

Right Sizing AC Systems for Profit and Energy Star Certification Part II

RESNET 2007

Dennis J Stroer

CALCS-PLUS

Venice Florida

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Reading the Reports

Project Page

Project Information
 Project Name: M & M's South
 Project Date: Wednesday, December 27, 2006
 Project Comment: 11 Miles Street, Alpharetta, GA
 Client Name: Your Home Town, Florida
 Client Address: 717 Hwy 200
 Client City: 32022
 Client Phone: 407-224-2243
 Client E-Mail Address: jonesm@att.net
 Client Website: mconstruction.com
 Client Comment: Johnny Southright
 Company Name: Your Company Name
 Company Representative: Your Name
 Company Address: Your Address

Project Page

Lists data entered in the inputs on the General, Client, Company and Design tabs of the General Project Data window, as well as Check Figures and total building heating and cooling loads.

Check Figures

Volume (ft ³ of Good Ductwork)	12,555	CFM Per Square Ft.	0.016
Total Building Supply CFM	1,285	Square Ft. Per Ton	0.06
Square Ft. of Floor Area	21,555	Air Turnover Rate (per hour)	2.2

Heating Loads

Total Heating Required With Outside Air	23,856	Btu/h	23,856	MBH
Total Heating Load	1,856	Btu/h	1,856	MBH
Total Load Cap.	3,997	Btu/h	17	%
Total Cooling Required With Outside Air	23,856	Btu/h	1.52	Tons (Based On Sensible + Latent Capacity)
			2.17	Tons (Based On 75% Sensible Capacity)

Notes

Calculations are based on 60° wet-bulb at 3.0° ASHRAE. All calculations are estimates and building use and weather data may vary. Errors in calculation are the responsibility of the user.

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Miscellaneous Report

System / System 1	Outdoor Air (ft ³ /min)				
Winter	45	0	50	70	75
Summer	51	70	50	75	59.42

Duct Sizing Inputs

Calculation	Max. Trunk	Supply
Use Schedule	Yes	Yes
Friction Factor	0.0100	0.0100
Pressure Drop	0.1000 in. w.c. / 100 ft.	0.1000 in. w.c. / 100 ft.
Minimum Velocity	550 ft/min	450 ft/min
Maximum Velocity	600 ft/min	750 ft/min
Minimum Height	0 ft.	0 ft.
Maximum Height	0 ft.	0 ft.

Outside Air Data

Winter	Summer
Volume (ft ³ /min)	Volume (ft ³ /min)
45	50
51	70
70	50
75	75
75	59.42

Information

Winter	Summer
Volume (ft ³ /min)	Volume (ft ³ /min)
45	50
51	70
70	50
75	75
75	59.42

Total Building Infiltration: 65 CFM
 Total Building Ventilation: 0 CFM

System 1 - Infiltration & Ventilation Sensible Gain Multiplier: 17.69 = (1.0 X 0.995 X 16.30 Summer Temp. Difference)
 Infiltration & Ventilation Latent Gain Multiplier: 40.28 = (0.60 X 0.995 X 59.42 Grams Difference)
 Infiltration & Ventilation Sensible Load Multiplier: 27.49 = (1.0 X 0.995 X 26.30 Winter Temp. Difference)

Duct Loss Factor Summary for System 1

No.	Type	Description	Location	Area	Duct Length	Duct Leakage	Insulation	Area	Material
1	Supply	Main	ASH	100	0.06	0	341	no	MDI
1	Return	Main	ASH	100	0.06	0	257	no	

Miscellaneous Page

Lists design conditions for each system, duct sizing inputs, and infiltration and ventilation data for each system.

The calculation is finished (for now) so it's time to make some sense out of the reports. The practitioner who understands the results of the calculation will use it as a tool for consulting and to identify problems having to do with system sizing, airflow, temperature un-balances, etc.

All calculation programs (ACCA certified that is) gives general or miscellaneous information that pertains to the project location, who it is for, who did the calculation, some check figures, etc. But they don't mean much unless you have the rest of the meat of the calculation to back it up.

Total Building Summary Loads

At a glance, a total building summary load report will give you the information you will need to make sure the AC is properly sized.

