EMS Heat Loss/Heat Gain Calculation

Company:	Green Engineering Solutions, Inc.	**Customer:**	Wil Todman
Preparer:	Misty Miller CER #1493	**Address:**	1276 Press Ruth Drive Lake City, FL 32025
Phone:	904-400-0624	**Phone:**	
		Date:	1/6/2023

This HVAC load calculation has been performed using sound engineering principles as prescribed by Manual J seventh and eighth abridged editions and ASHRAE Fundamentals. Duct sizing has been performed as prescribed by Manual D.

1. Design Conditions

Total conditioned area (sq.ft.)	1800		
	Indoor	**Outdoor**	**Temp. Diff.**
Winter	70	34	36
Summer	73	95	22

Front of home is facing:
West

2. How would you describe the summer humidity in your area? Very Humid 60 Grains difference

3. How tight is the house? Average-over 1500 Sq. Ft.
Winter air change / hr: 0.7 Summer air change / hr: 0.35

4. Fireplace evaluation : Number: 1 Tightness: Average 20

5. Number of occupants: 4

6. Overhang characteristics (optional)

	East	**West**	**S/SE/SW**
Distance of overhang from top of window (Ft.)			
Length of overhang			

7. Solar gain through glass

Use Manufacturer's Specs to determine HTM					
Latitude:		**U-value**	.35	**SHGC**	.27

Facing	Total area - Sq.Ft.	Type of glass	HTM	Linear ft.	Unshaded	Shaded	BTUH
N/Shaded	6	Trpl or low-E	15	Below OH		6	
NE/NW		**-- Select --**	30		0		0
South	54	Trpl or low-E	7		54	0	378
SE/SW		**-- Select --**	22		0	0	0
East	107	Trpl or low-E	36		107	0	3852
West	30	Trpl or low-E	36		30	0	1080
Skylight		**-- Select --**					0
Total North and Shaded						6	90
Total Solar Gain							5400
Adjust for tinted or reflective window coating?				No	1		5400

8. Ducts/Pipes

Location:	Trunk and branches in attic				
Attic Temp.	**Insulation**		**Leakage**		**Area**
130	R-6	1	sealed	1	1800

Duct gain:	0.358	**Duct loss:**	0.174

9. Load Calculation

Elements of Load	Insulation / R-value	Area/lin.ft.	U-value	Heat Loss	Heat Gain
Gross Wall		1919.3	**Glass solar gain**		5400
Glass 1	Trpl or low-E	197	0.42	2482	
Glass 2	**-- Select --**			0	
Skylight	**-- Select --**	0		0	
Doors	Insulated or Storm	53.34	0.4	768	469
Net walls	R-13	1669	0.077	4626	2827
Ceilings	R-19	1800	0.055	3564	4455
Floors	**-- Select --**			0	0
Open floors	**-- Select --**			0	0
Slab floors	No Insulation	208.59	0.8	6007	0
Volume of your building or zone (cu. Ft.)		16460.5		8397	2324
		People			1200
		Appliances			3600
		Sub Total		25845	20275
		Duct Loss/Gain		4497	7259
		Sensible Load		30342	27534
		Latent Load			4838
		TOTAL BTUH		30342	32371

Summary		
	BTUH	**Tons**
Total heating load	30342	
Total cooling load	32371	2.7

Room by Room

Total Heat Loss	30205	System CFM (cooling)	1200
Total Heat Gain	27437	System CFM (heating)	1200

