Load Short Form
Entire House
Air Comfort Designs

Job:
Date: Sep 16, 2009
By: CAD

PO Box 113, Altoona, PA 16603 Phone: 814 946-1860 Fax: 814 946-0151 Email: designer@aircomfortdesigns.com Web: www.aircomfortdesigns.com

Project Information

For: Radiant Example

Design Information

	Htg	Clg
Outside db (°F)	***0***	88
Inside db (°F)	70	75
Design TD (°F)	70	13
Daily range	-	M
Inside humidity (%)	30	50
Moisture difference (gr/lb)	30	30

Infiltration

Method	Simplified
Construction quality	Semi-tight
Fireplaces	0

HEATING EQUIPMENT

Make	Generic
Trade	
Model	AFUE 92
GAMA ID	

Efficiency	92 AFUE	
Heating input	18633	Btuh
Heating output	17142	Btuh
Temperature rise	0	°F
Actual air flow	0	cfm
Air flow factor	0	cfm/Btuh
Static pressure	0.50	in H2O
Space thermostat		

COOLING EQUIPMENT

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
ARI ref no.	n/a

Efficiency	n/a	
Sensible cooling	0	Btuh
Latent cooling	0	Btuh
Total cooling	0	Btuh
Actual air flow	0	cfm
Air flow factor	0	cfm/Btuh
Static pressure	0.50	in H2O
Load sensible heat ratio	0.40	

ROOM NAME	Area (ft²)	Htg load (Btuh)	Clg load (Btuh)	Htg AVF (cfm)	Clg AVF (cfm)
Living	300	4617	0	0	0
Dining	140	2026	0	0	0
Kitchen	138	1915	0	0	0
PR	24	0	0	0	0
Master Bedroom	120	2129	0	0	0
Bath	42	126	0	0	0
Hall	43	0	0	0	0
MB Cl	14	0	0	0	0
Mud	28	798	0	0	0
L Cl	8	0	0	0	0
L Cl	8	0	0	0	0
B1 Cl	11	0	0	0	0
Bedroom 1	115	1849	0	0	0

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Entire House	991	13461	0	0	0
Other equip loads		3730	389		
Equip. @ 0.93 RSM			360		
Latent cooling			582		
TOTALS	991	17191	942	0	0

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Building Analysis
Entire House
Air Comfort Designs

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Project Information

For: Radiant Example

Design Conditions

Location:
Youngstown, OH, US
Elevation: 1184 ft
Latitude: 41 °N

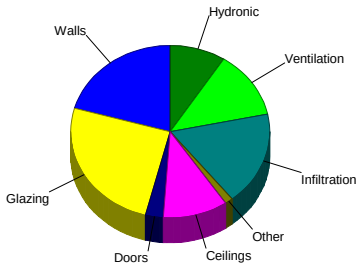
Outdoor:	**Heating**	**Cooling**
Dry bulb (°F)	***0***	88
Daily range (°F)	-	21 (M)
Wet bulb (°F)	-	72
Wind speed (mph)	15.0	7.5

Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	70	13
Relative humidity (%)	30	50
Moisture difference (gr/lb)	29.6	30.3

Infiltration:	
Method	Simplified
Construction quality	Semi-tight
Fireplaces	0

Heating

Component	Btuh/ft²	Btuh	% of load
Walls	3.6	3543	20.6
Glazing	32.9	4365	25.4
Doors	11.9	500	2.9
Ceilings	1.8	1804	10.5
Floors	0.2	228	1.3
Infiltration	2.6	3022	17.6
Ducts		0	0
Piping		1552	9.0
Humidification		0	0
Ventilation		2177	12.7
Adjustments		-0	
Total		**17191**	**100.0**



Cooling

Component	Btuh/ft²	Btuh	% of load
Walls	0	0	0
Glazing	0	0	0
Doors	0	0	0
Ceilings	0	0	0
Floors	0	0	0
Infiltration	0	0	0
Ducts		0	0
Ventilation		389	100.0
Internal gains		0	0
Blower		0	0
Adjustments		0	
Total		**389**	**100.0**

Overall U-value = 0.048 Btuh/ft²-°F

Data entries checked.

