



EMS Heat Loss/Heat Gain Calculation

Company:	Green Engineering Solutions, Inc.
Preparer:	Misty Miller CER #1493
Phone:	904-400-0624

Customer:	
Address:	SW Bishop Avenue Lake City, FL 32024
Phone:	
Date:	6/11/2023

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.)	1200			
	Indoor	Outdoor	Temp. Diff.	Front of home is facing:
Winter	70	34	36	West
Summer	73	95	22	

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

3. How tight is the house? Average-under 1500 Sq. Ft.

Winter air change / hr: 1 Summer air change / hr: 0.5

4. Fireplace evaluation : Number: None Tightness: No fireplace 0

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

Facing	Total area - Sq.Ft.	Type of glass	HTM	Linear ft.	Unshaded	Shaded	BTUH
N/Shaded		-- Select --		Below OH		0	
NE/NW		-- Select --			0		0
South	30	Trpl or low-E	33		30	0	990
SE/SW		-- Select --			0	0	0
East	24	Trpl or low-E	65.0		24	0	1560
West	40	Trpl or low-E	65.0		40	0	2600
Skylight		-- Select --					0
Total North and Shaded						0	0
Total Solar Gain							5150
Adjust for tinted or reflective window coating?				No	1		5150

8. Ducts/Pipes

Location:	Trunk and branches in attic				
Attic Temp.	Insulation		Leakage		Area
130	R-6	1	sealed	1	1200
Duct gain:	0.322	Duct loss:	0.15		

9. Load Calculation

Elements of Load	Insulation / R-value	Area/lin.ft.	U-value	Heat Loss	Heat Gain
Gross Wall		1120	Glass solar gain		5150
Glass 1	Trpl or low-E	94	0.42	1421	
Glass 2	-- Select --			0	
Skylight	-- Select --	0		0	
Doors	Insulated or Storm	40	0.4	576	352
Net walls	R-13	986	0.077	2733	1670
Ceilings	R-38	1200	0.026	1123	1404
Floors	-- Select --			0	0
Open floors	-- Select --			0	0
Slab floors	No Insulation	140	0.8	4032	0
Volume of your building or zone (cu. Ft.)		9600		6336	1936
		People			1200
		Appliances			2700
		Sub Total		16222	14412
		Duct Loss/Gain		2433	4641
		Sensible Load		18655	19053
		Latent Load			4184
		TOTAL BTUH		18655	23237

Summary		
	BTUH	Tons
Total heating load	18655	
Total cooling load	23237	1.9

Room by Room

Total Heat Loss	18655	System CFM (cooling)	800
Total Heat Gain	19053	System CFM (heating)	800

Room name	Living Room	Master Closet	Master Bedroom	Master Bath/Laundry	Kitchen	Bedroom 2	Bathroom	Bedroom 3
Gross wall	148.64	120	118	170	130	192	49.36	192
North windows								
NE/NW windows								
South windows			30					
SE/SW windows								
East windows					9	15		
West windows	25							15
Skylight								
Doors	20				20			
Net walls	104	120	88	170	101	177	49	177
Ceiling	302	53	172	112	199	144	74	144
Floor-crawl								
Floor-open								
Floor-slab	18.58	15	14.75	21.25	16.25	24	6.17	24
Infiltration	45	0	30	0	29	15	0	15
People			2			1		1
Appliances	500		500	500	700	250		250
Heat loss	4484	936	3107	1366	3139	2591	441	2591
Sensible Heat Gain	4601	351	3799	1215	3019	2922	225	2922
Cooling CFM	193	15	160	51	127	123	9	123
Heating CFM	192	40	133	59	135	111	19	111

Air Ducts Sizing

Total measured length of ducts	45
Total equivalent length of fittings	25
Available static pressure for duct	.34
Friction rate	.05

Use cooling CFM
Flex ducts used

	CFM	No. outlets	Outlet CFM	Duct diam.	Air vel.
Supply trunk / branch					
First section off AHU	800			16.1	564
1st reduction / branch	600			14.5	526
2nd reduction / branch	400			12.4	476
3rd reduction / branch	300			11.1	444
4th reduction / branch	200			9.5	402
5th reduction / branch	100			7.3	340
Return trunk / branch					
First section off AHU	800			16.1	564
1st reduction / branch	600			14.5	526
2nd reduction / branch	400			12.4	476
3rd reduction / branch	300			11.1	444
4th reduction / branch	200			9.5	402
5th reduction / branch	100			7.3	340
Room runs					
Living Room	193	2	96.5	7.2	337.1
Master Closet	15	1	15	3.6	214.4
Master Bedroom	160	2	80	6.7	322.1
Master Bath/Laundry	51	1	51	5.7	288.7
Kitchen	127	1	127	8	360.3
Bedroom 2	123	1	123	7.9	357.6
Bathroom	9	1	9	3	189.4
Bedroom 3	123	1	123	7.9	357.6

