Heating System Detail

Project #:AppleBrookHouse2
July 29, 2018

Project Information

Project #: AppleBrookHouse2
Name:
Location:

Notes:

Design Conditions and Summary

Load Calculation Method:	Manual J8
Design Location:	(User Specified) Chadlington, Oxfordshire
Outdoor Temperature:	-3.8 °C
Floorplans / Levels:	
Ground Floor	150.9 m²
Main Floor	115.8 m²
Total Area:	266.7 m²

Total Tubing Lengths:	
hePEX 1/2"	1142.2 m
Total RH Circuits:	24
Total Manifolds:	4
Total Zones:	15
Fluid Type:	100% Water
Total Tubing Volume:	130.6 L

Component Losses:	5,168 W
Infiltration/Ventilation:	2,129 W
Radiant Back Losses:	4,855 W
Total Heating Load:	12,152 W
Radiant Heating:	7,201 W
Radiant Back Losses:	4,855 W
Other:	96 W
Total Heating Load:	12,152 W

Some panels have excessive downward loss. The water temperature calculations are not valid when the downward losses (or back losses) exceed the required upward load. This can occur when inadequate, or no insulation is specified under the panel. It is recommended that adequate insulation be added to radiant panels.

Zone Heating Summary

Zone #	Area	Heating Types	RH Circuits	Flowrate	Head Loss	Supplemental	Rooms
102	24.2	RH	2	1.61	2.1	0	Bed 1
103	6.6	RH	1	0.42	0.4	0	Ensuite
104	16.5	RH	2	0.76	0.5	0	Bed 3
105	8.0	RH	1	0.38	0.4	0	Hall 2
106	8.1	RH	1	0.38	0.4	0	Main Bathroom
107	6.6	RH	0	0.00	0.0	0	Utility
108	20.7	RH	1	0.38	0.5	0	Hall 1
109	17.2	RH	2	0.97	0.9	0	Bed 2
110	11.3	RH	1	0.43	0.7	0	Bed 4
111	31.5	RH	2	1.63	4.2	0	Basement

Length = m Area = m² Temperature = °C Flowrate = L/min Air Flow = L/s Heat Loss = W Unit Heat Loss = W/m² Rv = m²·K/W
Head Loss = kPa RH = Radiant Floor Heating BB = Baseboard FA = Forced Air OTH = Other Heating SM = Snowmelt N = Not Heated

Created Using LoopCAD 2018 Uponor(US) (7/30/2018)
Version:18.0.0594 R (Trial)

See end of report for important Notes and Disclaimers.

201	9.5	RH	1	1.44	4.9	0	Study
202	38.7	RH	5	3.27	5.3	0	Kitchen
203	67.6	RH,OTH	5	10.50	22.7	96	Main Cottage, Entrance, WC
Total	266.7	RH,OTH	24	22.17	22.7	96	

*RH Loads include internal panel back loss that may not be included in the project total.

Room Heating Summary

Ground Floor

Basement

Total Area:	31.5	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	28.8	m²	**Room Design Load:**	739 W
Room Temperature:	21	°C	Tubing in Floor:	131.2	m		
Floor Covering (RSI):	0.09		Circuits in Room:	2		Radiant Load:	1,317 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	23	°C	Forced Air Load	0 W
			Required Water Temp:	30	°C	Other Load:	0 W
			Est. Peak Output:	1,328	W		
						Radiant Back Loss:	578 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	1,317 W

Bed 1

Total Area:	24.2	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	22.6	m²	**Room Design Load:**	733 W
Room Temperature:	21	°C	Tubing in Floor:	135.4	m		
Floor Covering (RSI):	0.09		Circuits in Room:	2		Radiant Load:	1,083 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	24	°C	Forced Air Load	0 W
			Required Water Temp:	31	°C	Other Load:	0 W
			Est. Peak Output:	1,140	W		
						Radiant Back Loss:	350 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	1,083 W

Bed 2

Total Area:	17.2 m²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH	Heated Area:	15.2 m²	**Room Design Load:**	367 W
Room Temperature:	21 °C	Tubing in Floor:	105.0 m		
Floor Covering (RSI):	0.09	Circuits in Room:	2	Radiant Load:	625 W
		Tube Spacing:	200	Baseboard Load:	0 W
		Required Surface Temp:	23 °C	Forced Air Load	0 W
		Required Water Temp:	30 °C	Other Load:	0 W
		Est. Peak Output:	639 W		
				Radiant Back Loss:	258 W
				Recovered Back Loss:	0 W
				Total Heat Loss:	625 W

