Sample Residence HVAC Load Calculations

for

Weston, MA. 02493



Prepared By:

Des Crowley Hvac Design & Support Llc. PO. Box 368 Danvers, MA .01923 978-774-1416 Wednesday, October 01, 2014

Rhvac is an ACCA approved Manual J and Manual D computer program. Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.



Project Report

General Project Informatio	n						
Project Title:	Sar	nple Residen	ce				
Designed By:	Djc						
Project Date:	Tue	esday, Septen	nber 30th 20	14			
Client City:	We	ston, MA. 024	93				
Company Name:	Hva	ac Design & S	upport Llc.				
Company Representative:	Des	s Crowley					
Company Address:	PO	. Box 368					
Company City:	Dai	nvers, MA .01	923				
Company Phone:	978	3-774-1416					
Company Fax:	978	3-774-2468					
Company E-Mail Address:	info	@hvacsuppo	rtservices.co	n			
Company Website:	ww	w.hvacsuppo	tservices.cor	n			
Design Data							
Reference City:			Weston,	Massachuse	etts		
Building Orientation:			Front do	or faces Nort	heast		
Daily Temperature Range:			Medium				
Latitude:			42 Degrees	i			
Elevation:			180 ft.				
Altitude Factor:		0.9	994				
0	utdoor	Outdoor	Outdoor	Indoor	Indoor	Grains	
Dr	v Bulb	Wet Bulb	Rel Hum	Rel Hum	Dry Bulb	Difference	

	<u>Dry Bulb</u>	Wet Bulb	<u>Rel.Hum</u>	<u>Rel.Hum</u>	<u>Dry Bulb</u>	<u>Difference</u>		
Winter:	0	2.24	n/a	30%	72	25.76		
Summer:	95	74	38%	50%	72	35		
								,
Check Figures								
Total Building Supply (CFM:		5,765	CFM F	Per Square ft	.:	0.479	9 *
Square ft. of Room Are	ea:	1	2,026	Square	e ft. Per Ton:		712	2 **
Volume (ft ³) of Cond. S	Space: (htg.)	12	2,400					
* Based on area of roo	oms being he	eated or coole	ed (whichever o	overns sy	stem) rather	than entire floo	r area.	
** Based on area of roo	oms being co	ooled.	、		,			
Building Loads								
Total Heating Required	d Including V	entilation Air:	185,05	1 Btuh	185.051	MBH		
Total Sensible Gain:	Ū.		119,77	5 Btuh	75	%		
Total Latent Gain:			39,75	3 Btuh	25	%		
Total Cooling Required	l Including V	entilation Air:	159,52	8 Btuh	16.03	Tons (Based C	On 75% Sensible	

Notes

Rhvac is an ACCA approved Manual J and Manual D computer program.

Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

All computed results are estimates as building use and weather may vary.

Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.

Capacity)



Load Preview Report

Scope	Rec Ton	ft.² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM
Building	16.03	712	12,026	119,775	39,753	159,528	185,051	2,899	5,555	5,765
System 1	2.17	705	1,533	20,343	4,725	25,068	31,608	380	894	894
Ventilation				804	1,871	2,675	2,518			
Duct Latent					1,155	1,155				
Humidification							2,565			
Zone 1 - Clg.: 71%, Htg.: 79%			1,183	14,557	1,100	15,657	20,977	301	666	666
1-Master Bedroom			342	7,141	400	7.541	8.245	118	327	327
2-Master Bathroom (radiant)			285	2.771	500	3.271	4.753	68	127	127
3-Link Corridor			50	1.011	0	1.011	1.506	22	46	46
4-Master Sitting			243	1.825	200	2.025	2.705	39	84	84
5-Hamper Room			58	591	0	591	972	14	27	27
6-Dressing (hers)			115	944	0	944	2,103	30	43	43
7-Dressing (his)			90	273	0	273	693	10	13	13
Zone 2 - Cla : 29% Hta : 21%			350	6.028	600	6 628	5 549	80	276	276
8-Library/office			350	6.028	600	6,628	5 549	80	276	276
			000	0,020	000	0,020	0,040		210	210
System 2	2 88	650	1 873	26 617	6 707	33 324	23 555	259	1 163	1 163
Ventilation	2.00	000	1,075	1 207	2,806	4 012	3 777	200	1,100	1,105
Humidification				1,207	2,000	4,012	3 /70			
Zone 1 - Clg : 31% Htg : 32%			406	0 088	1 200	10 288	5 270	84	416	416
Q-Family Poom			490	9,000	1,200	10,200	5 270	84	416	410
			490	9,000	2,701	22.019	11.020	175	410	410
2016 2 - Cig., 09%, Fig., 66%			524	20,217	2,701	12,910	2 710	1/0	925	925
14 Producer Doom			024	10,707	1,701	12,400	2,719	40	490	490
11-Breaklast Room			100	4,000	800	5,400	2,730	43	213	213
12-Butter's Pantry			60	55	0	55	166	3	3	3
			87	1,421	200	1,621	241	4	65	65
14-Mudroom			375	1,543	0	1,543	2,652	42	/1	/1
15-Powder Room 2			46	610	0	610	864	14	28	28
16-Cloak Room			46	381	0	381	892	14	1/	17
17-Laundry			84	833	0	833	750	12	38	38
System 3	1.40	883	1,239	7,371	3,871	11,242	13,415	525	525	525
				804	1,871	2,675	2,518			
							2,289			
Zone 1			1,239	6,567	2,000	8,567	8,608	525	525	525
18-Dining Room			331	2,680	1,200	3,880	2,520	154	214	214
19-Front Entry Foyer			418	1,852	0	1,852	4,095	250	148	148
20-Hall 1			78	0	0	0	0	0	0	0
21-Hall 2			112	0	0	0	0	0	0	0
22-Living Room			300	2,034	800	2,834	1,993	122	163	163
System 4	1.62	962	1,560	14,594	4,135	18,729	27,638	328	631	631
Ventilation				804	1,871	2,675	2,518			
Duct Latent					1,165	1,165				
Humidification							2,364			
Zone 1 - Clg.: 66%, Htg.: 70%			1,222	9,464	700	10,164	15,828	228	433	433
31-Upper Mudroom			799	4,685	0	4,685	7,224	104	214	214
33-Bedroom 5			329	2,759	200	2,959	5,533	80	126	126
34-Bath 5			94	2,020	500	2,520	3,070	44	92	92
Zone 2 - Clg.: 34%, Htg.: 30%			338	4,961	400	5,361	6,928	100	227	227
32-Future Art Studio			338	4,961	400	5,361	6,928	100	227	227



