INSTALLING INSULATION

Insulation is a very important part of a well performing and efficient system. It is essential that you choose the correct type for your application. Heat transferred from the tubing will go the path of least resistance. Insulation is used to block heat transfer to areas where we don't want it to go, and to direct it to the areas where it is needed. The R-value and type of insulation depends on the application.

Heat transfer is a balancing act between warm and cool objects and their ability to transfer their stored heat/energy. Higher density objects such as concrete has a higher conductivity or ability to transfer heat than wood, which, due to its lower density does not transfer heat well and even works as an insulator. Nature seeks equilibrium, meaning, that if you have two masses next to each other, one at 50°F and the other at 80°F, if no other influences are present, given time, the cooler object would absorb heat from the warmer object and the warmer object would give up some of its heat until both objects reach the same temperature. What that temperature will be is dependent on which mass is greater. The speed at which the heat transfer will take place is subject to the objects ability to transfer its heat and what the temperature difference between the two objects actually is. The greater the differential temperature, the greater the heat transfer. But as the temperature differential gets smaller, so does the heat transfer.

Knowing this dynamic is essential when designing a radiant floor heating or snowmelt systems. Heat transfer will take the path of least resistance if given the opportunity. To make sure that the heat is not lost or directed in the wrong direction, we install insulation to eliminate the effects of colder masses that may interfere with our system. Floor covering will then also play an important role in that, the R-value of the floor covering will work against the insulation below, and it is important to make sure that the path of least resistance is up by having a greater R-value below. As you can imagine, a slab poured right on grade will have the mass of the earth beneath it to contend with. If there is no insulation underneath the slab and there is a floor covering on top of the slab, the path of least resistance is actually down! Of course there are different types of soils, some lower in conductivity than others. Dry soil such as sand is less of detriment than let's say clay that has a tendency to retain water that increases its conductivity.

▶ Install suitable insulation as per chart below.

SPECIAL INSULATION CONSIDERATIONS:

QUICK REFERENCE			
APPLICATION		**MIN. R-VALUE**	**COVERAGE**
SLAB ON GRADE	Alternate #1	*(Ti-To) 0.125	Perimeter To Below Frost Line
	Alternate #2	R-10	4' Horizontal Or Vertical At Perimeter
	Alternate #3	R-10	Under Entire Slab Edge
SLAB BELOW GRADE		**R-10	
SUSPENDED FLOOR			
Over Heated Space	Hard Surface	R-5	Under Entire Floor
	Carpeted Surface	R-11	Under Entire Floor
Over Unheated Space	Hard Surface	R-13	Under Entire Floor
	Carpeted Surface	R-19	Under Entire Floor
WALLS WITH PANELS	Outside Wall	R-13	Entire Wall
	Inside Wall	Optional	
CEILINGS PANELS	Inside Ceiling	R-11	Entire Ceiling Above Panel
	Outside Ceiling	R-30	Entire Ceiling Above Panel

*R-value = Inside Temperature - Outdoor Temperature x 0.125 (temperatures in °F)

*(72°inside temp.- 10°outside temp.) 62 x 0.125= 7.75 of R-value needed

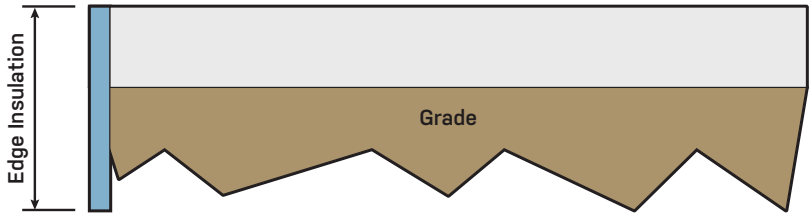
** For slab above frost line, slab edge

Disclaimer: It is the responsibility of the installer to verify the required structural integrity, compressive strength, and rvalue with project engineers and local building authorities prior to installation.

There are three areas to consider for insulation; Edge, Perimeter, and Under Slab. Depending on the specifics of the project such as use and construction method used, it may be important to use all three. Here's a brief description of these areas:

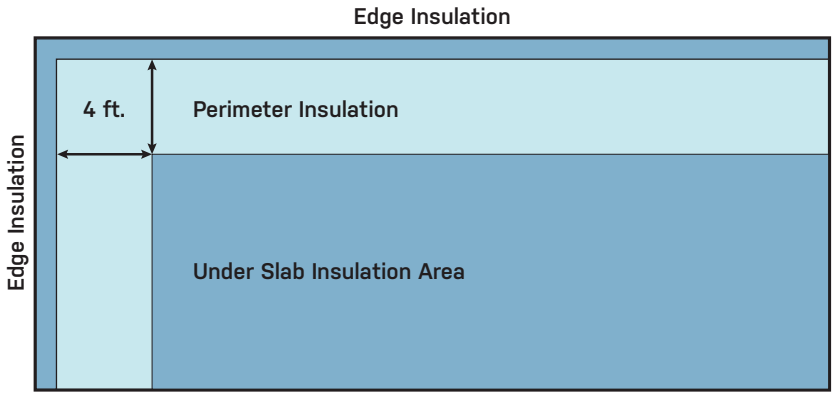
EDGE INSULATION

Edge insulation refers to the vertical area of the slab and is there to eliminate side losses or to break conductivity between a block wall, foundation wall or footing. If only edge insulation is used, it is recommended to go vertically down past the frost-line as determined by local building code. Make sure the soil beneath the slab is dry and water table is not present. For thickness, refer to chart on previous page.



PERIMETER INSULATION

Perimeter insulation is placed 4 feet in from the edge horizontally around the perimeter of the heated area to eliminate downward migration of heat to cooler soil directly adjacent to the heated slab. If only edge and perimeter insulation is used, make sure the soil beneath the un-insulated portion of the slab is dry and water table is not present. For thickness, refer to chart on previous page.



UNDER SLAB

Under slab insulation is placed horizontally underneath the whole heated area. Installations that should consider Under Slab Insulation includes but not limited to; the need for fast response, high water table or highly conductive soil, bed rock, or thick floor covering. In areas where the soil underneath is dry and sandy, the under slab area can be left un-insulated to help build a heat sink that will maintain even temperatures. Do keep in mind that creating a heat sink requires a lot of energy in the startup phase to saturate the slab. For thickness, refer to chart on previous page.