Bed 3

Total Area:	16.5 m²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH	Heated Area:	15.5 m²	**Room Design Load:**	308 W
Room Temperature:	21 °C	Tubing in Floor:	99.6 m		
Floor Covering (RSI):	0.09	Circuits in Room:	2	Radiant Load:	423 W
		Tube Spacing:	200	Baseboard Load:	0 W
		Required Surface Temp:	23 °C	Forced Air Load	0 W
		Required Water Temp:	29 °C	Other Load:	0 W
		Est. Peak Output:	580 W		
				Radiant Back Loss:	115 W
				Recovered Back Loss:	0 W
				Total Heat Loss:	423 W

Bed 4

Total Area:	11.3 m²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH	Heated Area:	10.0 m²	**Room Design Load:**	178 W
Room Temperature:	21 °C	Tubing in Floor:	59.8 m		
Floor Covering (RSI):	0.09	Circuits in Room:	1	Radiant Load:	250 W
		Tube Spacing:	200	Baseboard Load:	0 W
		Required Surface Temp:	23 °C	Forced Air Load	0 W
		Required Water Temp:	29 °C	Other Load:	0 W
		Est. Peak Output:	302 W		
				Radiant Back Loss:	72 W
				Recovered Back Loss:	0 W
				Total Heat Loss:	250 W

Ensuite

Total Area:	6.6	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	5.9	m²	**Room Design Load:**	159 W
Room Temperature:	21	°C	Tubing in Floor:	33.0	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	269 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	23	°C	Forced Air Load	0 W
			Required Water Temp:	30	°C	Other Load:	0 W
			Est. Peak Output:	278	W		
						Radiant Back Loss:	109 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	269 W

Hall 1

Total Area:	20.7	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	19.2	m²	**Room Design Load:**	300 W
Room Temperature:	21	°C	Tubing in Floor:	44.9	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	347 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	22	°C	Forced Air Load	0 W
			Required Water Temp:	29	°C	Other Load:	0 W
			Est. Peak Output:	826	W		
						Radiant Back Loss:	48 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	347 W

Hall 2

Total Area:	8.0	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	7.4	m²	**Room Design Load:**	36 W
Room Temperature:	21	°C	Tubing in Floor:	35.5	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	36 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	22	°C	Forced Air Load	0 W
			Required Water Temp:	27	°C	Other Load:	0 W
			Est. Peak Output:	372	W		
						Radiant Back Loss:	0 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	36 W

Main Bathroom

Total Area:	8.1 m²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH	Heated Area:	7.5 m²	**Room Design Load:**	64 W
Room Temperature:	21 °C	Tubing in Floor:	39.1 m		
Floor Covering (RSI):	0.09	Circuits in Room:	1	Radiant Load:	64 W
		Tube Spacing:	200	Baseboard Load:	0 W
		Required Surface Temp:	22 °C	Forced Air Load	0 W
		Required Water Temp:	28 °C	Other Load:	0 W
		Est. Peak Output:	364 W		
				Radiant Back Loss:	0 W
				Recovered Back Loss:	0 W
				Total Heat Loss:	64 W

Utility

Total Area:	6.6 m²	Radiant Heating:		Load/Loss Summary:	
Heated by:	RH	Heated Area:	5.4 m²	**Room Design Load:**	160 W
Room Temperature:	21 °C	Tubing in Floor:	0.0 m		
Floor Covering (RSI):	0.09	Circuits in Room:	0	Radiant Load:	282 W
		Tube Spacing:	169	Baseboard Load:	0 W
		Required Surface Temp:	24 °C	Forced Air Load	0 W
		Required Water Temp:	29 °C	Other Load:	0 W
		Est. Peak Output:	284 W		
				Radiant Back Loss:	121 W
				Recovered Back Loss:	0 W
				Total Heat Loss:	282 W

Main Floor

Entrance

Total Area:	3.0	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH,OTH		Heated Area:	2.5	m²	**Room Design Load:**	239 W
Room Temperature:	21	°C	Tubing in Floor:	65.5	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	516 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	29	°C	Forced Air Load	0 W
			Required Water Temp:	54	°C	Other Load:	96 W
			Est. Peak Output:	239	W		
						Radiant Back Loss:	276 W
			Supplemental Req'd:	96	W	Recovered Back Loss:	0 W
						Total Heat Loss:	612 W

Kitchen

Total Area:	38.7	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	28.6	m²	**Room Design Load:**	1,215 W
Room Temperature:	21	°C	Tubing in Floor:	114.4	m		
Floor Covering (RSI):	0.09		Circuits in Room:	4		Radiant Load:	2,388 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	25	°C	Forced Air Load	0 W
			Required Water Temp:	37	°C	Other Load:	0 W
			Est. Peak Output:	1,233	W		
						Radiant Back Loss:	1,174 W
						Recovered Back Loss:	-1,174 W
						Total Heat Loss:	1,215 W