Load Preview Report (cont'd)

Scope	Rec Ton	ft.² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM
System 5	2.79	809	2,255	25,877	6,050	31,927	36,828	457	1,156	1,156
Ventilation				603	1,403	2,006	1,888			
Duct Latent					1,147	1,147				
Humidification							2,450			
Zone 1 - Clg.: 41%, Htg.: 63%			1,403	11,467	1,400	12,867	20,545	289	525	525
23-Bedroom 2			255	2,081	200	2,281	4,023	57	95	95
24-Bath 2			72	987	500	1,487	1,521	21	45	45
25-Walk-in Closet 2			54	87	0	87	146	2	4	4
26-Hallway			176	286	0	286	475	7	13	13
27-Upper Foyer			396	3,120	0	3,120	5,216	73	143	143
28-Bedroom 3			264	2,687	200	2,887	5,245	74	123	123
29-Walk-in Closet 3			54	87	0	87	146	2	4	4
30-Bath 3			80	1,197	500	1,697	2,729	38	55	55
35-Laundry 2			52	935	0	935	1,045	15	43	43
Zone 2 - Clg.: 59%, Htg.: 37%			852	16,479	2,100	18,579	11,945	168	754	754
36-Bedroom 4			248	2,554	200	2,754	2,589	36	117	117
37-Walk-in Closet 4			28	228	0	228	1,015	14	10	10
38-Bath 4			35	56	500	556	94	1	3	3
39-Hallway			79	127	0	127	212	3	6	6
40-Lounge			232	5,223	800	6,023	3,107	44	239	239
41-Homework/Study			231	8,291	600	8,891	4,927	69	379	379
System 6	1.89	963	1,819	9,467	5,214	14,681	17,198	525	525	525
Ventilation				918	2,058	2,976	2,973			
Duct Latent					1,031	1,031				
Zone 1 - Clg.: 35%, Htg.: 32%			449	3,088	825	3,913	4,553	168	183	183
42-Exercise Room			449	3,088	825	3,913	4,553	168	183	183
Zone 2 - Clg.: 65%, Htg.: 68%			1,371	5,772	1,300	7,072	9,672	357	342	342
43-Bath Room			57	0	500	500	0	0	0	0
44-Lounge			1,314	5,772	800	6,572	9,672	357	342	342
System 7	3.28	348	1,140	15,506	9,050	24,557	18,766	216	661	661
Ventilation				1,049	2,556	3,605	2,273			
Duct Latent					1,202	1,202				
Zone 1			1,140	14,457	5,292	19,749	16,493	216	661	661
45-Sports Court			1,140	14,457	5,292	19,749	16,493	216	661	<u>661</u>
System 8	0.00	0	607	0	0	0	16,043	210	0	210
Zone 1			607	0	0	0	16,043	210	0	210
46-Garage (radiant)			607	0	0	0	16,043	210	0	210
Sum of room airflows may be greater than system airflow beca	ause									
system has multiple zones.										



