers and spreads heat very quickly.

## Above Sub-Floor Tube & Plate (Sandwich)

This method can be used where the subfloor is exposed in new construction or in remodel & retrofits where the floor is being replaced. We fasten the tubing to the subfloor with aluminum plates and then it is covered with the flooring you choose—ideally something that has a low thermal mass for maximum response time in respect to heat transfer. Many of our clients use Gypcrete with this application.

## Slab on Grade

In this method we lay down rigid insulation and 6” welded wire then fasten the tubing to the welded wire. staple the tubing to the insulation. Concrete is then poured over the insulation and tubing. Concrete slab systems have high heat capacity and are ideal for storing heat from solar energy systems—which have a fluctuating heat output. Because of its high thermal mass—concrete has a slow thermal response time which has its advantages and disadvantages. In cold climates it works wonderfully. The downside is that if the temperature warms up considerably and quickly---these systems take longer to disperse their stored heat.

## Radiant Wall Heat

Radiant Wall and Ceiling heat works the same way a radiant floor heating system does. Tubes are run inside a track system and sheet rock or other wall coverings are installed right over the top. We are starting to get more requests for radiant wall heat as people tend to really enjoy the comfort it provides.

## Warmboard

Warmboard combines a structural subfloor and a thermodynamically sophisticated radiant panel into one simple component of your radiant heating system. Warmboard is built with a stiff, strong 1-1/8" thick, 4'x8' sheet of tongue and groove, weather-resistant plywood. A modular pattern of channels is cut into the top surface. A thick sheet of aluminum is stamped to match the channel pattern and is permanently bonded to each panel.

It can be sawn with a Skilsaw, and nailed or screwed directly to your floor joists just like any conventional subfloor. The same labor that would ordinarily install just a subfloor, installs a high performance modular radiant system, saving you time and labor from the very beginning.

Other radiant heat systems are typically more labor intensive because they're added either above or below the subfloor. Warmboard is the subfloor.

As Warmboard is installed, there are four configurations of modular sections that create a variety of radiant tubing layouts to suit the needs of any home. A roll of half-inch PEX tubing is then easily installed into the channel to complete the hydronic circuit.

Warmboard has the two most important properties for excellent thermodynamic performance and in floor radiant heat output:

- High Conductivity
- Low Thermal Mass

## Radiators

Radiators are really just vessels that allow hot water to circulate through it. Because water has a specific heat value, a hot water radiator can be sized through calculations to correctly replace the room's heat loss and maintain your required comfort.

Heat to an individual hot water radiator can be controlled manually through the wheel head radiator valve, or automatically by a thermostatic radiator valve (TRV) which stops the hot water flow when the room has reached the pre-set temperature. Mitchell Mechanical, Inc always uses TRV's.

Central heating radiators, as opposed to under floor heating, have a fast response time for both heating up and cooling down.

Radiators are made to operate as part of a closed loop, forced hot-water (hydronic) heating system. The radiators heat by circulating hot water from a boiler through hollow, flat tubes. The boiler typically operates from heating oil, natural gas or LPG propane but can also be supplemented by solar thermal, geothermal or heat pump.

Radiators are a great alternative to radiant floor heating. They offer the same great radiant heat comfort which heats objects rather than air. Radiators are great for home remodels, and new construction when budget is a high priority or concern.

### **Panel Radiators**

Panel radiators are generally made from milled steel but more frequently they are being produced from aluminum as this material is far better at emitting heat than steel. Panel hot water radiators come as single or double panel. Double panel reduces the size of the radiator but increases its heat output.

Most new radiators are low water content radiators meaning they are not filled completely internally with water. Rather, inside the radiator casing is a network of conduction fins that augment the heat output.

### **Conductivity**

For our applications conductivity is the ability of a material to transfer energy from one place to another. Why is conductivity important when talking about radiant heat systems? The primary purpose of any radiant heat panel is to conduct heat to the living spaces of your home. Products differ in their conductive capacity so it's very important to think this through when choosing a radiant heat system. Every situation is slightly different and we understand conductivity and how to best design a system based on your comfort needs.

### **Thermal Mass**

Thermal mass is the ability of a material's capacity to absorb and store heat. Thermal mass is also very important when considering a radiant heat system. Fast response is one of the most important **considerations** characteristics of an in floor radiant heating system. The amount of heat required by a home or an individual room changes over time and the changes can be fairly rapid.

Cloud cover can clear in just a few minutes causing rapid changes in the warmth provided by the sun. The outside temperature can change significantly in just one hour due to normal daily variations. For these reasons, fast response is essential to the performance of an in floor radiant heat system.

Thermal mass, on the other hand, will cause significant delays between when heat is needed and when it is finally delivered. It is not unusual for the owners of slab-based systems to wait many hours before their homes are warm or cool again.

In floor radiant heat starts up within minutes of heat being called for and rapidly responds to changing needs to provide the right amount of radiant heat right when you need it. The only downside to low thermal mass is that

the water running through the PEX tubing must be hotter than water running through systems with higher thermal mass (concrete).

### Choices

As you can see there are many choices when it comes to a radiant heat system. Mitchell Mechanical, Inc has worked with all these systems and understands how to design a system for optimal performance based on your needs. Many people are now taking advantage of multiple components by combining them together. For instance, we install a lot of **Solar Thermal Hot Water Panels and Solar Storage Tanks** in conjunction with a **High Efficiency Boiler**. We can do the same thing with **Heat Pumps, Reverse Cycle Chillers** and also **Geothermal Systems**. We use high quality PEX tubing that comes with a 25 year warranty—not the cheap non-warrantable stuff that lacks an adequate oxygen membrane. In short order, that lack of membrane can ruin ferrous material (i.e.—your nice new hot water boiler). We have high efficiency standards and we rely on and only use quality components. We hope that you will take the opportunity to learn more about our past projects and standards and also contact us for more information.

### Advantages of a Mitchell Mechanical Radiant Heat System

- Choices, Flexibility, Experience, Knowledge
- Comfortable even heat, ideal for homes with vaulted ceilings
- A clean and healthy living environment (It doesn't stir up pollutants or dust).
- Lower energy bills (in most cases as operating temperatures are typically lower)
- Leak proof PEX tubing system, guaranteed for 25 years.
- Efficient and affordable heat which can be used with many different coverings/applications.
- Complete system integration that comes with operations and maintenance manuals that we organize and make easy to understand for future maintenance.
- A full 2 year warranty covering workmanship and all equipment.
- Clean job sites, professional installers and timely service.