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Ellie Software Development, Inc. 4 Mtn South Page 2					
Total Building Summary Loads					
Component Description	Area Qty	Sen Loss	Lat Gain	Sen Gain	Total Gain
1A-cb-o: Glazing-Single pane, operable window, clear, metal frame with break, outdoor insect screen with 50% coverage, white or reflective color drapes with tight weave with 50% coverage, u-value 1.00	115.4	3,114	0	2,466	2,466
1A-cb-d: Glazing-Single pane, sliding glass door, clear, metal frame with break, outdoor insect screen with 100% coverage, u-value 1.00	80.4	2,172	0	2,132	2,132
10A-t: Glazing-French door, single pane clear glass, metal frame with break, u-value 0.97	20.1	487	0	537	537
11J: Door-Metal - Fiberglass Core	20.1	302	0	326	326
11D: Door-Wood - Solid Core	20.1	157	0	118	118
13A-5oc: Wall-Block, board insulation only, R-5 board insulation, open core, siding finish	999.7	3,124	0	2,039	2,039
12B-0w: Part-Frame, R-11 insulation in 2 x 4 stud cavity, no board insulation, siding finish, wood studs	308.1	597	0	448	448
10B-19: Roof/Ceiling-Under attic or knee wall, Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-19 insulation	1285.6	1,575	0	3,213	3,213
10B-15: Roof/Ceiling-Under attic or knee wall, Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-15 insulation	84.8	130	0	264	264
22A-ph-c: Floor-Slab on grade, No edge insulation, no insulation below floor, carpet covering, passive, heavy moist soil	174	5,908	0	0	0
Subtotals for structure:		17,566	0	11,543	11,543
People:	4	800	920	1,720	1,720
Equipment:			1,200	1,200	2,400
Lighting:	0		0	0	0
Ductwork:		4,510	647	4,818	5,465
Infiltration: Winter CFM: 65, Summer CFM: 33		1,780	1,350	588	1,938
Ventilation: Winter CFM: 0, Summer CFM: 0		0	0	0	0
Total Building Load Totals:		23,856	3,997	19,069	23,066
Check Figures:					
Total Building Supply CFM:	867		CFM Per Square ft.:	0.675	
Square ft. of Room Area:	1,285		Square ft. Per Ton:	606	
Volume (ft ³) of Cond. Space:	12,535		Air Turnover Rate (per hour):	4.2	
Building Loads:					
Total Heating Required With Outside Air:	23,856 Btuh	23,856 MBH			
Total Sensible Gain:	19,069 Btuh	83 %			
Total Latent Gain:	3,997 Btuh	17 %			
Total Cooling Required With Outside Air:	23,066 Btuh	1.92 Tons (Based On Sensible + Latent)			
		2.12 Tons (Based On 75% Sensible Capacity)			
Notes:	Calculations are based on 10th edition of ACCA Manual J. 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.				

At a glance, a total building summary load report will give you the information you will need to make sure the AC is properly sized. For heating you will look at the sensible loss and for cooling the sensible and latent gain must be considered. The report will give the materials used, area or quantity, and the loss or gain of those materials. It will also include internal gains, duct gains, and infiltration/ventilation gains that were used to calculate the total HVAC load. Other important information on this summary should include conditioned area & volume and the cooling sensible heat ratio (SHR) of the building load.

Load Summary for Each Room

Rhvac - Residential & Light Commercial HVAC Loads						Elite Software Development, Inc.			
Calcs-Plus Venice, FL 34293-6060						Mr & Mrs Smith Page 7			
System 1 Room Load Summary									
Room No Name	Area SF	Htg Sens Btuh	Htg Nom CFM	Run Duct Size	Run Duct Vel	Clg Sens Btuh	Clg Lat Btuh	Clg Nom CFM	Air Sys CFM
---Zone 1---									
1 Bedroom 1	155	3,376	36	1-6	465	2,006	246	91	91
2 Bedroom 2	155	3,376	36	1-6	465	2,006	246	91	91
3 Bedroom 3	120	1,680	18	1-4	580	1,113	113	51	51
4 Bathroom Powder Area	48	73	1	1-4	84	162	0	7	7
5 Bathroom Tub Area	43	990	10	1-4	287	550	77	25	25
6 Great Room	368	5,629	59	1-10	506	6,071	631	276	276
7 Kitchen / Dining	276	4,618	49	1-9	462	4,484	1,406	204	204
8 Laundry	120	4,114	43	1-7	456	2,678	631	122	122
Duct Latent							647		
System 1 total		1,285	23,856	251		19,069	3,997	867	867
Cooling System Summary									
	Cooling Tons	Sensible/Latent Split		Sensible Btuh	Latent Btuh	Total Btuh			
Net Required:	1.92	83% / 17%		19,069	3,997	23,066			
Recommended:	2.12	75% / 25%		19,069	6,356	25,426			