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Component Constructions
Entire House
Air Comfort Designs

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Indoor:	**Heating**	**Cooling**
Indoor temperature (°F)	70	75
Design TD (°F)	70	13
Relative humidity (%)	30	50
Moisture difference (gr/lb)	29.6	30.3

Infiltration:

Method	Simplified
Construction quality	Semi-tight
Fireplaces	0

Construction descriptions	**Or**	**Area** ft²	**U-value** Btuh/ft²-°F	**Insul R** ft²-°F/Btuh	**Htg HTM** Btuh/ft²	**Loss** Btuh	**Clg HTM** Btuh/ft²	**Gain** Btuh
Walls								
12E-5sw: Frm wall, vnl ext, r-19 cav ins, 1/2" gypsum board int fnsh, r-5 ext bd ins, 2"x6" wood frm	n	314	0.052	24.0	3.64	1143	0	0
	e	170	0.052	24.0	3.64	620	0	0
	s	322	0.052	24.0	3.64	1172	0	0
	w	167	0.052	24.0	3.64	608	0	0
	all	973	0.052	24.0	3.64	3543	0	0
Partitions								
(none)								
Windows								
4A5-2ov: 2 glazing, clr low-e outr, air gas, insulated vinyl frm mat, clr innr, 1/4" gap, 1/8" thk	n	20	0.470	0	32.9	658	0	0
	e	49	0.470	0	32.9	1601	0	0
	s	12	0.470	0	32.9	395	0	0
	w	52	0.470	0	32.9	1711	0	0
	all	133	0.470	0	32.9	4365	0	0
Doors								
11Q0: Door, mtl pur core type, mtl strm strm	e	21	0.170	10.5	11.9	250	0	0
	w	21	0.170	10.5	11.9	250	0	0
	all	42	0.170	10.5	11.9	500	0	0
Ceilings								
16B-38ad: Attic ceiling, asphalt shingles roof mat, r-38 ceil ins, 1/2" gypsum board int fnsh		991	0.026	38.0	1.82	1804	0	0
Floors								
19A-19bscp: Part floor, carpet flr fnsh, r-19 ins, frm flr, 10" thkns		28	0.049	19.0	2.69	75	0	0
19A-19bstp: Part floor, tile flr fnsh, r-19 ins, frm flr, 10" thkns		40	0.049	19.0	2.69	107	0	0
19C-19cscp: Flr floor, frm flr, 6" thkns, carpet flr fnsh, r-2 ext ins, r-19 cav ins, tight crwl ovr, r-11 wall insul		39	0.049	30.0	1.19	46	0	0
43A0: Radiant panel over room, 3/4" ply subflr, staple up T-Fin heat xfer plates		888	0	0	0	0	0	0

Project Summary
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Project Information

For: Radiant Example

Notes:

Design Information

Weather: Youngstown, OH, US

Winter Design Conditions

Outside db	***0***	°F
Inside db	70	°F
Design TD	70	°F

Summer Design Conditions

Outside db	88	°F
Inside db	75	°F
Design TD	13	°F
Daily range	M	
Relative humidity	50	%
Moisture difference	30	gr/lb

Heating Summary

Structure	13461	Btuh
Ducts	0	Btuh
Central vent (30 cfm)	2177	Btuh
Humidification	0	Btuh
Piping	1552	Btuh
Equipment load	17191	Btuh

Sensible Cooling Equipment Load Sizing

Structure	0	Btuh
Ducts	0	Btuh
Central vent (30 cfm)	389	Btuh
Blower	0	Btuh
Use manufacturer's data	n	
Rate/swing multiplier	0.93	
Equipment sensible load	360	Btuh

Infiltration

Method	Simplified
Construction quality	Semi-tight
Fireplaces	0

	Heating	Cooling
Area (ft²)	991	0
Volume (ft³)	7929	0
Air changes/hour	0.31	0.22
Equiv. AVF (cfm)	41	0

Latent Cooling Equipment Load Sizing

Structure	0	Btuh
Ducts	0	Btuh
Central vent (30 cfm)	582	Btuh
Equipment latent load	582	Btuh
Equipment total load	942	Btuh
Req. total capacity at 0.70 SHR	0.0	ton

Heating Equipment Summary

Make	Generic
Trade	
Model	AFUE 92
GAMA ID	

Efficiency	92 AFUE	
Heating input	18633	Btuh
Heating output	17142	Btuh
Temperature rise	0	°F
Actual air flow	0	cfm
Air flow factor	0	cfm/Btuh
Static pressure	0.50	in H2O
Space thermostat		

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
ARI ref no.	n/a

Efficiency	n/a	
Sensible cooling	0	Btuh
Latent cooling	0	Btuh
Total cooling	0	Btuh
Actual air flow	0	cfm
Air flow factor	0	cfm/Btuh
Static pressure	0.50	in H2O
Load sensible heat ratio	0.40	

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Radiant Heating Tubing Requirements