Room name	Foyer	Bedroom 2	Bathroom 2	Bedroom 3	Great Room	Dining/Kitchen	Master Bath	Master Bedroom	Office	Laundry/Pantı
Gross wall	63	306	171	288	153	154.53	309.78	139.5	137.97	154.53
North windows			6							
NE/NW windows										
South windows							12	30	12	
SE/SW windows										
East windows				15	50	30	12			
West windows		30								
Skylight										
Doors	33.34									20
Net walls	30	276	165	273	103	125	286	110	126	135
Ceiling	44	190	135	169	288	257	201	233	94	189
Floor-crawl										
Floor-open										
Floor-slab	7	34	19	32	17	17.17	34.42	15.5	15.33	17.17
Infiltration	33	30	6	15	50	30	24	30	12	20
People		1		1				2		
Appliances	0	500		500	600	500		500	500	500
Heat loss	2312	4115	1818	3176	4288	3208	3861	3047	1797	2583
Sensible Heat Gain	1035	4205	1031	3205	5094	3674	2336	3192	1550	2115
Cooling CFM	45	184	45	140	223	161	102	140	68	92
Heating CFM	92	163	72	126	170	127	153	121	71	103

Room name
Gross wall
North windows
NE/NW windows
South windows
SE/SW windows
East windows
West windows
Skylight

Doors
Net walls
Ceiling
Floor-crawl
Floor-open
Floor-slab
Infiltration
People
Appliances
Heat loss
Sensible Heat Gain
Cooling CFM
Heating CFM

Air Ducts Sizing

Total measured length of ducts	55	Use cooling CFM	
Total equivalent length of fittings	32	Flex ducts used	
Available static pressure for duct	.34		
Friction rate	.05		

	CFM	No. outlets	Outlet CFM	Duct diam.	Air vel.
Supply trunk / branch					
First section off AHU	1200			18.8	622
1st reduction / branch	800			16.1	564
2nd reduction / branch	600			14.5	526
3rd reduction / branch	400			12.4	476
4th reduction / branch	200			9.5	402
5th reduction / branch	100			7.3	340
Return trunk / branch					
First section off AHU	1200			18.8	622
1st reduction / branch	800			16.1	564
2nd reduction / branch	600			14.5	526
3rd reduction / branch	400			12.4	476
4th reduction / branch	200			9.5	402
5th reduction / branch	100			7.3	340
Room runs					
Foyer	45	1	45	5.4	280
Bedroom 2	184	2	92	7.1	333.2
Bathroom 2	45	1	45	5.4	280
Bedroom 3	140	1	140	8.3	369
Great Room	223	2	111.5	7.7	349.1
Dining/Kitchen	161	2	80.5	6.8	322.6
Master Bath	102	1	102	7.4	341.7
Master Bedroom	140	1	140	8.3	369
Office	68	1	68	6.3	309.6
Laundry/Pantr/Powder	92	1	92	7.1	333.2

Equipment selection as per Manual S

	BTUH	Nom.Tons
Total heat loss	30342	
Total heat gain	32371	2.7
Sensible heat gain	27534	
Latent heat gain	4838	
Sensible/total ratio	0.85	
Target cooling TD	17	

Design temp.	Outdoor	Indoor
Winter	34	70
Summer	95	73
ID design RH	50%, 63F WB	
Altitude		

Predominantly Cool climate

Manufacturer's Equipment Specification

Equipment	Manufacturer	Model No.	BTUH output	Clg. capacity @ OD design temp.		
Furnace						
Boiler				Total	Sensible	Latent
Heat pump / AC	Amana	ASZ14036		35200	26048	9152
Evaporator						
Air handler	Amana	ARUF37C14				
TOTAL CAPACITY with altitude correction			0	35200	26048	9152
Selected equipment size			OK	OK	OK	OK

Heating CFM	Cooling CFM (rec.)	Ext. static pressure of blower
1200	1393	.5

Available static pressure for duct

Blower ext. static press.	.5
coil pressure drop	
filter pressure drop	.1
register pressure drop	.03
grille pressure drop	.03
other	
Available SP for duct	0.34

Supplemental heat needed for heat pump

HP capacity @ 47F	32800
HP capacity @ 17F	19000
HP capacity @ ODDT	26820
BTUH supplemental heat	3522
KW supplemental heat	1