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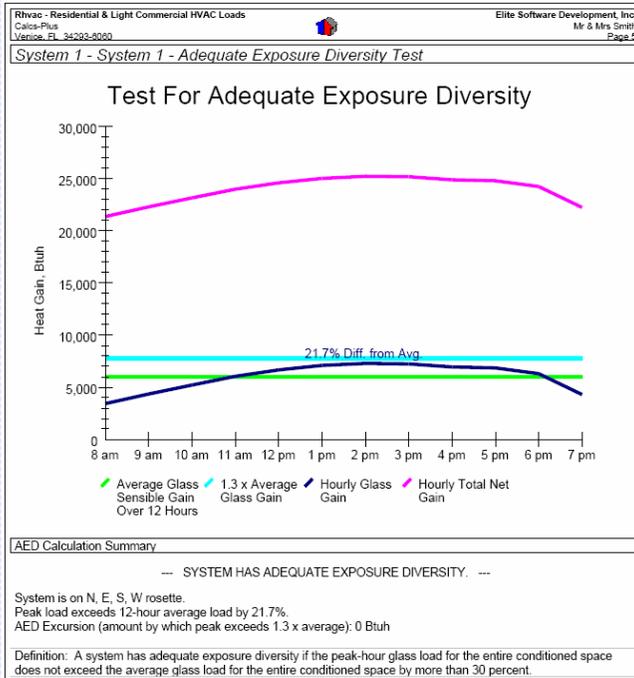
The room summary report should give the area, heating BTUH, heating CFM, run-out duct size (if you are using that feature), run-out duct velocity (again if you are using that feature), sensible cooling BTUH, latent cooling BTUH, nominal cooling CFM, and system CFM for each room (if it was set to a fixed CFM).

Adequate Exposure Diversity

AED Report:

Displays a chart showing the hourly glass load compared to the average glass load over a period of 12 hours. Defines Adequate Exposure Diversity and shows the percent difference between the peak hour glass load and the average.

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Adequate exposure diversity (AED) is the comparison of the peak load to the average load. The chart above shows the average sensible gain of the glass (the green line) over a 12 hour period during the day (8AM to 7PM). The cyan colored line marks where 30% above the average glass load would follow. The dark blue line is the actual glass load during various times of the day. Note that in this house the glass peaks out sometime between 1 and 3 PM. Also notice that the peak load does not go above the 30% line, it falls short by about 8.3%. The hourly glass gain curve is positioned at the start of the average load line which projects the deviation of the total building load during the day with respect to peak load.

Building Rotation Report

Rihvac - Residential & Light Commercial HVAC Loads		Elite Software Development, Inc.								
Calcs-Plus Version: FL 34293-6680		Mr & Mrs Smith Page 8								
Building Rotation Report										
All rotation degree values in this report are clockwise with respect to the project's original orientation. Building orientation as entered (zero degrees rotation): Front door faces South										
Individual Rooms										
Rm. No.	Room Name	0° Rot. CFM	45° Rot. CFM	90° Rot. CFM	135° Rot. CFM	180° Rot. CFM	225° Rot. CFM	270° Rot. CFM	315° Rot. CFM	High Duct Size
System 1:										
Zone 1:										
1	Bedroom 1	91	104	*144	130	91	123	133	102	1-7
2	Bedroom 2	91	134	*144	100	91	95	133	132	1-7
3	Bedroom 3	51	72	*78	55	51	52	71	71	1-5
4	Bathroom Powder Area	7	8	*8	8	7	7	7	8	1-4
5	Bathroom Tub Area	25	27	*36	34	25	32	34	26	1-4
6	Great Room	276	296	298	*435	276	411	274	292	1-12
7	Kitchen / Dining	204	290	*315	236	204	223	289	286	1-10
8	Laundry	122	133	*147	138	122	131	135	131	1-7
* Indicates highest CFM of all rotations.										
Whole Building										
Rotation Degrees	Front door Faces	Supply CFM	Sensible Gain	Latent Gain	Net Tons	Recommended Tons				
0°	South	867	19,069	3,997	1.92	2.12				
45°	Southwest	1,064	23,403	3,997	2.28	2.60				
90°	West	*1,171	*25,742	3,997	*2.48	*2.86				
135°	Northwest	1,136	24,981	3,997	2.41	2.78				
180°	North	867	19,069	3,997	1.92	2.12				
225°	Northeast	1,075	23,629	3,995	2.30	2.63				
270°	East	1,075	23,631	3,995	2.30	2.63				
315°	Southeast	1,050	23,081	*3,998	2.26	2.56				
* Indicates highest value of all rotations.										

