

Geothermal Residential Radiant Floor Heat

When I trained IGSHPA installers in Indianapolis a few years ago, I was impressed by the Indiana Warm Floors company that provided customers with radiant floor heat as their main business. Generally, cold floors are not a solution for residential cooling air conditioning, so the vast majority of geothermal heating and cooling systems use ducted forced hot or cold air. Radiant floors here in the northeast are redundant systems that are in addition to the water to air ducted heat pump operations. Comfort comes at a cost to install both ducts that alone do the job, and radiant tubing for warm floors as well.

While the 1% have no problem with this, we geothermists strive to improve the indoor environment for all at reasonable cost. One new house with geothermal I installed, had staple up radiant at the prefab factory. It did not use tubing within the plywood which is of course more efficient. Once up and running, the owner tried turning the air handlers off and heating in frigid weather with the radiant floors alone, and was disappointed that it could not keep up. The prefab designers had not spaced the tubing for 100% heat. So the owner now keeps the blower fan on for heating and has warm, but not hot floors for his comfort. This is better for oak floor shrinkage issues too.

With a recent job on Long Island, NY the owner similarly wanted to add new radiant plywood floors and retrofit his ductwork to geothermal on a budget. He wished to remove his heating oil tank and did not want propane radiant heat. Another water to water heat pump would have been required, in addition to two new water to air split systems, for his two existing air handlers. One large water to water with less efficiency did not appeal to him compared to refrigerant based heating and cooling by line set. And the need to switch from heat to air conditioning quickly without waiting for tank reset by a day or so, is important to him. Combination water to air and water to water heat pumps are very costly too. He has a separate new hot water heater, and does not require a desuperheater and new domestic hot water buffer tank. So we considered using the inexpensive desuperheaters for two new water to air heat pumps, to power his new first floor radiant.

From the Performance Chart as shown, the Hot Water Capacity (HWC) in the last column shows hot water capacity at about (2.5M) 2000 btuh average part and full load, for the 3 ton first and basement unit, and 1500 btuh for the 2 ton upstairs unit. This totals 3500 btuh at the lowest 30F Entering Ground Loop Water Temperature (below my 34F design with hot water extra), so figure about 4000 btuh cold weather operating output. 4000/ 23,575 btuh design load = 17% of heat to rooms through the floor during the coldest days and more on average winter days. This will keep the floors in the high 80 degrees that will not heat 100% by itself, but will give warm floor comfort, which is all he really asks for.

Michele, This link has the chart I mention. I took a picture of the important portion on top. If you can get a better image from the top of page 25 here, that is fine. The last column on the right is most important. Picture is also attached. Pete

<http://www.climatemaster.com/geothermal-dealer/wp-content/uploads/2016/04/rp1003-climatemaster-residential-tranquility-digital-split-tes-tep-geothermal-heating-and-cooling-product-catalog1.pdf>

geothermal-heating-and-cooling-product-catalog1...25 / 48

Performance Data — TES/TEP038 Full Load With vFlow

1000 CFM Nominal Airflow Heating, 1000 CFM Nominal Airflow Cooling Performance capacities shown in thousands of Btu/h

EWT °F	Cooling - EAT 80/67°F											Heating - EAT 70°F												
	WPD		CFM	TC	SC	KW	HR	EER	LWT	TTS HWC	TTP HWC	WPD		CFM	HC	KE	COP	LAT	LWT	TTS HWC	TTP HWC			
	GPM	PSI										FT	GPM									PSI	FT	
20	2.0	1.4	3.3	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	9.0	8.3	19.2	1010	23.9	2.12	16.7	3.3	61.9	16.3	2.0	1.9
	2.0	1.4	3.3	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	9.0	8.3	19.2	1250	24.5	2.01	17.6	3.6	68.1	16.1	2.1	2.0
	2.5	1.2	2.7	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	4.5	2.6	6.0	1010	26.0	2.15	18.7	3.6	63.9	21.7	2.3	2.2
	2.5	1.2	2.7	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	4.5	2.6	6.0	1250	26.6	2.04	19.7	3.8	69.7	21.3	2.4	2.3
	2.5	1.2	2.7	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	6.8	4.6	10.6	1010	27.1	2.17	19.7	3.7	64.8	24.2	2.5	2.4
30	2.5	1.2	2.7	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	6.8	4.6	10.6	1250	27.7	2.06	20.7	3.9	60.6	23.9	2.6	2.5
	2.5	1.2	2.7	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	9.0	6.9	16.0	1010	27.7	2.18	20.2	3.7	65.4	25.5	2.5	2.4
	2.5	1.2	2.7	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	9.0	6.9	16.0	1250	28.3	2.07	21.3	4.0	61.0	25.3	2.6	2.5
	3.3	1.3	2.9	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	4.5	2.0	4.7	1010	29.5	2.21	21.9	3.9	67.0	30.2	2.8	2.7
	3.3	1.3	2.9	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	4.5	2.0	4.7	1250	30.2	2.10	23.0	4.2	62.4	29.8	2.9	2.8
40	3.3	1.3	2.9	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	6.8	3.8	8.8	1010	30.7	2.24	23.1	4.0	68.2	33.2	3.0	2.9
	3.3	1.3	2.9	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	6.8	3.8	8.8	1250	31.5	2.13	24.2	4.3	63.3	32.9	3.1	2.9
	3.3	1.3	2.9	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	9.0	5.9	13.6	1010	31.4	2.25	23.7	4.1	68.8	34.7	3.1	2.9
	3.3	1.3	2.9	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	9.0	5.9	13.6	1250	32.1	2.14	24.8	4.4	63.8	34.5	3.2	3.0
	3.3	1.3	2.9	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	4.5	1.7	3.9	1010	32.9	2.29	25.1	4.2	100.2	36.8	3.3	3.1
50	4.5	1.7	3.9	1250	42.9	28.8	1.79	49.0	24.0	71.8	1.9	1.8	4.5	1.7	3.9	1250	33.7	2.17	26.3	4.6	66.0	36.8	3.4	3.2
	4.9	1.9	4.5	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	6.8	3.3	7.9	1010	34.3	2.32	26.4	4.3	101.5	42.2	3.5	3.3
	4.9	1.9	4.5	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	6.8	3.3	7.6	1250	35.1	2.20	27.6	4.7	66.0	41.9	3.6	3.4
	4.9	1.9	4.5	1010	41.9	25.8	1.68	47.6	24.9	70.0	1.8	1.7	9.0	5.2	11.9	1010	35.0	2.34	27.0	4.4	102.1	44.0	3.6	3.4
	4.9	1.9	4.5	1250	43.1	28.8	1.77	49.1	24.3	70.0	1.9	1.8	9.0	5.2	11.9	1250	35.8	2.22	28.3	4.7	66.6	43.7	3.7	3.5
4.9	1.9	4.5	1010	40.9	25.6	1.67	46.9	24.1	69.9	2.5	2.4	4.5	1.6	3.6	1010	36.2	2.36	28.2	4.5	103.2	47.6	3.8	3.6	
4.9	1.9	4.5	1250	42.9	28.8	1.79	49.0	24.0	71.8	2.5	2.4	4.5	1.6	3.6	1250	37.1	2.24	29.4	4.8	97.6	46.9	3.9	3.7	