Equipment selection as per Manual S

	BTUH	Nom.Tons
Total heat loss	18655	
Total heat gain	23237	1.9
Sensible heat gain	19053	
Latent heat gain	4184	
Sensible/total ratio	0.82	
Target cooling TD	19	

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			
Furnace				Clg. capacity @ OD design temp.		
Boiler				Total	Sensible	Latent
Heat pump / AC	Carrier	25SPA524A003		23600	18880	4720
Evaporator						
Air handler	Carrier	FJ4DNXB24L				
TOTAL CAPACITY with altitude correction			0	23600	18880	4720
Selected equipment size			OK	OK	OK	OK
			Heating CFM	Cooling CFM (rec.)	Ext. static pressure of blower	
			800	903	.5	

AHRI # 210998532
SEER2: 15.2 / HSPF2: 7.5

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	23600
HP capacity @ 17F	14400
HP capacity @ ODDT	19613
BTUH supplemental heat	-958
KW supplemental heat	-0

2023 - AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA-TABLE 402.4.1.1^a

Project Name: SW Bishop Avenue		Builder Name: Evanston Contracting Inc	
Street: SW Bishop Avenue		Permit Office: Lake City	
City, State, Zip: Lake City, FL, 32024		Permit Number:	
Owner:		Jurisdiction: 221200	
Design Location: FL, Jacksonville		County: Columbia(Florida Climate Zone 2)	
COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA	COM
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.	10
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.	
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.	
Windows, skylights and doors	The space between window/door jambs and framing, and skylights and framing shall be sealed.		
Rim joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.	
Floors (including above-garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking, or floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extends from the bottom to the top of all perimeter floor framing members.	
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	Where provided instead of floor insulation, insulation shall be permanently attached to the crawlspace walls.	
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.		
Narrow cavities		Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity spaces.	
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.		
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.	
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.	
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.	
Electrical, communication, and other equipment boxes, housings, and enclosures	Boxes, housings, and enclosures that penetrate the air barrier shall be caulked, taped, gasketed, or otherwise sealed to the air barrier element being penetrated. All concealed openings into the box, housing, or enclosure shall be sealed. The continuity of the air barrier shall be maintained around boxes, housings, and enclosures that penetrate the air barrier. Alternatively, air-sealed boxes shall be installed in accordance with R402.4.6	Boxes, housings, and enclosures shall be buried in or surrounded by tightly fitted insulation.	
HVAC register boots	HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the sub-floor, wall covering or ceiling penetrated by the boot.		
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.		

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Envelope Leakage Test Report (Blower Door Test)
Residential Prescriptive, Performance or ERI Method Compliance
2023 Florida Building Code, Energy Conservation, 8th Edition