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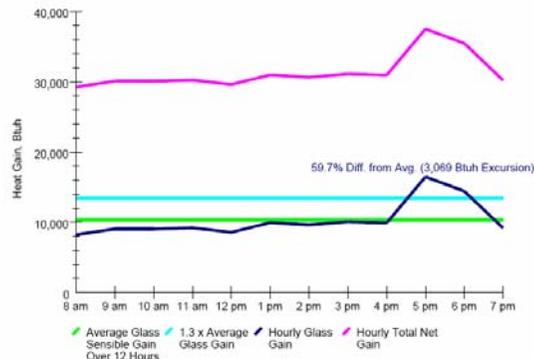
If you do consulting for a builder that has several models that will be placed in a subdivision in any one of the 8 orientations this report will be a real value. In our initial set-up we told the program that the front door would face south. The above report shows that the worse direction the home can face is west. The load on the building increases from 2.12 tons (recommended) when south facing to 2.86 tons (recommended) facing west. Lets see why.

Note: Recommended Tons will be discussed in the section on Equipment selection.

AED for
Worse
Case
Orientation
Front Facing West

System 1 - System 1 - Adequate Exposure Diversity Test

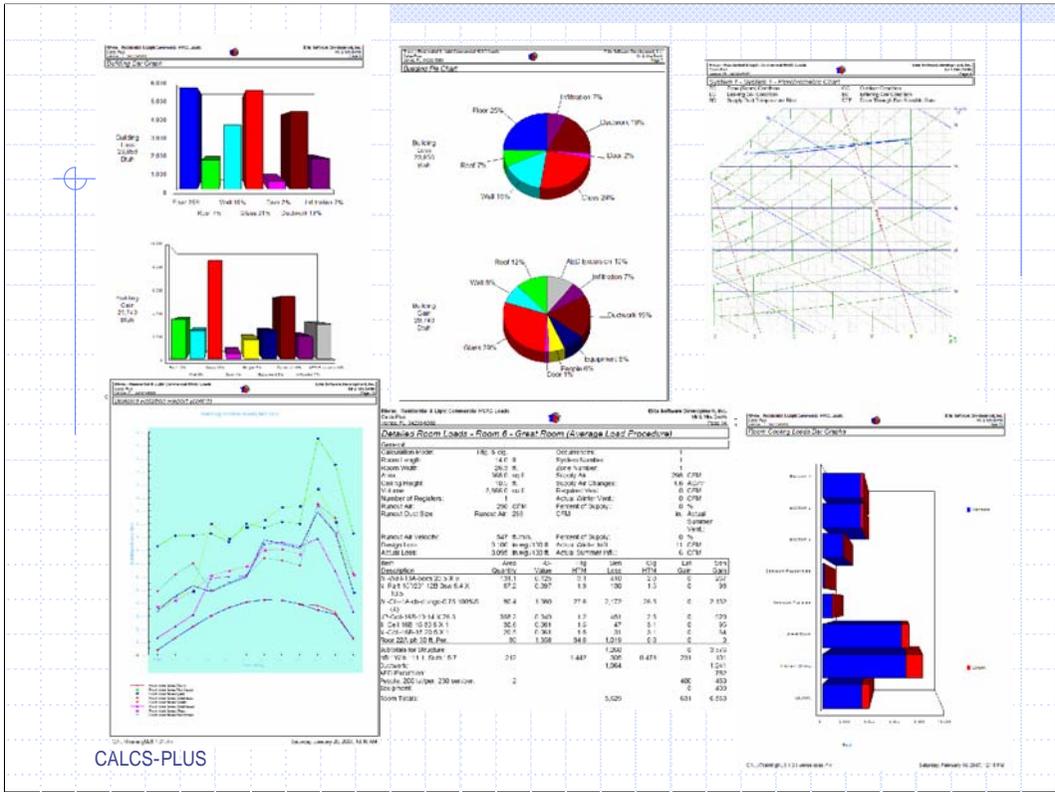
Test For Adequate Exposure Diversity



ZZA-ph-c: # floor-slab on grade, no edge insulation, no insulation below floor, carpet covering, passive, heavy moist soil	174	5,308	0	0	0
Subtotals for structure:	17,566	0	15,096	15,096	
People:	4	800	920	1,720	
Equipment:		1,200	1,200	2,400	
Lighting:	0		0	0	
Ductwork:	4,510	647	4,869	5,517	
Infiltration: Winter CFM: 65, Summer CFM: 33	1,760	1,350	588	1,938	
Ventilation: Winter CFM: 0, Summer CFM: 0	0	0	0	0	
AED Excursion:	0	0	3,069	3,069	litre conditioned space percent
Total Building Load Totals:	23,856	3,997	25,742	29,740	
Check Figures					
Total Building Supply CFM:	1,171	CFM Per Square Ft.:	0.911		
Square ft. of Room Area:	1,285	Square ft. Per Ton:	449		
Volume (ft³) of Cond. Space:	12,535	Air Turnover Rate (per hour):	5.6		
Building Loads					
Total Heating Required With Outside Air:	23,856 Btuh	23,856 MBH			
Total Sensible Gain:	25,742 Btuh	87 %			

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Here is the AED test for the home after we have rotated the front from south to west. The glass peaks over the 30% line by 3,069 BTUH. When this happens we call the 3,069 the “Excursion and it is added back to the calculation. This can be seen on the output with the total building summary loads. If building does not have AED the Excursion becomes a line item in the “Total Building Load Totals”. If the building does have AED the Excursion line is not added to the report.