Total Building Summary Loads

Component	Area	Sen	Lat	Sen	Total
Description $3A_{W-0}$: Clazing Double pape low-o ($\alpha = 0.40$), operable	Quan	LOSS	Gain		
window, wood frame, indoor insect screen with 50%	15	107	0	274	274
coverage, u-value 0.2, SHGC 0.22					
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable	104.1	1,499	0	2,060	2,060
window, wood frame, u-value 0.2, SHGC 0.22			_		
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixed	249.1	3,588	0	4,835	4,835
sash, wood frame, u-value 0.2, SHGC 0.22	<i>i</i>				
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable	657.4	9,467	0	11,763	11,763
window, wood frame, outdoor insect screen with 50%					
Coverage, u-value 0.2, SHGC 0.22	04	4 004	0	4 5 4 4	4 544
TA-cw-d: Glazing-Single pane, sliding glass door, clear,	21	1,301	0	1,511	1,511
wood frame, u-value 0.9, SFIGC 0.04 2P w α : Clozing Double pape low α ($\alpha = 0.40$) fixed	16.2	224	0	216	216
sash wood frame light color drapes with modium	10.2	234	0	210	210
weave with 50% coverage usvalue 0.2 SHGC 0.22					
3A-w-o: Glazing-Double pape low-e (e = 0.40) operable	63.8	2 4 3 1	0	3 199	3 199
window wood frame outdoor insect screen with 50%	00.0	2,101	Ũ	0,100	0,100
coverage, u-value 0.53, SHGC 0.56					
3B-w-o; Glazing-Double pane low-e (e = 0.40), fixed	11	381	0	408	408
sash, wood frame, light color drapes with medium					
weave with 50% coverage, u-value 0.51, SHGC 0.66					
4A-1w-o: Glazing-Double pane low-e (e = 0.20 or less),	90	2,115	0	0	0
operable window, e=0.20 on surface 2, wood frame,					
outdoor insect screen with 50% coverage, u-value					
0.47, SHGC 0.49					
11D: Door-Wood - Solid Core	327.6	7,160	0	1,192	1,192
11P: Door-Metal - Polyurethane Core	21	0	0	140	140
12F1-0sw: Wall-Frame, R-21 open cell 1/2 lb. spray foam	2319.7	10,858	0	3,512	3,512
insulation in 2 x 6 stud cavity, no board insulation,					
siding finish, wood studs	205	0	0	206	206
inculation in 2 x 6 stud covity, no board inculation	205	0	0	300	300
siding finish wood stude					
12F1-0hw: Wall-Frame R-21 open cell 1/2 lb sprav foam	575	2 690	0	694	694
insulation in 2 x 6 stud cavity no board insulation	575	2,000	0	004	004
brick finish wood studs					
12F-0sw: Wall-Frame, R-21 insulation in 2 x 6 stud	3414	15.155	0	4.412	4.412
cavity, no board insulation, siding finish, wood studs	• • • •	,	-	.,	-,
12B-0sw: Wall-Frame, R-11 insulation in 2 x 4 stud	435.7	3,043	0	1,356	1,356
cavity, no board insulation, siding finish, wood studs					
Concrete 10": Wall-Basement, Custom, 10" Concrete	1259	5,435	0	2,591	2,591
wall below grade, 2x4 cavity w/R-15 batt. insul.					
12F-0bw: Wall-Frame, R-21 insulation in 2 x 6 stud	477	2,109	0	514	514
cavity, no board insulation, brick finish, wood studs					
C-38: Roof/Ceiling-Roof Joists Between Roof Deck and	5559.8	10,406	0	6,940	6,940
Ceiling or Foam Encapsulated Root Joists, Custom,					
R-38 Open cell 1/2lb, sprayfoam insul.	40.4	4 700	0	4 050	4 050
Root -15: Root/Celling-Root Deck (rooting, wood,	494	1,798	0	1,356	1,356
Custom 12" soil membrane wood metal dock P 15					
batt					
20P-19-c: Partition Floor (STD=17 WTD-17)-Over open	342	291	Ο	291	201
crawl space or garage. Passive. R-19 blanket	072	201	0	201	201
insulation, carpet covering					
19A-19r: Floor-Over enclosed unconditioned crawl space.	154.8	613	0	145	145
No insulation on exposed walls, sealed or vented					
space, radiant, R-19 blanket					

Total Building Summary Loads (cont'd)