Main Cottage

Total Area:	61.5	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	56.7	m²	**Room Design Load:**	2,096 W
Room Temperature:	21	°C	Tubing in Floor:	278.8	m		
Floor Covering (RSI):	0.09		Circuits in Room:	5		Radiant Load:	5,677 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	24	°C	Forced Air Load	0 W
			Required Water Temp:	35	°C	Other Load:	0 W
			Est. Peak Output:	5,402	W		
						Radiant Back Loss:	3,581 W
						Recovered Back Loss:	-910 W
						Total Heat Loss:	4,767 W

Study

Total Area:	9.5	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	8.6	m²	**Room Design Load:**	407 W
Room Temperature:	21	°C	Tubing in Floor:	61.4	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	696 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	25	°C	Forced Air Load	0 W
			Required Water Temp:	38	°C	Other Load:	0 W
			Est. Peak Output:	407	W		
						Radiant Back Loss:	289 W
						Recovered Back Loss:	-289 W
						Total Heat Loss:	407 W

WC

Total Area:	3.0	m²	Radiant Heating:			Load/Loss Summary:	
Heated by:	RH		Heated Area:	2.4	m²	**Room Design Load:**	198 W
Room Temperature:	21	°C	Tubing in Floor:	66.0	m		
Floor Covering (RSI):	0.09		Circuits in Room:	1		Radiant Load:	456 W
			Tube Spacing:	200		Baseboard Load:	0 W
			Required Surface Temp:	28	°C	Forced Air Load	0 W
			Required Water Temp:	49	°C	Other Load:	0 W
			Est. Peak Output:	232	W		
						Radiant Back Loss:	257 W
						Recovered Back Loss:	0 W
						Total Heat Loss:	456 W

Radiant Heating Details

Manifold Summary

Manifold Name	Zones	Circuits	Flowrate	Head Loss[1]	Required Temp.	Supplied Temp.	Temp Drop	Manifold Type	Control Type	Actuators	S/R Length[2]	S/R Pipe
Manifold 1	2	6	4.70	5.3	38	38	11	TruFLOW Jr Valved w/ Balancing	Circuit	6	-	-
Manifold 2	4	5	2.79	2.1	32	38	11	TruFLOW Jr Valved w/ Balancing	Circuit	5	-	-
Manifold 3	1	5	10.50	22.7	54	54	11	TruFLOW Jr Valved w/ Balancing	Manifold	0	-	-
Manifold 4	5	8	4.18	4.2	32	38	11	TruFLOW Jr Valved w/ Balancing	Circuit	8	-	-

Total	12	24	22.17	22.7	54	-	-	-	-	19	-	-

(1) Total Head loss includes manifold, circuits and supply/return piping if specified., (2) S/R Length = one way

Tubing Circuit Details

Manifold 1

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop	Load	Actuator	Valve Setting
B-1	Kitchen	44.8	200	9.3	hePEX 1/2"	1.01	1.9	11	777	Yes	0.76
B-2	Kitchen	3.8	71	0.0	hePEX 1/2"	0.38	0.0	11	1	Yes	0.42
B-3	-	4.3		0.0	hePEX 1/2"	0.00	0.0	11	0	Yes	0.25
B-4	Kitchen	4.1	62	0.0	hePEX 1/2"	0.38	0.0	11	1	Yes	0.42
B-5	Study	61.4	200	14.0	hePEX 1/2"	1.44	4.7	11	1,109	Yes	2.88
B-6	Kitchen	61.6	200	13.9	hePEX 1/2"	1.50	5.1	11	1,158	Yes	4.2
Total	-	180.1		37.2	-	4.70	5.1		3,047	6	

(1) Head loss for circuit tubing only

Manifold 2

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop	Load	Actuator	Valve Setting
A-1	Main Bathroom	39.1	200	8.3	hePEX 1/2"	0.38	0.3	11	105	Yes	0.5
A-2	Ensuite	33.0	200	7.1	hePEX 1/2"	0.42	0.3	11	328	Yes	0.56
A-3	Bed 1	68.8	200	12.9	hePEX 1/2"	0.81	2.0	11	598	Yes	4.2
A-4	Bed 1	66.6	200	12.8	hePEX 1/2"	0.80	1.9	11	582	Yes	2.86
A-5	Hall 2	35.5	200	7.7	hePEX 1/2"	0.38	0.3	11	121	Yes	0.5
Total	-	242.9		48.8	-	2.79	2.0		1,733	5	