There are many other useful reports that can come out of the MJ8 calculation such as graphs that show where the loads are coming from, graphs that show room loads, Psychrometric process relating to infiltration and or ventilation, and detailed report for each room. These reports are useful when analyzing to identify problems.

Total Building Summary Loads

Component Description	Area	U-value	Q	Q ₁	Q ₂
1A-Cb-c Glazing-Single pane, operable window, clear metal frame with break, outdoor insect screen w 50% coverage, white or reflective color drapes w tight weave with 50% coverage, u-value: 1.08	80.4	2.172	0	2,152	2,152
1A-Cb-d Glazing-Single pane, sliding glass door, clear, metal frame with break, outdoor insect screen with 100% coverage, u-value: 1.08	20.1	.487	0	537	537
10A-B Glazing-French door, single pane clear glass, metal frame with break, u-value 0.97					
11J Door-Metal - Fiberglass Core					
11D Door-Wood - Solid Core					
13A-5oc5 Wall-Block, board insulation only, insulation, open core, siding finish					
13D-5oc5 Part-Frame, R-11 insulation in 2 x 4 no board insulation, siding finish, wood s					
16B-15 Roof/Ceiling-Under attic or knee wa Attic, No Radiant Barrier, Dark Asphalt S...	84.8	130	0	264	264
16B-15 Roof/Ceiling-Under attic or knee wa Attic, No Radiant Barrier, Dark Asphalt S...					
22A-gh-c Floor-Slab on grade, no edge insulation, no insulation below floor, carpet covering, passive, heavy moist soil	174	5,508	0	0	0
Subtotals for structure:	17,566	0	11,543	11,543	
People	4	800	920	1,720	
Equipment		1,200	1,200	2,400	
Lighting	0		0	0	
Ductwork	4,510	647	4,818	5,465	
Infiltration: Winter CFM: 65, Summer CFM: 33	1,780	1,350	588	1,938	
Ventilation: Winter CFM: 0, Summer CFM: 0	0	0	0	0	
Total Building Load Totals:	23,856	3,997	19,069	23,066	

Check Figures	Value	CFM Per Square Ft.	Value
Total Building Supply CFM:	867	0.675	
Square ft. of Room Area:	1,285	505	
Volume (ft ³) of Cond. Space:	12,535	Air Turnover Rate (per hour):	4.2

Building Loads	Value	Unit	Value	Unit
Total Heating Required With Outside Air:	23,856	Btuh	23,856	MBH
Total Sensible Gain:	19,069	Btuh	83	%
Total Latent Gain:	3,997	Btuh	17	%
Total Cooling Required With Outside Air:	23,066	Btuh	1.92	Tons (Based On Sensible + Latent)
			2.12	Tons (Based On 75% Sensible Capacity)

Notes
 Calculations are based on 8th edition of ACCA Manual J.
 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.