Component	Area	Sen	Lat	Sen	Total
Description	Quan	LOSS	Gain	Gain	Gain
19A-19p-c: Floor-Over enclosed unconditioned crawl	49.5	137	0	44	44
space, No insulation on exposed walls, sealed or					
vented space, passive, R-19 blanket, carpet covering			_		
19A-19p: Floor-Over enclosed unconditioned crawl	3427.4	9,473	0	3,026	3,026
space, No insulation on exposed walls, sealed or					
vented space, passive, R-19 blanket					
20P-19-c: Partition Floor (STD=0, WTD=17)-Over open	350.4	298	0	0	0
crawl space or garage, Passive, R-19 blanket					
insulation, carpet covering					
20P1-30op: Floor-Over open crawl space or garage.	761.2	1.918	0	479	479
Passive, spray foam insulation, R-30 open cell 1/2 lb.		,			
spray foam insulation 8 inches in 2 x 10 joist cavity					
any cover					
21B-20: Floor-Basement Concrete slab, any thickness, 2	118 5	570	0	0	0
ar more fact below grade. B.2 or higher inculation	440.5	575	0	0	0
installed below floor, any floor eaver, shortest side of					
financiale below hoor, any hoor cover, shortest side of					
floor slab is 20 wide	4040 7	0.440	0	0	0
21A-20: Floor-Basement, Concrete slab, any thickness, 2	1313.7	2,412	0	0	0
or more feet below grade, no insulation below floor,					
any floor cover, shortest side of floor slab is 20' wide					
21A-28: Floor-Basement, Concrete slab, any thickness, 2	1140	1,630	0	0	0
or more feet below grade, no insulation below floor,					
any floor cover, shortest side of floor slab is 28' wide					
22C-10rh: Floor-Slab on grade, Horizontal board	71	6,502	0	0	0
insulation extends 4' under slab, any floor cover, R-					
10 insulation, radiant, heavy moist soil					
Subtotals for structure:		103 770	0	51 264	51 264
	54	103,770	10 900	12 420	22 220
Feuple.	54		7 706	12,420	23,220
Equipment.	0040		1,180	17,373	25,159
	2610	~~~~~	5 7 00	8,900	8,900
		39,669	5,700	20,686	26,387
Infiltration: Winter CFM: 141, Summer CFM: 32		10,001	1,032	1,059	2,091
Ventilation: Winter CFM: 600, Summer CFM: 600		18,465	14,434	6,190	20,624
Exhaust: Winter CFM: 80, Summer CFM: 80					
Humidification (Winter) 35.85 gal/day :		13,147	0	0	0
AED Excursion:		0	0	1,883	1,883
Total Building Load Totals:		185 051	39 753	119 775	159 528
		100,001	00,100	110,110	100,020
Check Figures					
Total Building Supply CFM: 5.765	CFM I	Per Souare ft	:		0.479 *
Square ft. of Room Area: 12.026	Squar	e ft. Per Ton:			712 **
Volume (ft ³) of Cond Space: (htg.) 122,400	• • • •				
* Based on area of rooms being beated or cooled (whichey	ver aoverns sv	(stem) rather	than entire flo	or area	
** Based on area of rooms being cooled	voi govorno oy				
Building Loads					
I otal Heating Required Including Ventilation Air: 185	5,051 Btuh	185.051	MBH		
Total Sensible Gain: 119	9,775 Btuh	75	%		
Total Latent Gain: 39	9,753 Btuh	25	%		
Total Cooling Required Including Ventilation Air: 159	9,528 Btuh	16.03	Tons (Based	l On 75% Ser	sible
			Capacity)		
Notes					
Rhvac is an ACCA approved Manual J and Manual D comm	outer program				
Calculations are performed per ACCA Manual J 8th Edition	, Version 2. a	nd ACCA Ma	nual D.		
All computed results are estimates as building use and weat	ather may vary	/.			
Be sure to select a unit that meets both sensible and latent	loads accordi	ng to the mar	nufacturer's p	erformance d	ata at
		J			

your design conditions.



System 1 System 1 Summary Loads

Component		Area	Sen	Lat	Sen	Total
$\frac{\text{Description}}{24 \text{ w c}} = \frac{1}{24 \text{ c}} $		12	107	Gain		274
window wood frame indeer insect screen with 50%		15	107	0	214	274
covorago, u-valuo 0.2, SHCC 0.22						
$24 \text{ w} \approx \text{Classing Double pape low } \alpha (\alpha - 0.40)$ energible		00	1 1 9 0	0	1 660	1 660
SA-w-0. Glazing-Double parle low-e (e = 0.40), operable		02	1,100	0	1,000	1,000
window, wood frame, u-value 0.2, SHGC 0.22		CO 4	005	0	4 500	4 500
3B-w-o: Glazing-Double pane low-e ($e = 0.40$), fixed		68.4	985	0	1,520	1,520
sash, wood frame, u-value 0.2, SHGC 0.22		00 F	4 440	0	4 000	4 000
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable		98.5	1,418	0	1,820	1,820
window, wood frame, outdoor insect screen with 50%						
coverage, u-value 0.2, SHGC 0.22		007.0	0 5 4 4	0	0.440	0.440
12F1-Usw: Wall-Frame, R-21 open cell 1/2 lb. spray foam	1	397.6	6,541	0	2,116	2,116
insulation in 2 x 6 stud cavity, no board insulation,						
siding finish, wood studs						
C-38: Root/Ceiling-Root Joists Between Root Deck and		1533	2,870	0	1,914	1,914
Ceiling or Foam Encapsulated Roof Joists, Custom,						
R-38 Open cell 1/2lb, spraytoam insul.				_		
20P-19-c: Partition Floor (STD=17, WTD=17)-Over open		342	291	0	291	291
crawl space or garage, Passive, R-19 blanket						
insulation, carpet covering						
19A-19r: Floor-Over enclosed unconditioned crawl space,	,	154.8	613	0	145	145
No insulation on exposed walls, sealed or vented						
space, radiant, R-19 blanket						
19A-19p-c: Floor-Over enclosed unconditioned crawl		49.5	137	0	44	44
space, No insulation on exposed walls, sealed or						
vented space, passive, R-19 blanket, carpet covering						
19A-19p: Floor-Over enclosed unconditioned crawl		506.1	1,398	0	447	447
space, No insulation on exposed walls, sealed or						
vented space, passive, R-19 blanket						
20P-19-c: Partition Floor (STD=0, WTD=17)-Over open		350.4	298	0	0	0
crawl space or garage, Passive, R-19 blanket						
insulation, carpet covering						
Subtotals for structure:			15.918	0	10.231	10.231
People:		6		1.200	1.380	2,580
Equipment:		-		500	1.733	2.233
Lighting:		0			0	_,0
Ductwork:		Ū	10.608	1,155	6,195	7.349
Infiltration: Winter CEM: 0 Summer CEM: 0			0	0	0	0
Ventilation: Winter CFM: 80, Summer CFM: 80			2.518	1.871	804	2.675
Humidification (Winter) 6.99 gal/day :			2,565	0	0	_,010
System 1 System 1 Lood Totals			21,000	4 705	20.242	
System i System i Load Totals.			31,000	4,725	20,343	25,000
Check Figures						
Supply CFM: 894		CFM F	Per Square ft	:		0.583
Square ft. of Room Area: 1.533		Squar	e ft. Per Ton:			705
Volume (ft ³) of Cond. Space: 16,185		- 1				
System Loads						
Total Heating Required Including Ventilation Air:	31 608	Btub	31 608	MBH		
Total Sensible Gain:	20 343	Btuh	Q1	%		
Total Latent Gain:	1 725	Btub	10	/0 0/2		
Total Cooling Required Including Ventilation Air	25 068	Btuh	2 17	Tons (Rase	1 On 78% Ser	sihle
	20,000		2.17	Canacity		
				Capacity)		
Krivac is an AUCA approved Manual J and Manual D col	mputer p	rogram.				

Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.

All computed results are estimates as building use and weather may vary.



System 1 System 1 Summary Loads (cont'd)

Notes

System 2 System 2 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description		Quan	Loss	Gain	Gain	Gain
3A-w-o: Glazing-Double pane low-e (e = 0.40), ope window, wood frame, outdoor insect screen wit coverage, u-value 0.2. SHGC 0.22	rable h 50%	170.7	2,459	0	3,178	3,178
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixe sash, wood frame, u-value 0.2, SHGC 0.22	d	98	1,411	0	1,725	1,725
1A-cw-d: Glazing-Single pane, sliding glass door, o wood frame, u-value 0.9, SHGC 0.64	lear,	21	1,361	0	1,511	1,511
11D: Door-Wood - Solid Core		42	1,180	0	556	556
11P: Door-Metal - Polyurethane Core		21	0	0	140	140
12F1-0sw: Wall-Frame, R-21 open cell 1/2 lb. spray insulation in 2 x 6 stud cavity, no board insulati siding finish, wood studs	y foam on,	922.1	4,317	0	1,396	1,396
12F1-0sw: Part-Frame, R-21 open cell 1/2 lb. spray insulation in 2 x 6 stud cavity, no board insulati siding finish, wood studs	/ foam on,	205	0	0	306	306
C-38: Roof/Ceiling-Roof Joists Between Roof Deck Ceiling or Foam Encapsulated Roof Joists, Cus R-38 Open cell 1/2lb, sprayfoam insul.	and stom,	211.2	395	0	264	264
19A-19p: Floor-Over enclosed unconditioned crawl space, No insulation on exposed walls, sealed vented space, passive, R-19 blanket	or	1872.7	5,176	0	1,653	1,653
Subtotals for structure:			16.299	0	10.729	10.729
People:		15	-,	3.000	3.450	6,450
Equipment:		-		901	6.849	7,750
Lighting:		900			3.069	3.069
Ductwork:			0	0	0	0
Infiltration: Winter CFM: 0. Summer CFM: 0			0	0	0	0
Ventilation: Winter CFM: 120. Summer CFM: 120			3.777	2.806	1.207	4.012
Humidification (Winter) 9.49 gal/day :			3,479	0	0	0
AED Excursion:			0	0	1.314	1.314
System 2 System 2 Load Totals:			23,555	6,707	26,617	33,324
Check Figures						
Supply CFM: 1,	163	CFM	Per Square ft	.:		0.621
Square ft. of Room Area: 1,	873	Squa	re ft. Per Ton:			650
Volume (ft ³) of Cond. Space: 19,	195					
System Loads						
Total Heating Required Including Ventilation Air:	23 555	Btuh	23 555	MBH		
Total Sensible Gain:	26 617	Btuh	80	%		
Total Latent Gain:	6 707	Btuh	20	%		
Total Cooling Required Including Ventilation Air	33 324	Btuh	2 88	Tons (Based	1 On 77% Sen	sible
	00,024	Dian	2.00	Capacity)		0.010

