

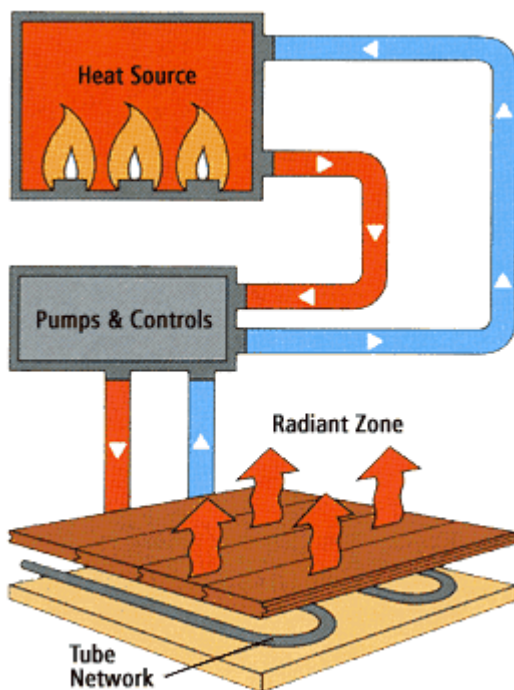
  
**EXPO FLOORS**  
PREMIERE WOOD FLOOR MANUFACTURER  
**RADIANT HEAT INSTALLATION GUIDELINES**  
**Types & Styles of hard wood flooring that are best  
suited for radiant heat systems**

Radiant heating is a growing source of heating in North America, both in residential and commercial installations. Consequently, it's important for installers to understand how radiant heating works with hardwood flooring installations.

Radiant heating does not heat air directly as do more conventional forms of heating, such as baseboard convectors or forced air circulation. Radiant heat is "omni-directional." Unlike warm air, which tends to rise, radiant energy tends to travel in all directions. A large area of mild surface temperatures, such as a warm floor, is capable of transferring as much heat as a small surface area, such as a steam radiator, at high surface temperatures.

Radiant heat beneath wood flooring involves tubing in concrete, or tubing under plywood subfloors.

### How Radiant Heat Works



The most important factor in a successful wood flooring installation over radiant heat is a dry slab and a dry subfloor. The only sure way to dry a slab and subfloor system is to turn on the radiant heating system before installing the wood flooring. If this isn't done, moisture left in the slab will enter the wood flooring as soon as the heat is turned on. The result is floors that will expand, contract, shrink, crack, cup and bow excessively. If the heat can't be turned on, then everyone involved-down to the homeowner-should understand and accept the compromises that will appear down the road.

Opinions on the amount of time required vary widely. Some say the heating system should be turned on at least 72 hours before installation, with a preferred time of five to six days. That assumes that the slab has been in place for at least 60 days. If the slab is relatively new, the recommendation is to have the heating system turned on for 30 to 60 days before installing wood floors. As always, follow the recommendations of your wood flooring manufacturer.



Wood dries rapidly when the heat is first turned on. It dries to a lower moisture content toward the end of the heating season. When the radiant heat is turned off, moisture once again starts to seep into the wood subfloor and radiant slab. Abruptly turning on the radiant heat in the fall will subject wood flooring to rapid and easily noticed movement: Evidence of this movement will be cupping or crowning of the boards. Finally, shrinkage cracks will appear between individual floor boards. Alternatively, gradually turning the heat on before the first really cool day will begin the seasonal movement more gradually. Thus, the movement of the floor will be much less noticeable. As always, humidity controls can help offset flooring expansion and contraction.

Not all species of wood are good candidates for an installation over radiant heating. It's best to follow the manufacturer's recommendation for a species' suitability over radiant heat. When possible, choose a species that is known for its stability. Quartersawn or rift-sawn flooring is preferable to plainsawn in the search for stability. Strip flooring is also a better choice than plank flooring, because narrow boards expand and contract less than wide boards do. Using narrow boards also means there are more seams in a floor to take up movement. Because of its dimensional stability, laminated flooring is another good choice.

Radiant heating systems are currently designed to run cooler than they did years ago, although water supplied to the systems generally range from 90 degrees to 140 degrees. In years past, when water temperatures exceeded 140 degrees, wood fibers were repeatedly traumatized, causing stress fractures, gaps and twisting. Repeated heating and cooling also broke down the adhesive that bonded the hardwood to the slab.

But today, a set of thermostat controls can help avoid those problems. It is recommended to have three thermostats—one to control the tubing water supply temperature; one to control the room temperature with different zone controls; and one for outside the house. This three-thermostat system is kindest to wood flooring, because it moderates the floor temperature. People tend to crank up the heat when they're cold, but with three thermostats, the system adapts itself to conditions both inside and out. The outside thermostat gears up the system for the arrival of colder weather, and a thermostat adjusting the control water temperature on the tubing will keep the temperature at the homeowner's comfort level.