Equipment Selection

Matching the MJ8 Results to Manufacturer's Performance Data

February 10, 2007

Outdoor Model: TTR400A1
 Indoor Model: TWFR1F13

(Capacities are in btuh 1000 - indoor fan heat deducted)

Condition	Capacity	SEER
Capacity	0.98	1.02
Capacity	0.94	1.06
Capacity	0.99	1.01

Indoor Fan Power = 236 watts
 Outdoor Fan Power = 150 watts
 S.E.E.R. = 14.00

Band with 25' Net of 3/4" sections and 5/8" liquid lines

O.D.	I.D.	TOTAL CAP	-SENSIBLE CAPACITY-				SYSTEM	
D.B.	W.B.		72	75	78	80	KW	
85	70	36.0	71.1	75.9	76.0	76.0	7.11	
85	63	27.1	17.3	20.0	22.6	24.3	2.12	
85	67	29.2	15.4	15.4	18.9	20.7	2.16	
95	59	24.7	20.7	23.4	24.7	24.7	2.30	
95	63	25.7	16.7	19.4	22.0	23.8	2.31	
95	67	27.7	13.1	15.8	18.4	20.1	2.35	
105	63	21.3	16.2	18.8	21.1	23.2	2.51	
105	67	23.2	12.6	15.2	17.8	19.6	2.55	
105	71	25.3	8.9	11.6	14.2	15.9	2.57	
115	63	23.0	15.7	18.3	20.9	22.7	2.70	
115	67	24.7	12.0	14.7	17.3	19.0	2.75	
115	71	26.7	8.4	11.0	13.6	15.4	2.77	
***	95	63	25.7	I.D.B.B =		75	19.4	2.31

*** Performance at selected design conditions
 * Dry coil condition (Total Capacity = Sensible Capacity)
 Total capacity, compressor KW valid only for wet coil
 All temperatures in Degree F



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1.92 Tons (Based On Sensible + Latent)

2.12 Tons (Based on 75% Sensible Capacity)

?

16B-15: Roof/Ceiling-Under attic or knee wall, Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-15 insulation	84.8	130	0	264	264
22A-ph-c: Floor-Slab on grade, No edge insulation, no insulation below floor, carpet covering, passive, heavy moist soil	174	5,908	0	0	0
Subtotals for structure:		17,566	0	11,543	11,543
People:	4		800	920	1,720
Equipment:			1,200	1,200	2,400
Lighting:	0			0	0
Ductwork:		4,510	647	4,918	5,465
Infiltration: Winter CFM: 65, Summer CFM: 33		1,780	1,350	588	1,938
Ventilation: Winter CFM: 0, Summer CFM: 0		0	0	0	0
Total Building Load Totals:		23,856	3,997	19,069	23,066

Check Figures:			
Total Building Supply CFM:	867	CFM Per Square ft.:	0.675
Square ft. of Room Area:	1,285	Square ft. Per Ton:	606
Volume (ft³) of Cond. Space:	12,535	Air Turnover Rate (per hour):	4.2

Building Loads			
Total Heating Required With Outside Air:	23,856 Btuh	23,856 MBH	
Total Sensible Gain:	19,069 Btuh	83 %	
Total Latent Gain:	3,997 Btuh	17 %	
Total Cooling Required With Outside Air:	23,066 Btuh		

1.92 Tons (Based On Sensible + Latent)
2.12 Tons (Based On 75% Sensible Capacity)

Notes
Calculations are based on 8th edition of ACCA Manual J.
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.

System Data - System 1 of 1

No: 1 Name: System 1

Design | Equipment

System Design Conditions

Indoor Temperature:	Winter: 70	Summer: 75	Do Winter Humid.:	No
Relative Humidity:	50	50	System Air Type:	Auto
Lvg. Coil-Rtn DT:	70	20	System CFM:	
Infiltration:	0.31	0.16	Pct. Sens. Capacity:	25
Ventilation:	0	0	Radiator Btu/ft.:	0
Exhaust:	0	0	Radiator Text Option:	Foot
Do Heat Recovery:	No	No	Duct Load Factors:	(Date)
Heat Recovery SER:	60	60	Heating Duct Loads:	Yes
Blower Power:	0		Use CV if Multizone:	No
Hot Water Piping:	0			

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This program gives a recommended tonnage size for cooling based on the idea that typical air conditioning systems remove heat at 75% sensible relative to the total BTUH output. This would also mean that the latent removal is 25% of the output. Keep in mind that a 75% SHR may not fit the model line that the owner/builder may want.