Notes

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System 3 System 3 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description		Quan	Loss	Gain	Gain	Gain
3A-w-o: Glazing-Double pane low-e (e = 0.40), ope window, wood frame, outdoor insect screen wi coverage, u-value 0.2, SHGC 0.22	erable th 50%	62	893	0	1,010	1,010
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixe sash, wood frame, light color drapes with medi weave with 50% coverage, u-value 0.2, SHGC	d um 0.22	16.2	234	0	216	216
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixe sash, wood frame, u-value 0.2, SHGC 0.22	d	37.8	544	0	683	683
11D: Door-Wood - Solid Core		48	1,348	0	636	636
12F1-0bw: Wall-Frame, R-21 open cell 1/2 lb. spra insulation in 2 x 6 stud cavity, no board insulat brick finish, wood studs	y foam ion,	575	2,690	0	694	694
19A-19p: Floor-Over enclosed unconditioned craw space, No insulation on exposed walls, sealed vented space, passive, R-19 blanket	or	1048.6	2,899	0	926	926
Subtotals for structure:			8,608	0	4,165	4,165
People:		10		2,000	2,300	4,300
Equipment:				0	0	0
Lighting:		0			0	0
Ductwork:			0	0	0	0
Infiltration: Winter CFM: 0, Summer CFM: 0			0	0	0	0
Ventilation: Winter CFM: 80, Summer CFM: 80			2,518	1,871	804	2,675
Humidification (Winter) 6.24 gal/day :			2,289	0	0	0
AED Excursion:			0	0	102	102
System 3 System 3 Load Totals:			13,415	3,871	7,371	11,242
Check Figures						
Supply CFM:	525	CFM	Per Square ft.	.:		0.424
Square ft. of Room Area: 1,	239	Squa	re ft. Per Ton:			883
Volume (ft ³) of Cond. Space: 12	385					
System Loads						
Total Heating Required Including Ventilation Air:	13,415	Btuh	13.415	MBH		
Total Sensible Gain:	7,371	Btuh	66	%		
Total Latent Gain:	3,871	Btuh	34	%		
Total Cooling Required Including Ventilation Air:	11,242	Btuh	1.40	Tons (Based Capacity)	On 77% Sen	sible

Notes

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System 4 System 4 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description		Quan	Loss	Gain	Gain	Gain
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixed		45	648	0	907	907
sash, wood frame, u-value 0.2, SHGC 0.22						
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable		108.8	1,566	0	1,908	1,908
window, wood frame, outdoor insect screen with 50%	6					
coverage, u-value 0.2, SHGC 0.22						
12F-0sw: Wall-Frame, R-21 insulation in 2 x 6 stud	1	119.1	5,235	0	1,694	1,694
cavity, no board insulation, siding finish, wood studs						
C-38: Roof/Ceiling-Roof Joists Between Roof Deck and	1	560.4	2,921	0	1,947	1,947
Ceiling or Foam Encapsulated Roof Joists, Custom,						
R-38 Open cell 1/2lb, sprayfoam insul.				_		
20P1-30op: Floor-Over open crawl space or garage,		761.2	1,918	0	479	479
Passive, spray foam insulation, R-30 open cell 1/2 lb						
spray foam insulation, 8 inches in 2 x 10 joist cavity,						
any cover						
Subtotals for structure:			12,288	0	6,935	6,935
People:		3		600	690	1,290
Equipment:				500	0	500
Lighting:		0			0	0
Ductwork:			10,468	1,165	6,164	7,329
Infiltration: Winter CFM: 0, Summer CFM: 0			0	0	0	0
Ventilation: Winter CFM: 80, Summer CFM: 80			2,518	1,871	804	2,675
Humidification (Winter) 6.45 gal/day :			2,364	0	0	0
System 4 System 4 Load Totals:			27,638	4,135	14,594	18,729
Check Figures				-		0.404
Supply CFM: 631			er Square ft.	.:		0.404
Square II. OF ROOM Area: 1,500		Square	IL Per Ion:			962
Volume (ite) of Cond. Space. 13,419						
System Loads		D (1				
I otal Heating Required Including Ventilation Air:	27,638	Btuh	27.638	MRH		
I otal Sensible Gain:	14,594	Btun	78	%		
Total Caping Required Including Ventilation Air:	4,130	Dluii	1.60	70 Topo (Pocod	00 750/ 800	sible
rotal cooling Required including ventilation AIC	10,729	DIUN	1.02		UI / 5% Sen	SIDIG
				Capacity)		