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Project Information

For: Radiant Example

Tubing Requirements

Roll 1: 600 ft 1/2" BPEX (Part # WX-BP4-600) 5 lengths 3 ft waste
Mud: 59 ft
Hall: 68 ft
Bath: 76 ft
Bedroom 1: 201 ft
Master Bedroom: 191 ft

Roll 2: 600 ft 1/2" BPEX (Part # WX-BP4-600) 2 lengths 229 ft waste
Kitchen: 165 ft
Dining: 205 ft

Roll 3: 600 ft 1/2" BPEX (Part # WX-BP4-600) 2 lengths 137 ft waste
Living-A: 232 ft
Living-B: 231 ft

Radiant Heating Design Summary

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Project Information

For: Radiant Example

Design Information

Total floor area:	991	ft²	Design temperature:	0	°F
Radiantly heated area:	926	ft²	Maximum supply temperature:	132	°F
Total panel area:	888	ft²	Total flow rate:	2.18	gpm
Total tubing area:	874	ft²	Maximum head loss:	5.09	ft H2O
Total room load:	13461	Btuh	Total tubing required:	1431	ft
Total panel output:	13409	Btuh			
Total supplemental heat:	0	Btuh			
Total back loss:	1552	Btuh			
Boiler output required:	14961	Btuh			

Zones 1, Loops 9, Manifolds 1, Actuators 0, Zone Pumps 0, System Pumps 1, Mixing Valves 1, Injection Pumps 0