If you know the actual SHR of the equipment line that will be installed it can be entered in a "System Data" and the recommended tonnage will be based on it.

Total Building Load Totals: 23,856 3,997

Check Figures

Total Building Supply CFM:	867	CFM Per Square ft.:	
Square ft. of Room Area:	1,285	Square ft. Per Ton:	
Volume (ft ³) of Cond. Space:	12,535	Air Turnover Rate (per hour):	

Building Loads

Total Heating Required With Outside Air:	23,856 Btuh	23,856 MBH
Total Sensible Gain:	19,069 Btuh	83 %
Total Latent Gain:	3,997 Btuh	17 %
Total Cooling Required With Outside Air:	23,066 Btuh	1.92 Tons (Based On Sen Capacity)

Notes

Calculations are based on 8th edition of ACCA Manual J.
 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.

PERFORMANCE DATA COOLING

-- U.S. (ENGLISH) --
 (Capacities are net in Btuh/1000 - indoor fan heat deducted)

February 10, 2007

Outdoor Model
2TRK3030A1

Airflow = 1000

Values At ARI Rating Conditions

Total Net Capacity = 27800 Btuh

Airflow = 1020 CFM

Compressor Power = 1970 watts

Indoor Fan Power = 236 watts

Outdoor Fan Power = 150 watts

S.E.E.R. = 14.00

Indoor Model
TWE031E13

Correction Factors - Other Airflows

Airflow:	875	1125
Total Capacity:	0.98	1.02
Sensible Capacity:	0.94	1.06
Compressor Kw:	0.99	1.01

Rated with 25 feet of 3/4" suction and 5/16" liquid lines.

O.D.	I.D.	TOTAL	--SENSIBLE CAPACITY--				SYSTEM
D.B.	W.B.	CAP.	72	75	78	80	KW
85	59	26.0	21.3	23.9	26.0	26.0	2.11
85	63	27.1	17.3	20.0	22.6	24.3	2.12
85	67	29.2	15.4	15.4	18.9	20.7	2.16
85	59	24.7	20.7	23.4	24.7	24.7	2.30
95	63	25.7	16.7	19.4	22.0	23.8	2.31
95	67	27.7	15.1	15.8	18.4	20.1	2.35
105	63	24.3	16.2	18.8	21.4	23.2	2.51
105	67	26.2	12.6	15.2	17.8	19.6	2.55
105	71	28.3	8.9	11.6	14.2	15.9	2.57
115	63	23.0	15.7	18.3	20.9	22.7	2.70
115	67	24.7	12.0	14.7	17.3	19.0	2.75
115	71	26.7	8.4	11.0	13.6	15.4	2.77

*** Performance at selected design conditions

* Dry coil condition (Total Capacity = Sensible Capacity)

Total capacity, compressor KW valid only for wet coil

All temperatures in Degree °F



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Manufacturers' performance data shows equipment output at various outdoor and indoor conditions; conditions outside ARI testing. The difference is plainly shown on this manufacturer's performance sheet for a nominal 2.5-ton system. The "Values At ARI Rating Conditions" shows that this system has a total net capacity 27,800 BTUH and a SEER rating of 14.00 at 1020 CFM. This is good information but we really need to know how the system is going to perform at design conditions. At 95°F DB outdoor, and 75°F DB & 63°F WB indoor. This system match produces 25,700 BTUH total and 19,400 BTUH sensible output which gives it a 75.5% SHR. So it will work well for this application.

Where did 63°F Indoor WB Come From?

Psychrometrics - Mixed Air

Description: Mixed air conditions

Elevation ft: 0 Barometric Pressure inHg: 29.921

Psychrometric Properties	Source 1	Source 2	Mixed Air
Air Flow Rate (ft ³ /min)	1000	43	1043
Dry Bulb Temperature (F)	<input checked="" type="checkbox"/> 75	<input checked="" type="checkbox"/> 91	75.644
Wet Bulb Temperature (F)	<input type="checkbox"/> 62.547	<input checked="" type="checkbox"/> 78	63.273
Relative Humidity (%)	<input checked="" type="checkbox"/> 50	<input type="checkbox"/> 56.454	50.69
Vapor Pressure (psia)	<input type="checkbox"/> 0.21502	<input type="checkbox"/> 0.40704	0.22272
Dew Point Temperature (F)	<input type="checkbox"/> 55.08	<input type="checkbox"/> 73.37	56.048
Moisture Content (Grains/lb)	<input type="checkbox"/> 64.65	<input type="checkbox"/> 124.03	66.999
Specific Volume (ft ³ /lb)	<input type="checkbox"/> 13.673	<input type="checkbox"/> 14.271	13.697
Enthalpy (Btu/lb)	<input type="checkbox"/> 28.108	<input type="checkbox"/> 41.358	28.633