### **RADIANT HEAT INSTALLATIONS**

With radiant heat, the heat source is directly beneath the flooring, so the flooring may gain moisture or dry out faster than a similar floor in a home with a conventional heating system. Wood flooring can be installed over radiant heat as long as you understand radiant heat and how it can impact wood flooring, what precautions to take, and what type of wood flooring to use. See [manufacturers of wood floor products suitable for radiant heat](#).

**Styles of wood flooring that are best for radiant heat installation are as follows:**

#### **Laminated/Engineered Wood Flooring**

- it is more dimensionally stable than solid wood flooring.

#### **Floating Floors, Laminated/Engineered or Solid**

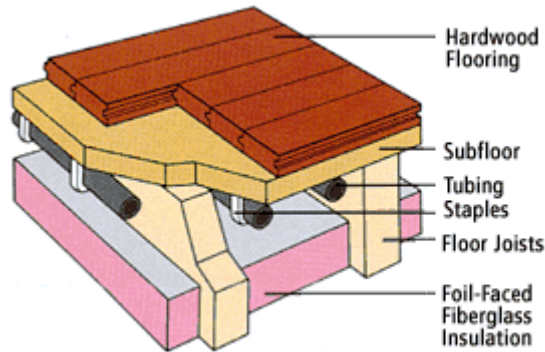
- tend to move as a unit to help accommodate moisture content changes.

**Certain Species** are known for their inherent dimensional stability such as American Cherry, American walnut, mesquite, teak and others. Other species such as maple and Brazilian Cherry are unstable. see [Wood Floor Species chart](#)

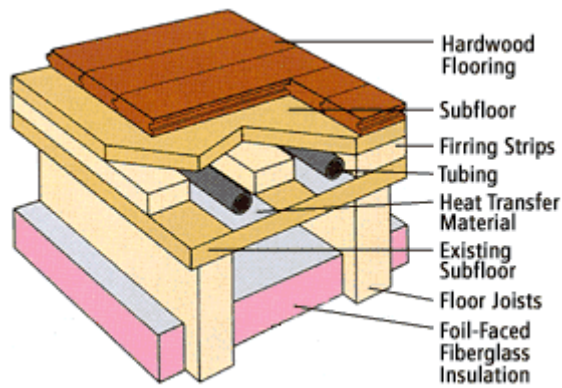
**Quartersawn or Rift Sawn Wood Flooring**

-are more dimensionally stable than plain sawn wood flooring. Narrow boards- (2¼"(56.7mm) or less) are the best choice of solid wood flooring over radiant heat.

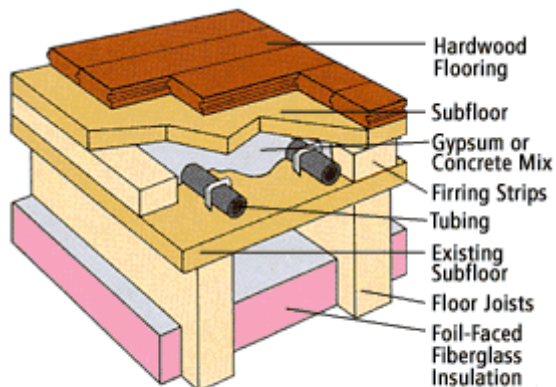
**Types of Radiant Heat Installations**



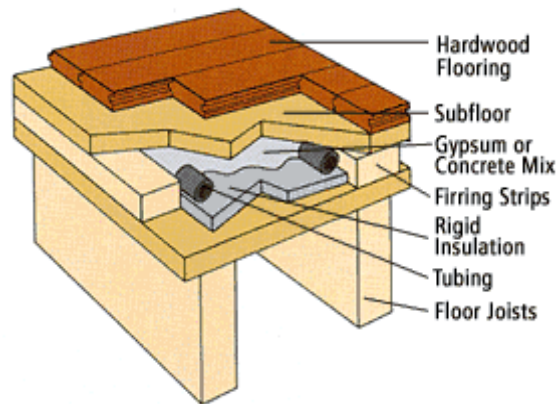
**STAPLED TO SUBFLOOR:**



**SANDWICH OVER FRAME FLOOR:**



**MASONRY FILLED SANDWICH OVER FRAME FLOOR WITH FIBERGLASS INSULATION:**



**MASONRY FILLED SANDWICH OVER FRAME FLOOR WITH FOAM INSULATION:**

### GENERAL RADIANT HEAT INSTALLATION GUIDELINES

To minimize the effect that rapid changes in temperature will have on the floor, it is recommended that an outside thermostat be installed. If one is not present, suggest to your customer that this should be considered. Unlike conventional heating systems whereby when it becomes cold, the heat is switched on, the radiant systems work most effectively and with less trauma to the wood floor if the heating process is gradual, based on small increment increases in relation to the outside temperature.