(1) Head loss for circuit tubing only

Manifold 3

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop	Load	Actuator	Valve Setting
B-8	Main Cottage	43.1	200	9.1	hePEX 1/2"	1.18	2.2	11	913	No	0.46
B-9	Main Cottage, WC	66.0	200	15.9	hePEX 1/2"	3.13	17.6	11	1,798	No	1.61
B-10	Main Cottage, Entrance	65.5	200	16.3	hePEX 1/2"	3.54	21.5	11	1,896	No	4.2
B-11	Main Cottage	36.1	200	7.1	hePEX 1/2"	0.92	1.2	11	708	No	0.42
B-12	Main Cottage	68.1	200	13.3	hePEX 1/2"	1.73	6.6	11	1,334	No	0.57
Total	-	278.8		61.7	-	10.50	21.5		6,648	0	

(1) Head loss for circuit tubing only

Manifold 4

Circuit	Rooms Served	Total Length	Tube Spacing	Area Covered	Tubing	Flowrate	Head Loss[1]	Temp Drop	Load	Actuator	Valve Setting
A-6	Bed 4	59.8	200	12.7	hePEX 1/2"	0.43	0.6	11	341	Yes	0.47
A-7	Bed 3	49.2	200	9.2	hePEX 1/2"	0.38	0.4	11	236	Yes	0.45
A-8	Bed 3	50.4	200	10.0	hePEX 1/2"	0.38	0.4	11	251	Yes	0.45
A-9	Bed 2	52.5	200	10.2	hePEX 1/2"	0.52	0.7	11	362	Yes	0.49
A-10	Bed 2	52.5	200	8.7	hePEX 1/2"	0.45	0.6	11	330	Yes	0.48
A-11	Hall 1	44.9	200	10.4	hePEX 1/2"	0.38	0.4	11	187	Yes	0.45
A-12	Basement	87.3	200	17.9	hePEX 1/2"	1.06	4.1	11	813	Yes	4.2
A-13	Basement	43.8	200	9.8	hePEX 1/2"	0.58	0.7	11	441	Yes	0.5
Total	-	440.5		88.7	-	4.18	4.1		2,962	8	

(1) Head loss for circuit tubing only

Disclaimers

With the permission of the Air Conditioning Contractors of America (“ACCA”), material is reproduced from Manual J Residential Load Calculation (8th Edition) which is copyrighted by ACCA. The program and data are provided "as is" without warranty of any kind either expressed or implied. The entire risk as the quality and performance of the program and data is with you. In no event will ACCA be liable to you for any damages, including without limitation any lost profits, lost savings, or other incidental or consequential damages arising out of the use or inability to use this program or the data. © 2015 Air Conditioning Contractors of America. All Rights Reserved. www.acca.org

ACCA, Manual J and Powered by ACCA Manual J are registered trademarks of the Air Conditioning Contractors of America. All rights reserved.

Cold weather humidification, or some lifestyles that produce excessive moisture, may cause condensation to occur if the absolute humidity of the indoor air is too high for the momentary circumstances. Condensation can occur on surfaces or concealed within the structure, and can lead to mold, mildew, frost damage, and moisture damage. The software does not perform calculations for the estimation or detection of possible condensation problems, and it is the designers (i.e. software users) responsibility to do so independently if required. For guidance and additional cautions refer to ACCA Manual J 8th Edition, including Section 1-11 and Section 27.

The calculated values shown in this report are based on the data input by the user of the software. Inaccurate or erroneous data input will result in inaccurate or erroneous results. You are strongly advised to review all input data carefully, and to have the calculated results reviewed by an experienced heating professional to ensure reasonableness and suitability for your application.

IN NO EVENT WILL AVENIR SOFTWARE INC. (“AVENIR”) OR ITS AFFILIATES BE LIABLE UNDER ANY CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE THEORY FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT OR SPECIAL OR PUNITIVE DAMAGES WHATSOEVER (INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF BUSINESS PROFITS, BUSINESS INTERRUPTION, LOSS OF BUSINESS INFORMATION OR DATA AND THE LIKE), EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. AVENIR'S CUMULATIVE LIABILITY FROM ANY CAUSE RELATED TO OR ARISING FROM THE USE THIS REPORT, AND REGARDLESS OF THE FORM OF THE ACTION, SHALL BE LIMITED TO NO GREATER THAN THE AMOUNT OF FEES PAID TO AVENIR UNDER THE SOFTWARE LICENSE AGREEMENT.