Calculate Close

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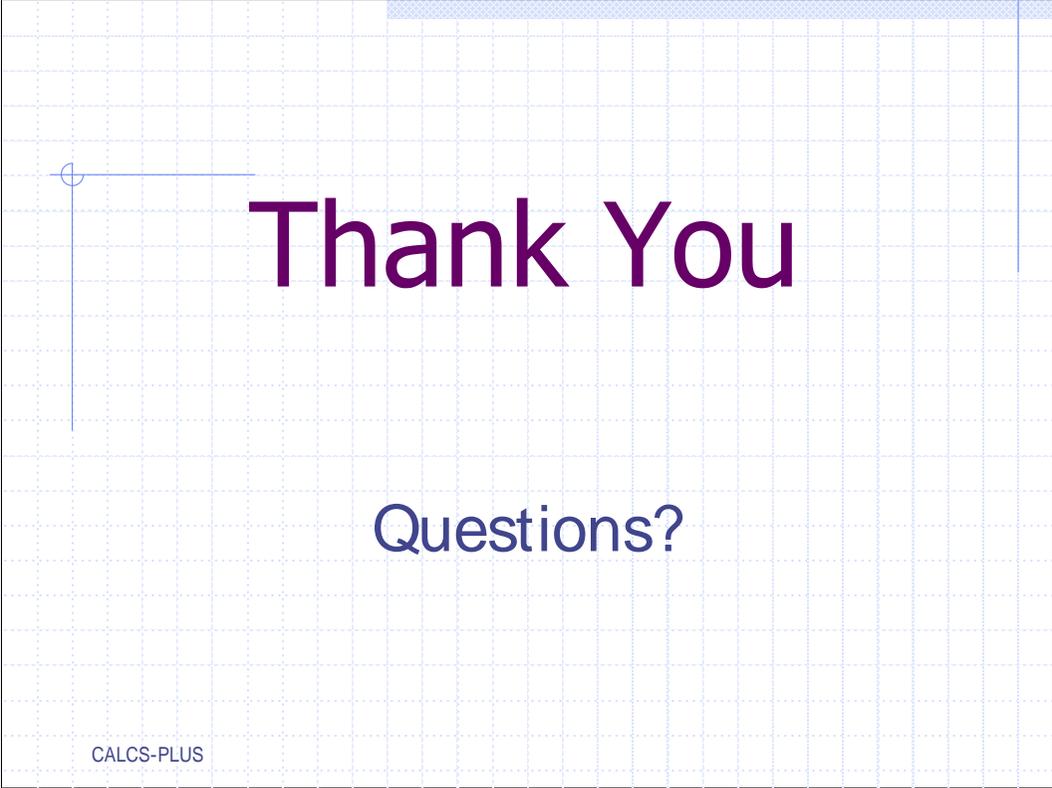
MJ8 indoor design conditions of 75°F DB @ 50% RH yields an indoor wet bulb temperature of 62.5. We guessed at the building infiltration rate, .16, semi tight for buildings under 1500 SQ FT. This equates out to 33 CFM which doesn't meet ASHRAE 62.2 minimum of 7.5 CFM per person and .01 CFM per SQ FT. The home has three bedrooms so four people are considered which gives 30 CFM + .01 CFM x 1285 SQ FT = 43 CFM. The condition of the mixed air at the return plenum just before the evaporator coil is 75.6° DB and 63.3° WB.

Wrap Up



- ◆ Understand the load calculation program you are using.
- ◆ Do a good take off from plans or as-built measurements.
- ◆ Understand the outputs and have faith in your work.
- ◆ Ask for manufactures performance data.
- ◆ Typically, if you choose a piece of equipment that will meet the sensible and net load the latent load will be handled by runtime.
- ◆ Do not exceed 15% of the total building cooling load.
- ◆ Remember that the cooling systems ability to control indoor relative humidity is through long run times.

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Thank You

Questions?

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