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Radiant slab on grade- insulation or no insulation?

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250,000 pounds plus Airlines.

The question which always arises in the business of radiant heating is: Does the area below the radiant slab have to be insulated?

The real answer is yes and no. The correct answer depends on two criteria: size of slab and height of the water table below. When our company got involved in the design of the world's largest radiant floor system there was a question of whether insulation should be placed below the slabs. The new National Maintenance Center for United Airlines in Indianapolis, IN, would consist of a total of 20 acres of floor space. The specifying engineers for the project decided to install 1" high density foam board under each slab at a cost of \$100,000. In this case it was the right decision. The heavily steel reinforced 14" slabs carry pressure loads of

More importantly, after numerous test drillings done in the Spring, it was found that the water table on the construction site would be as close as 3 feet to the bottom of the new slabs. The key factor in deciding to incur the insulation expense was the height of the water table. If the water table

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in the spring would have been 6 feet or more from the bottom of the slab, the State of Indianapolis could have saved themselves at least \$80,000.00 per hangar, because the insulation would have been wasted. In this case, the insulation was necessary and saves money in operating costs.

When it comes to residential and small commercial slabs up to 2000 ft², we always recommend to insulate the whole area with 1" foam board, no matter what. What is the logic behind this thinking?

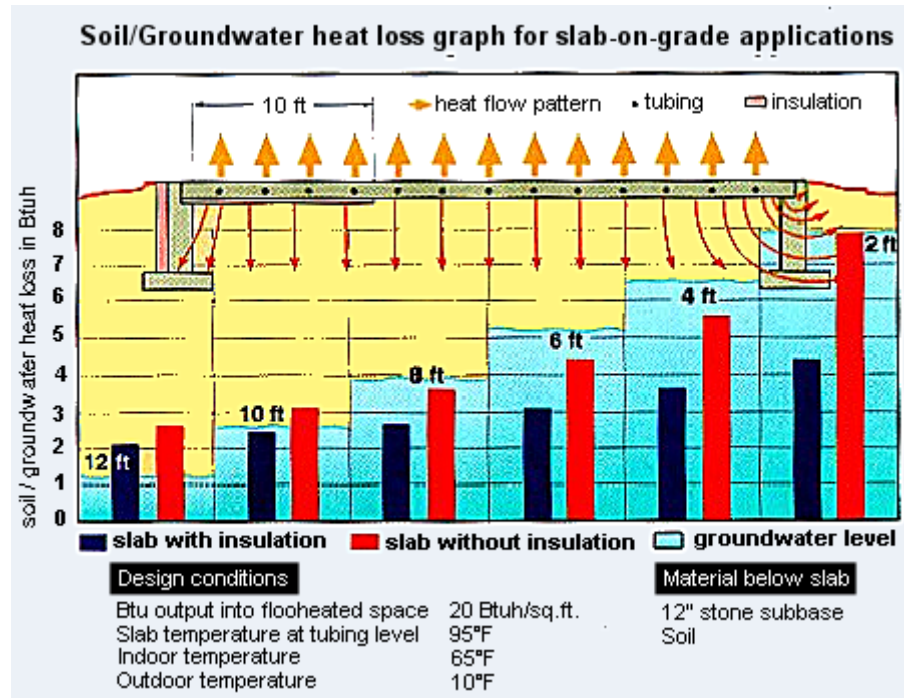
The BTU's traveling in the downward direction from the radiator slab are equalizing the temperature of the gravel below during the initial cold start up. Once all this gravel mass is heated up, literally all the heat is directed upwards into the heated space. The only remaining heat loss into the ground, however, is through the perimeter foundation of the slab into the solidly frozen ground surrounding it. To prevent this, proper insulation of the perimeter foundation is essential, irregardless of the size of the slab, 2" foam board is sufficient.

The amount of insulation necessary below the slab depends on the size and shape of the slab. The basic rule to follow is always insulate at least a 10 foot perimeter strip below the slab with 1" foam board. Research has documented that 76% of the

ground loss is within 5 feet of the slab's perimeter.

If the remaining uninsulated center of the slab area is 20

slab, total slab insulation becomes necessary, irregardless of the size of the slab. Water this close to the radiator slab will wick energy



feet or less in width, cover the whole area with foam board simply for practical purposes. Anything beyond these dimensions, insulation cost and its practical payback becomes an issue.

Generally speaking, in slab sizes under 2000 ft² total, slab insulation is the right approach. Anything larger, a 10 ft under slab perimeter strip is the right approach. There is, however, one more factor which must be taken into consideration, and that is the groundwater table. If the spring water table is 6 feet or less from the bottom of the

from it just like a candle wick will suck up wax. We certainly don't want to raise the environments average ground water temperature. That can become costly!

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