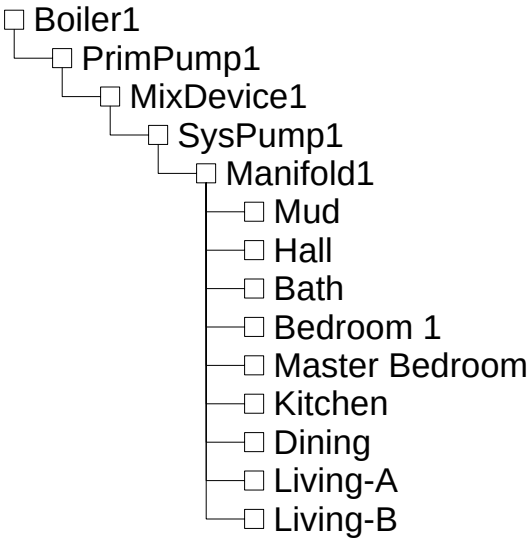
Space Heating Information

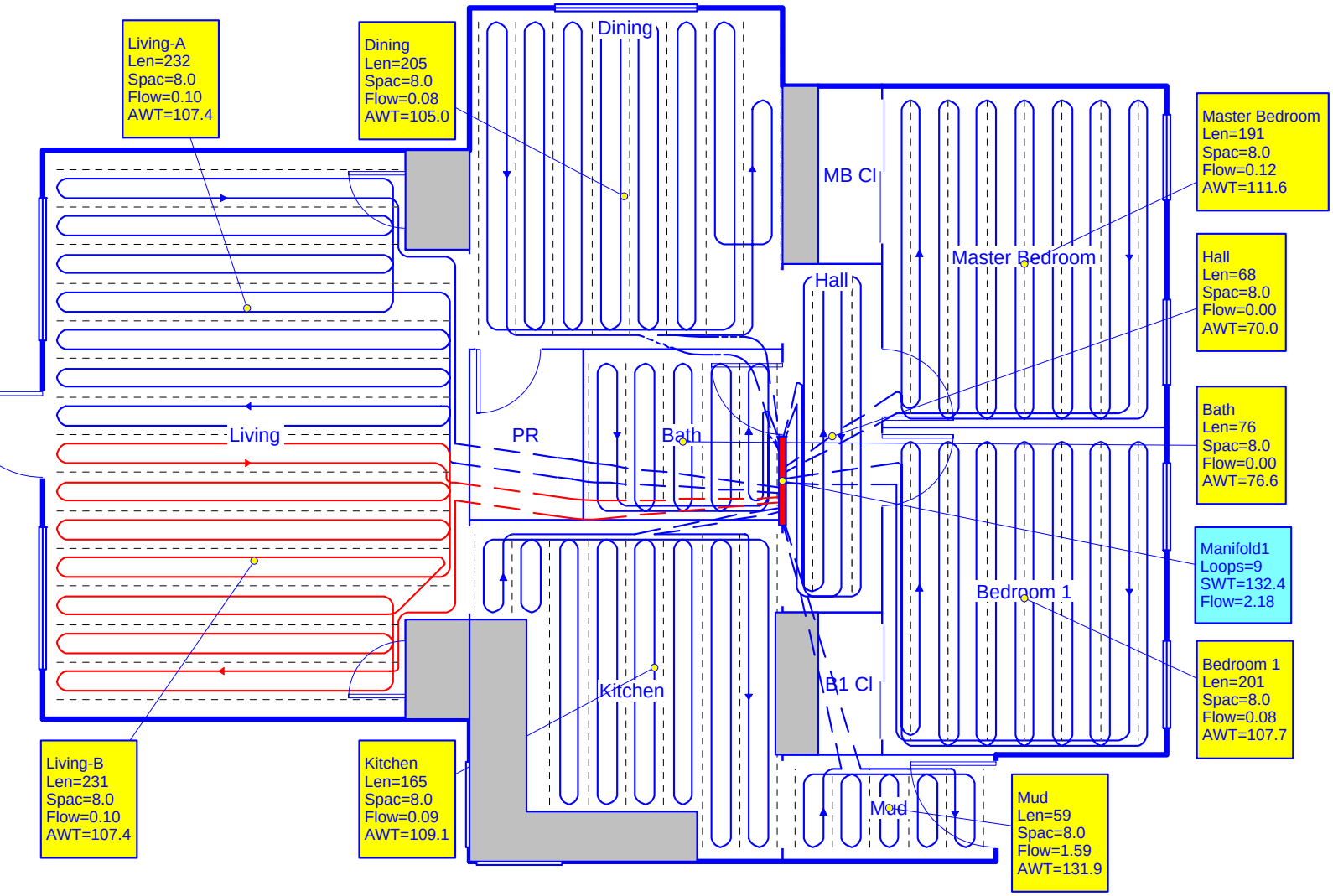
Room name	Room area (ft²)	Air temp (°F)	Room load (Btuh)	Supp. heat (Btuh)	F/C	Panel area (ft²)	Tubing area (ft²)	Surf. temp. (°F)	Deliv. temp. (°F)	Panel output (Btuh /ft²)	Back loss (Btuh /ft²)
Living	300	70	4617	0	F	290	287	79	132	15.9	1.8
Dining	140	70	2026	0	F	136	134	79	132	14.9	1.7
Kitchen	138	70	1915	0	F	115	113	80	132	16.7	1.9
PR	24	70	0	0							
Master Bedroom	120	70	2129	0	F	120	118	80	132	17.7	2.1
Bath	42	70	126	0	F	42	41	71	132	3.0	0.3
Hall	43	70	0	0	F	43	42	70	132	0.0	0.0
MB Cl	14	70	0	0							
Mud	28	70	798	53	F	28	27	85	132	26.5	3.1
L Cl	8	70	0	0							
L Cl	8	70	0	0							
B1 Cl	11	70	0	0							
Bedroom 1	115	70	1849	0	F	115	113	79	132	16.1	1.9
Totals	991		13461	0		888	874				

Hydronic Devices

Device Name	Device type	Load (Btuh)	Flow (gpm)	Head (ft H2O)	S/R tubing or Size,Cv	SWT Req. (°F)	SWT Spld (°F)
Manifold1	Manifold	14961	2.2	5.09	3/4" BPEX	132	132
MixDevice1	Tempering valve	14961	2.2	0		132	132
SysPump1	System Pump	14961	2.2	4.98	3/4" COPPER	132	132
PrimPump1	Primary Pump	14961	1.6	0	3/4" COPPER	180	180

Hydronic Navigator Tree




Living-A
Len=232
Spac=8.0
Flow=0.10
AWT=107.4
Dining
Len=205
Spac=8.0
Flow=0.08
AWT=105.0
Dining
MB Cl
Master Bedroom
Len=191
Spac=8.0
Flow=0.12
AWT=111.6
Master Bedroom
Hall
Len=68
Spac=8.0
Flow=0.00
AWT=70.0
Hall
Bath
Len=76
Spac=8.0
Flow=0.00
AWT=76.6
Living
PR
Bath
Manifold1
Loops=9
SWT=132.4
Flow=2.18
Bedroom 1
Bedroom 1
Len=201
Spac=8.0
Flow=0.08
AWT=107.7
Kitchen
B1 Cl
Living-B
Len=231
Spac=8.0
Flow=0.10
AWT=107.4
Kitchen
Len=165
Spac=8.0
Flow=0.09
AWT=109.1
Mud
Mud
Len=59
Spac=8.0
Flow=1.59
AWT=131.9