Jurisdiction: 221200	Permit #:
Job Information	
Builder: Evanston Contracting Inc Community: Lot: NA	
Address: SW Bishop Avenue	
City: Lake City State: FL Zip: 32024	
Air Leakage Test Results <i>Passing results must meet either the Performance, Prescriptive, or ERI Method</i>	
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"><input type="radio"/> PRESCRIPTIVE METHOD-The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 7 air changes per hour at a pressure of 0.2 inch w.g. (50 Pascals) in Climate Zones 1 and 2.</div> <div style="border: 1px solid black; padding: 5px;"><input checked="" type="radio"/> PERFORMANCE or ERI METHOD-The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding the selected ACH(50) value, as shown on Form R405-2023 (Performance) or R406-2023 (ERI), section labeled as infiltration, sub-section ACH50. <div style="display: flex; justify-content: space-between; align-items: center;">ACH(50) specified on Form R405-2023-Energy Calc (Performance) or R406-2023 (ERI):<div style="border: 1px solid black; padding: 2px 10px; text-align: center;">5.126</div></div></div>	
<div style="display: flex; justify-content: space-between; align-items: flex-start;"><div style="width: 60%;">$\frac{\text{CFM}(50)}{\text{Building Volume}} \times 60 \div \frac{9600}{\text{ACH}(50)} =$<div style="border: 1px solid black; width: 40px; height: 40px; margin: 10px auto; text-align: center; line-height: 40px;">PASS</div><div style="margin-top: 10px;"><input type="checkbox"/> When ACH(50) is less than 3, Mechanical Ventilation installation must be verified by building department.</div></div><div style="width: 35%;"><p>Method for calculating building volume:</p><div style="margin-top: 10px;"><input type="radio"/> Retrieved from architectural plans</div><div style="margin-top: 10px;"><input checked="" type="radio"/> Code software calculated</div><div style="margin-top: 10px;"><input type="radio"/> Field measured and calculated</div></div></div>	
<p>R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding seven air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. Dwelling units with an air leakage rate less than three air changes per hour shall be provided with whole-house mechanical ventilation in accordance with Section R403.6.1 of this code and Section M1507.3 if the <i>Florida Building Code, Residential</i>. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Testing shall be conducted by either individuals as defined in Section 553.993(5) or (7), <i>Florida Statutes</i>, or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i) or an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the <i>code official</i>. Testing shall be performed at any time after creation of all penetrations of the <i>building thermal envelope</i>.</p> <p>During testing:</p> <ol style="list-style-type: none">1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.2. Dampers including exhaust, intake, makeup air, back draft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.3. Interior doors, if installed at the time of the test, shall be open.4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.5. Heating and cooling systems, if installed at the time of the test, shall be turned off.6. Supply and return registers, if installed at the time of the test, shall be fully open.7. If an attic is both sealed and insulated at the roof deck, interior access doors and hatches between the conditioned space volume and the attic shall be opened during the test and the volume of the attic shall be added to the conditioned space volume for purposes of reporting the infiltration volume and calculating the air leakage of the home.	
Testing Company	
<div style="display: flex; justify-content: space-between;"><div>Company Name: _____</div><div>Phone: _____</div></div> <p>I hereby verify that the above Air Leakage results are in accordance with the 2023 8th Edition Florida Building Code Energy Conservation requirements according to the compliance method selected above.</p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"><div>Signature of Tester: _____</div><div>Date of Test: _____</div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>Printed Name of Tester: _____</div><div></div></div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"><div>License/Certification #: _____</div><div>Issuing Authority: _____</div></div>	

ENERGY PERFORMANCE LEVEL (EPL) DISPLAY CARD

ESTIMATED ENERGY PERFORMANCE INDEX* = 94

The lower the EnergyPerformance Index, the more efficient the home.

SW Bishop Avenue,Lake City,FL,32024

1. New construction or existing	New (From Plans)	10. Wall Types(1120.0 sqft.)	Insulation	Area
2. Single family or multiple family	Detached	a. Frame - Wood, Exterior	R=13.0	1120.00 ft ²
3. Number of units, if multiple family	1	b. N/A		
4. Number of Bedrooms	3	c. N/A		
5. Is this a worst case?	No	d. N/A		
6. Conditioned floor area above grade (ft ²)	1200	11. Ceiling Types(1200.0 sqft.)	Insulation	Area
Conditioned floor area below grade (ft ²)	0	a. Flat ceiling under att (Vented)	R=38.0	1200.00 ft ²
7. Windows**	Description	b. N/A		
a. U-Factor:	Dbl, U=0.35	c. N/A		
SHGC:	SHGC=0.27	12. Roof(Comp. Shingles, Vented)	Deck R=0.0	1342 ft ²
b. U-Factor:	N/A	13. Ducts, location & insulation level	R	ft ²
SHGC:		a. Sup: Attic, Ret: Attic, AH: Living Ro	6	240
c. U-Factor:	N/A	b.		
SHGC:		c.		
Area Weighted Average Overhang Depth:	0.000 ft	14. Cooling Systems	kBtu/hr	Efficiency
Area Weighted Average SHGC:	0.270	a. Central Unit	23.6	SEER2:15.20
8. Skylights	Description	15. Heating Systems	kBtu/hr	Efficiency
U-Factor:(AVG)	N/A	a. Electric Heat Pump	23.6	HSPF2:7.50
SHGC(AVG):	N/A	16. Hot Water Systems		
9. Floor Types	Insulation	a. Electric		Cap: 50 gallons
a. Slab-On-Grade Edge Insulation	R= 0.0			EF: 0.950
b. N/A	R=			
c. N/A	R=	b. Conservation features		
		17. Credits		None
				CF

I certify that this home has complied with the Florida Energy Efficiency Code for Building Construction through the above energy saving features which will be installed (or exceeded) in this home before final inspection. Otherwise, a new EPL Display Card will be completed based on installed Code compliant features.

Builder Signature: _____ Date: _____

Address of New Home: SW Bishop Avenue

City/FL Zip: Lake City,FL,32024



*Note: This is not a Building Energy Rating. If your Index is below 70, your home may qualify for energy efficient mortgage (EEM) incentives if you obtain a Florida Energy Rating. For information about the Florida Building Code, Energy Conservation, contact the Florida Building Commission's support staff.

**Label required by Section R303.1.3 of the Florida Building Code, Energy Conservation, if not DEFAULT.