Notes

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System 5 System 5 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description	(Quan	Loss	Gain	Gain	Gain
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable window, wood frame, outdoor insect screen with 50% coverage, u-value 0.2, SHGC 0.22	6	217.5	3,131	0	3,847	3,847
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable window, wood frame, u-value 0.2, SHGC 0.22		22.1	319	0	400	400
3A-w-o: Glazing-Double pane low-e (e = 0.40), operable window, wood frame, outdoor insect screen with 50% coverage, u-value 0.53, SHGC 0.56	6	63.8	2,431	0	3,199	3,199
12F-0sw: Wall-Frame, R-21 insulation in 2 x 6 stud cavity, no board insulation, siding finish, wood studs	10	8.88	5,096	0	1,649	1,649
12B-0sw: Wall-Frame, R-11 insulation in 2 x 4 stud cavity, no board insulation, siding finish, wood studs	4	435.7	3,043	0	1,356	1,356
C-38: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Custom, R-38 Open cell 1/2lb, sprayfoam insul.	22	255.3	4,220	0	2,815	2,815
Subtotals for structure:			18,240	0	13,266	13,266
People:		10		2,000	2,300	4,300
Equipment:				1,500	3,287	4,787
Lighting:		0			0	0
Ductwork:			9,990	1,147	6,203	7,350
Infiltration: Winter CFM: 54, Summer CFM: 0			4,260	0	0	0
Ventilation: Winter CFM: 60, Summer CFM: 60			1,888	1,403	603	2,006
Humidification (Winter) 6.68 gal/day :			2,450	0	0	0
AED Excursion:			0	0	217	217
System 5 System 5 Load Totals:			36,828	6,050	25,877	31,927
Check Figures						
Supply CFM: 1,156		CFM F	Per Square ft	.:		0.513
Square ft. of Room Area: 2,255		Square	e ft. Per Ton:			809
Volume (ft ³) of Cond. Space: 19,396						
System Loads						
Total Heating Required Including Ventilation Air:	36,828 E	Btuh	36.828	MBH		
Total Sensible Gain:	25,877 E	Btuh	81	%		
Total Latent Gain:	6,050 E	Btuh	19	%		
Total Cooling Required Including Ventilation Air:	31,927 E	Btuh	2.79	Tons (Based Capacity)	I On 77% Sen	sible

Notes

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System 6 System 6 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description		Quan	Loss	Gain	Gain	Gain
3B-w-o: Glazing-Double pane low-e (e = 0.40), fixed		11	381	0	408	408
sash, wood frame, light color drapes with medium						
weave with 50% coverage, u-value 0.51, SHGC 0.0	66					
Concrete 10": Wall-Basement, Custom, 10" Concrete		171	768	0	264	264
wall below grade, 2x4 cavity w/R-15 batt. insul.						
12F-0bw: Wall-Frame, R-21 insulation in 2 x 6 stud		477	2,109	0	514	514
cavity, no board insulation, brick finish, wood stude	i	770	0 440	0	1 000	1 000
12F-USW: Wall-Flame, R-21 Insulation in 2 X 6 stud		112	3,412	0	1,069	1,069
21B-20: Eloor-Basement, Concrete slab, any thickness	2	118 5	570	0	0	0
or more feet below grade R-3 or higher insulation	, ∠	440.5	579	0	0	0
installed below floor, any floor cover, shortest side	of					
floor slab is 20' wide	01					
21A-20: Floor-Basement, Concrete slab, any thickness	.2 1	1313.7	2,412	0	0	0
or more feet below grade, no insulation below floor	, ,		,			
any floor cover, shortest side of floor slab is 20' wid	le					
Subtotals for structure:			9.661	0	2.255	2.255
People:		6	-,	1,200	1,380	2,580
Equipment:				925	3,584	4,509
Lighting:		0			0	0
Ductwork:			4,564	1,031	1,080	2,112
Infiltration: Winter CFM: 0, Summer CFM: 0			0	0	0	0
Ventilation: Winter CFM: 100, Summer CFM: 100			2,973	2,058	918	2,976
AED Excursion:			0	0	250	250
System 6 System 6 Load Totals:			17,198	5,214	9,467	14,681
Check Figures		0511				0.000
Supply CFM: 525		CFM	Per Square ft	.:		0.289
Square ft. of Room Area: 1,819		Squa	re ft. Per Ton:			963
Volume (ft ³) of Cond. Space: 16,372						
System Loads		.				
Total Heating Required Including Ventilation Air:	17,198	Btuh	17.198	MBH		
Total Sensible Gain:	9,467	Btuh	64	%		
I Utal Latent Gain:	5,214	Biun	36	% Topo (Reco	d On 770/ Car	aibla
rotal cooling Required including ventilation AIr.	14,001	Blun	1.89		u on //% Ser	ISIDIG
				Capacity)		

Notes

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System 7 System 7 Summary Loads

