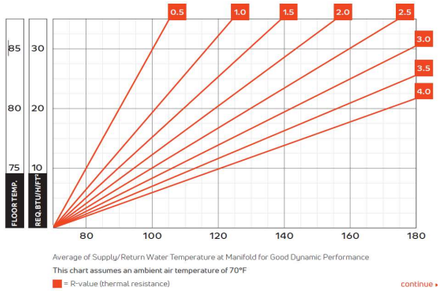
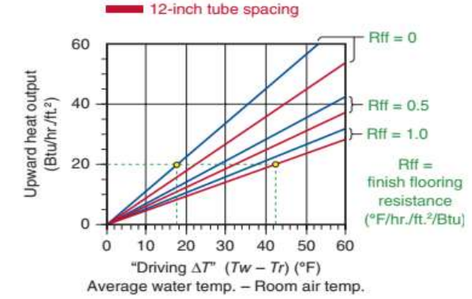
Room Name	Radiant Panel	Flooring	Rf	Ra	Total Loss BTUh	Upward Loss BTUh	Available Area Sq. Ft	Floor Rf	Room Temp °F	Ext Temp °F	Fresh Air CFM	Heat Flux Max. BTUh	Heat Flux Required BTUh	Heat Flux Qd Btuh	Surface Temp Max °F	Surface Temp Required °F	Heat Y/N	Tube Size Inches	Tube Space Inches	Tube Length Feet	#	Circuits Lead Feet	Circuits Length Feet	Circuits k	Circuits Avg °F	Circuits ΔT °F	Circuits Flow GPM	Circuits Supply °F	Volume Gallon	Density	HD2 GPM	RN	Pipe Size inches	Tube c	Fluid Viscosity	Fluid Alpha	Fluid Specific Heat	Resistance Per 100 ft	Resistance Lead r1	Resistance Panel re	Head Loss Feet	Manifold Total rN	Manifold Name	Manifold Loop	Manifold Pump
AHU																					35					5						3/4"	0.0638				6.2	2.17		8.40	5.0	Buffer Tank		Alpha2 15-55F
Porch	Warmboard		0.5	84.3	5594	5594	346.9	0.5	70	-8	30	20.0	16.1	117.0	85.0	78.1	N	1/2"	12	347	2	15	173.5	0.550	90	5	1.216	93	3.91	64.30	0.60		1/2"	0.6162	0.00190	0.07037	0.90000	6.1	0.92	10.59	11.51	0.25		Warmboard	UI-1	
Great Room	Warmboard		1.0	84.3	5175	5175	808.9	1.0	70	-8	15	12.0	6.4	840.5	90.0	73.2	N	0.5	12	809	3	30	269.6	0.440	90	5	0.750	93	9.02	64.30	0.40		1/2"	0.6162	0.00190	0.07037	0.90000	2.6	0.79	1.65	2.44	0.60		Upper-Level	UL-2, UL-3, UL-4	
Bedroom 1	Warmboard		1.0	84.3	922	922	167.5	1.0	69	-8	15	12.0	5.5	169.4	90.0	71.8	N	0.5	12	168	1	45	167.5	0.440	90	5	0.401	93	2.67	64.30	0.20		1/2"	0.6162	0.00190	0.07037	0.90000	0.9	0.39	1.21	1.60	0.76		Upper-Level	UL-5	
Master Bed	Warmboard		1.0	84.3	1606	1606	237.6	1.0	69	-8	30	12.0	6.8	245.6	90.0	72.4	N	0.5	12	238	1	75	237.6	0.440	90	5	0.698	93	4.02	64.30	0.30		1/2"	0.6162	0.00190	0.07037	0.90000	2.3	1.74	1.65	3.39	0.50		Upper-Level	UL-6	
Study	Warmboard		1.0	84.3	822	822	115.0	1.0	70	-8	15	12.0	7.1	121.0	90.0	73.6	N	1/2"	12	115	1	45	115.0	0.440	90	5	0.357	93	2.13	64.30	0.20		1/2"	0.6162	0.00190	0.07037	0.90000	0.7	0.32	0.26	0.58	1.36		Upper-Level	UL-7	
Hallway	Warmboard		1.0		160	160	107.3	1.0			15										1			0.440		5			0.00	64.30			1/2"	0.6162	0.00190	0.07037	0.90000							Upper-Level		
Bathroom	Warmboard	Tile	0.5	84.3	1271	1271	369.0	0.5	72	-8	30	20.0	3.4	0.0	85.0	73.7	N	1/2"	12	369	1	75	369.0	0.550	90	5	0.552	93	5.39	64.30	0.20		1/2"	0.6162	0.00190	0.07037	0.90000	1.5	1.15	5.66	6.82	0.33		Warmboard	UL-8	
Main Bath	Warmboard	Tile	0.5	84.3	1152	1152	161.0	0.5	72	-8	30	20.0	7.2	0.0	85.0	75.6	N	1/2"	12	161	1	75	161.0	0.550	90	5	0.501	93	3.23	64.30	0.20		1/2"	0.6162	0.00190	0.07037	0.90000	1.3	0.97	2.08	3.05	0.53		Warmboard	UL-9	
