WARMBOARD TUBING SPACING

WHITE PAPER

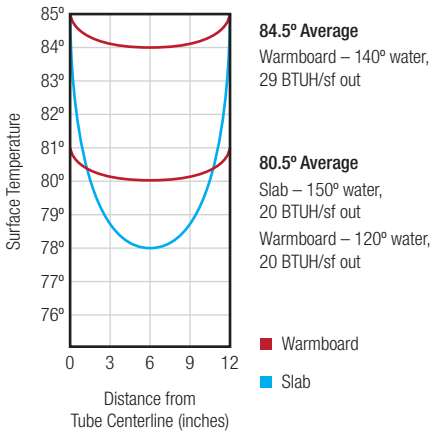
We are often asked why Warmboard is only available with 12" tubing spacing. These questions typically come from people familiar with the limitations of low conductivity thin slab systems which often require tubing spacing of 6" o.c. (on center) or closer. The short answer is that because of its high conductivity, Warmboard at 12" o.c. equals the performance of a thin slab system at 2" spacing. Therefore there is no need to ever use tubing spacing closer than 12" o.c. with Warmboard.

The long answer begins with an analogy. Imagine a frying pan with a solid aluminum handle (highly conductive) compared to a similar pan that has a wood handle (a poor conductor). When the pan is hot you would certainly not grab the aluminum handle near the pan itself. You would move your hand nearer the end in the hope that the handle would be less hot further away from the pan. But even then, unless the handle was very long you would probably still need a potholder to keep from burning your hand. But if you were to grab the wooden handle version, the wooden handle may not be very hot at all a few inches from the pan. This is a good intuitive way to understand the power of conductivity to deliver heat far from its source.

Now let's remember what is happening in a radiant floor. The heat supplied by a radiant floor is directly proportional to its average surface temperature. The floor surface is always the warmest right above one of the tubes carrying hot water. The question is how warm is it halfway between two tubes? With 12" o.c. Warmboard the drop off between tubes is between 1°–3° depending on floor coverings. In a 12" o.c. thin slab system it is between 5°–10°. If we shorten the distance between tubes to 6" o.c. in the thin slab, we may reduce the drop off to between 2.5°–5°, still not equal to Warmboard's performance. The thermodynamic formula below defines the relationship of conductivity and tubing spacing to heat flow.

$$F = \frac{\triangle TKA}{L}$$

When we use this formula to compare Warmboard to gypsum based thin slab systems, the laws of thermodynamics tell us that a Warmboard system at 12" o.c. roughly equals the heat flow of a thin slab at about 2" o.c. The graph below will help you visualize the benefits of Warmboard's superior thermodynamics.



Because of the low conductivity of slab systems, the floor temperature directly above a tube averaged with that half way between two tubes is significantly lower and therefore the output of the floor also drops significantly. The only way to increase the output of these systems is to tighten the tubing spacing.

Complex thermodynamics aside, Warmboard's high conductivity provides many benefits, not the least of which is greater comfort through more even floor temperature. This even heat is also one of the reasons that Warmboard works better with hardwood floors. Wider tubing spacing lowers labor and materials costs throughout your completed system by requiring less tubing, fewer manifolds and controls, and less labor to install all of these components, which also ensures greater reliability. Warmboard's superior conductivity also lowers the required supply water temperature which will save a significant amount on your heating bill year after year, decade after decade. This is why we say that in radiant floors, conductivity is king, whether we are talking about tubing spacing, comfort or energy savings.

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