Component		Area	Sen	Lat	Sen	Total
Description		Quan	Loss	Gain	Gain	Gain
Concrete 10": Wall-Basement, Custom, 10" Concrete wall below grade, 2x4 cavity w/R-15 batt. insul.		1088	4,667	0	2,327	2,327
Roof -15: Roof/Ceiling-Roof Deck (roofing, wood, insulation) or SIP Panels Supported on Beams, Custom, 12" soil, membrane, wood, metal deck, R-15 batt	i	494	1,798	0	1,356	1,356
21A-28: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, no insulation below floor, any floor cover, shortest side of floor slab is 28' wide		1140	1,630	0	0	0
Subtotals for structure:			8,095	0	3,683	3,683
People:		4		800	920	1,720
Equipment:				3,460	1,920	5,380
Lighting:		1710			5,831	5,831
Ductwork:			4,039	1,202	1,044	2,246
Infiltration: Winter CFM: 61, Summer CFM: 32			4,359	1,032	1,059	2,091
Ventilation: Winter CFM: 80, Summer CFM: 80 Exhaust: Winter CFM: 80, Summer CFM: 80			2,273	2,556	1,049	3,605
System 7 System 7 Load Totals:			18,766	9,050	15,506	24,557
Check Figures						
Supply CFM: 661		CFM	Per Square ft	.:		0.580
Square ft. of Room Area: 1,140		Squa	re ft. Per Ton:			348
Volume (ft ³) of Cond. Space: 19,380						
System Loads						
Total Heating Required Including Ventilation Air:	18,766	Btuh	18.766	MBH		
Total Sensible Gain:	15,506	Btuh	63	%		
Total Latent Gain:	9,050	Btuh	37	%		
Total Cooling Required Including Ventilation Air:	24,557	Btuh	3.28	Tons (Base Capacity)	d On 77% Sen	sible

Notes

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System 8 System 8 Garage Radiant Sur	nmary Loa	nds			
Component	Area	Sen	Lat	Sen	Total
Description	Quan	Loss	Gain	Gain	Gain
4A-1w-o: Glazing-Double pane low-e (e = 0.20 or less).	90	2.115	0	0	0
operable window, e=0.20 on surface 2, wood frame.		_,	-	-	-
outdoor insect screen with 50% coverage u-value					
11D: Door-Wood - Solid Core	237.6	4 632	0	0	0
12E-0sw: Wall-Frame R-21 insulation in 2 x 6 stud	434.2	1 412	0	0	0
covity, no board inculation, siding finish, wood stude	404.2	1,412	0	0	0
22C 10th: Elect Slob on grade. Herizontal board	71	6 502	0	0	0
inculation extends 4' under eleb enviller sever D	71	0,502	0	0	0
Insulation extends 4 under slab, any floor cover, R-					
10 Insulation, radiant, neavy moist soli					
Subtotals for structure:		14,661	0	0	0
People:	0		0	0	0
Equipment:			0	0	0
Lighting:	0			0	0
Ductwork:		0	0	0	0
Infiltration: Winter CFM: 25. Summer CFM: 0		1.382	0	0	0
Ventilation: Winter CFM: 0. Summer CFM: 0		0	0	0	0
System 8 System 8 Garage Radiant Load Totals:		16,043	0	0	0
Chock Figures					
Supply CEM: 210	CEM P	ar Square ft :			0.346 *
Square ft of Room Area: 607	Square	ft Per Ton			0.040
Volume (ft3) of Cond Space: (btg.) 6068	Oquare				0
* Based on area of rooms being beated or cooled (whichous	or dovorne eve	tom) rathor tha	n ontiro floor	aroa	
** Based on area of rooms being cooled	er governs sys			alea.	
Sustem Leade					
Total Heating Required Including Ventilation Air: 16	043 Btub	16.043 MI	зн		
	o lo Blair	10.010 10	511		
Notes					
Rhvac is an ACCA approved Manual J and Manual D compu	iter program.				
Calculations are performed per ACCA Manual J 8th Edition,	Version 2, and	d ACCA Manua	al D.		
All computed results are estimates as building use and weat	her may vary.				
Be sure to select a unit that meets both sensible and latent lo	oads according	g to the manufa	acturer's perfo	ormance dat	a at
your design conditions.					

Radiant Floor Report

Room Name	Radiant Floor Description [Heat Output Spacing]	Room Area	Sens. Heat	Tubing Length To Meet	Tubing Length To Fill Room	Floor Heat Output Btub	Supple- mental Heat Reg'd
System 1 S	System 1:	71104	2000	Loud	Room	Dun	
2-Master Bathroom (radiant)	3/8" PEX [10,9]	285	2,852	380	336	2,522	330
Zone 1 Total:		285	2,852	380	336	2,522	330
System 1 Total:		285	2,852	380	336	2,522	330
System 8 S	System 8 Garage Radiant:						
46-Garage (radiant)	1/2" PEX in slab [30,9]	607	16,043	713	745	16,756	-713
System 8 Total:		607	16,043	713	745	16,756	-713
Building Total:		892	18,895	1,093	1,081	19,278	-383
A.L							

Notes

Area values shown include only those rooms for which radiant floor properties have been entered.

Sensible heat loss values on this report do not include losses associated with ductwork, ventilation, winter humidification or hot water piping.

Tubing lengths include only the tubing that is part of the radiant floor panel itself and not the supply and return piping to and from the manifold. Tubing lengths are calculated from the Tubing Spacing input and an assumed installed coverage area that is based on a 6-inch offset from each wall around the perimeter of a rectangular room.

The Floor Heat Output Btuh values shown are calculated with the assumption that the tubing is installed to fill the room at the given spacing.

If the Supplemental Heat Required is negative, the radiant floor output exceeds the sensible loss of the room by the indicated amount, assuming that the tubing is installed to fill the room at the given spacing.