					16701	2422					180										1	30			90	10	3.631	95	17.84	64.30	1.30	3096	1/2"	0.6162	0.00190	0.07037	0.90000	41.4	12.42			0.1289	12.6	Upper-Level		ALPHA1 26-99 F
Lower Bath	Concrete	Tile	0.5	26.9	348	282	34.8	0.5	70	45	15	10.0	10.0	66.0	85.0	75.0	N	3/8"	8	52	1	5	52.2	0.882	90	5	0.151	93	0.33	64.30	0.20		3/8"	0.3542	0.00190	0.07037	0.90000	0.1	0.00	0.05	0.05	5.39		Lower-Level	LL-1	
Library	Concrete	Carpet	1.0	26.9	377	303	47.1	1.5	70	45	15	10.0	8.0	74.0	85.0	74.0	N	3/8"	8	71	1	20	70.7	0.470	90	5	0.164	93	0.59	64.30	0.20		3/8"	0.3542	0.00190	0.07037	0.90000	0.1	0.02	0.07	0.10	3.83		Lower-Level	LL-2	
Storage	Concrete	Bare	0.0	26.9	379	263	37.9	0.0	70	45	15	10.0	10.0	115.6	85.0	75.0	N	3/8"	8	57	1	15	56.8	0.882	90	5	0.165	93	0.46	64.30	0.20		3/8"	0.3542	0.00190	0.07037	0.90000	0.1	0.02	0.06	0.08	4.36		Lower-Level	LL-3	
Bedroom 2	Concrete	Carpet	1.0	26.9	704	606	88.0	1.0	70	45	15	10.0	8.0	98.6	85.0	74.0	N	3/8"	8	132	1	20	132.1	0.470	90	5	0.306	93	1.65	64.30	0.30		3/8"	0.3542	0.00190	0.07037	0.90000	0.3	0.06	0.41	0.48	1.52		Lower-Level	LL-4	
Bedroom 3	Concrete	Carpet	1.0	26.9	836	710	104.5	1.0	70	45	15	10.0	8.0	125.7	85.0	74.0	N	3/8"	8	157	1	20	156.8	0.882	90	5	0.363	93	1.89	64.30	0.40		3/8"	0.3542	0.00190	0.07037	0.90000	0.4	0.08	0.66	0.75	1.18		Lower-Level	LL-5	
Family Room	Concrete	Carpet	1.0	26.9	3713	2647	464.1	1.0	70	45	15	10.0	8.0	532.8	85.0	74.0	N	1/2"	12	464	2	25	232.1	0.882	90	5	0.807	93	4.94	64.30	0.80		1/2"	0.6162	0.00190	0.07037	0.90000	3.0	0.75	6.92	7.66	0.31		Lower-Level	LL-6	
Mechanical	Concrete	Bare	0.0	26.9	726	510	72.6	0.0	70	45	15	10.0	10.0	215.4	85.0	75.0	N	1/2"	12	73	1	30	72.6	0.470	90	5	0.316	93	1.27	64.30	0.10		1/2"	0.6162	0.00190	0.07037	0.90000	0.6	0.17	0.42	0.59	1.35		Lower-Level	LL-8	
					7083						105										1	30			90	13	1.184	97		64.30	1.60	2957	1/2"	0.6162	0.00190	0.07037	0.90000	5.8	1.75			0.0073	1.8	Lower-Level		ALPHA1 26-99 F
House					**23784**						285																																	
Garage	Concrete	Bare	0.0	26.9	11474	3808	720.0	0.0	70	55		10.0	5.3	782.4	85.0	72.6	N	1/2"	12	720	3	5	240.0	0.882	90	5	1.663	93	7.01	64.30	1.30		1/2"	0.6162	0.00190	0.07037	0.90000	10.6	0.53	25.34	25.87	0.16		Garage	GA-1	
					11474																1	30			90	20	1.247	100	18.15	64.30	1.30	3180	1/2"	0.6162	0.00190	0.07037	0.90000	6.4	1.92			0.0063	1.9	Garage		Alpha1 26-99
Hot Tub					2147																																						
					37405																																							

Warm Board Heat Flux is 18 BTUh at average water 88°F



Average of Supply/Return Water Temperature at Manifold for Good Dynamic Performance

This chart assumes an ambient air temperature of 70°F

= R-value (thermal resistance)

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