Subfloor should have proper moisture test according to standards in the trade.

A 6-8 mil polyethylene vapor barrier should be installed over slab radiant heat systems. Tape all seams to be sure the barrier is tight. To protect the barrier from rips, some contractors lay 1/16" (1.5625mm) thick foam sheeting over the vapor barrier.

When the slab has cured, turn the heat on regardless of the season and leave it on for at least 5-6 days before installation of the wood flooring.

#### The following installation systems can be used successfully over radiant heat:

1. Glue down
2. Direct nail to subfloor
3. T & G direct nail to sleepers
4. Single layer of plywood on sleepers
5. Double plywood floating
6. Floating solid/clip
7. Floating engineered/laminated

#### 1 - GLUE DOWN ENGINEERED/LAMINATED OR PARQUET

(Limited borders, height can be kept to a minimum, can get some movement on solid slab)

-Glue laminated flooring

-Install over approved sub-floor- Engineered/Laminated Unfinished/Prefinished/impregnated.

-Can be glued direct to approved subfloor. Glue direct is not recommended on lightweight slab (less than 3,000 psi).

-The heating system has to be turned off before gluing.

-Use adhesive approved by the wood manufacturer.

-Maximum surface temperature - 85 degrees F (29.44 degrees C).

-Expect some heating season separations.



## **2 - DIRECT NAIL TO SUB-FLOOR**

### **TYPE 1**

- Heating tubes are stapled to the underside of the wood sub-floor, between the floor joists. Must have an NWFA approved sub-floor for wood flooring.
  - Solid wood must be properly acclimated.
  - Be sure nails are not so long as to penetrate the tubing.
- All other installation procedures are the same , Strip-Unfinished/ Prefinished - Solid.

### **TYPE 2**

- A sandwich system, the pipes are laid between sleepers over an existing wood sub-floor. A new wood sub-floor is then nailed to the sleepers.
  - Must have an approved NWFA sub-floor for wood flooring.
  - Solid wood must be properly acclimated.
  - Be sure nails are not so long as to penetrate the tubing.
- All other installation procedures are the same ,Strip - Unfinished/ Prefinished - Solid

## **3 - T & G DIRECT NAIL TO SLEEPERS**

- Must choose direction before sleepers are installed.
- Sleepers should be 2X4' or 2X3', Group 1 density pressure treated kiln dried lumber, 12'(300mm) on center.
  - Use 2 ¼" (56.25mm) widths or less for solid wood flooring.
  - Solid wood must be property acclimated.
  - Cannot use shorts.(18" or less pieces)
  - Expect some heating season separations
- All other installation procedures are the same , Strip -Unfinished/ Prefinished - Solid.

## **4 - SINGLE LAYER OF PLYWOOD ON SLEEPERS**

- (Allows for borders with T & G, increases 'R' factor, raises finished floor height, makes nailing easier, can use shorter hardwood lengths)
- Sleepers will be embedded in concrete with only tops showing.
    - Install approved vapor barrier (6-8 mil polyfilm).
  - Fasten plywood to sleepers according to NWFA guidelines , Strip Unfinished/Prefinished - Solid.
    - Creates a more level surface.
    - Expect some heating season separations.

## **5 - DOUBLE PLYWOOD LAYER FLOATING WITH T & G**

- (High 'R' value, can use borders, makes nailing easier, can use shorter hardwood lengths) -Sleepers are unnecessary.
- Use NWFA approved subfloor guidelines for, Strip Unfinished/Prefinished - Solid.
  - Solid wood must be acclimated according to NWFA guidelines , Strip - Unfinished/Prefinished - Solid.

## **6 - FLOATING SOLID WITH CLIPS**

- (Easy to install, more expensive, short stave construction, solid floating, easy to remove e.g. leased rental space, slight noise reduction) -Expansion and contraction is noticeable
- Multi butt ends join together.
  - Use an adhesive approved by the wood manufacturer for joints.

## **7 - FLOATING ENGINEERED/LAMINATED**

- (Easy to install, comes prefinished and unfinished, limits finished height, slight noise reduction, "R' value increases) - Limits expansion and contraction.
- No cracking when slab cracks.
  - Multi butt ends join together.
  - Use an adhesive approved by the wood manufacturer for joints.
- Subfloor should be according to manufacturers recommendation , Engineered/Laminated - Unfinished/Prefinished/impregnated.