Residential System Sizing Calculation

Summary

Charles & Beth Matukaitis

Project Title:
210086 Matukaitis

Lake City, FL

2021-02-18

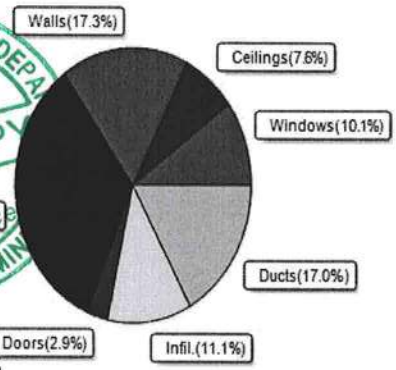
Location for weather data: Gainesville, FL - Defaults: Latitude(29.7) Altitude(152 ft.) Temp Range(M)
Humidity data: Interior RH (50%) Outdoor wet bulb (77F) Humidity difference(51gr.)

Winter design temperature(TMY3 99%)	30	F	Summer design temperature(TMY3 99%)	94	F
Winter setpoint	70	F	Summer setpoint	75	F
Winter temperature difference	40	F	Summer temperature difference	19	F
Total heating load calculation	**24942**	**Btuh**	**Total cooling load calculation**	**23545**	**Btuh**
Submitted heating capacity	% of calc	Btuh	Submitted cooling capacity	% of calc	Btuh
Total (Electric Heat Pump)	108.2	27000	Sensible (SHR = 0.75)	103.0	20250
Heat Pump + Auxiliary(0.0kW)	108.2	27000	Latent	173.5	6750
			Total (Electric Heat Pump)	114.7	27000

WINTER CALCULATIONS

Winter Heating Load (for 1784 sqft)

Load component			Load	
Window total	180	sqft	2513	Btuh
Wall total	1396	sqft	4315	Btuh
Door total	44	sqft	711	Btuh
Ceiling total	1856	sqft	1884	Btuh
Floor total	1784	sqft	8496	Btuh
Infiltration	63	cfm	2780	Btuh
Duct loss			4243	Btuh
Subtotal			**24942**	**Btuh**
Ventilation	0	cfm	0	Btuh
TOTAL HEAT LOSS			**24942**	**Btuh**



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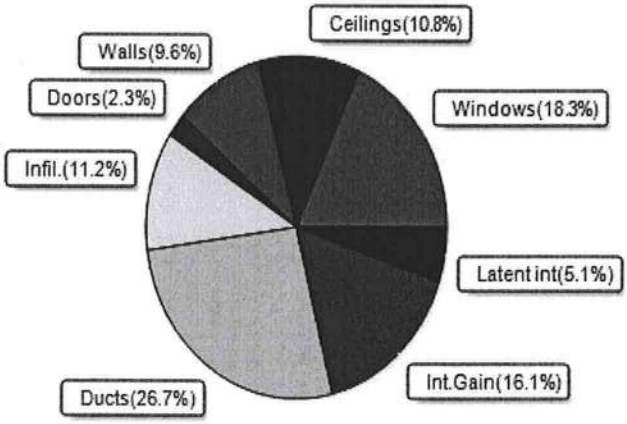
SUMMER CALCULATIONS

Summer Cooling Load (for 1784 sqft)

Load component			Load	
Window total	180	sqft	4303	Btuh
Wall total	1396	sqft	2272	Btuh
Door total	44	sqft	533	Btuh
Ceiling total	1856	sqft	2544	Btuh
Floor total			0	Btuh
Infiltration	48	cfm	990	Btuh
Internal gain			3780	Btuh
Duct gain			5232	Btuh
Sens. Ventilation	0	cfm	0	Btuh
Blower Load			0	Btuh
Total sensible gain			**19654**	**Btuh**
Latent gain(ducts)			1048	Btuh
Latent gain(infiltration)			1643	Btuh
Latent gain(ventilation)			0	Btuh
Latent gain(internal/occupants/other)			1200	Btuh
Total latent gain			**3891**	**Btuh**
TOTAL HEAT GAIN			**23545**	**Btuh**



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8th Edition

EnergyGauge® System Sizing
PREPARED BY: Evan Beamsley
DATE: 2021-02-18

System Sizing Calculations - Winter

Residential Load - Whole House Component Details

Charles & Beth Matukaitis

Lake City, FL

Project Title:
210086 Matukaitis
Building Type: User

2021-02-18

Reference City: Gainesville, FL (Defaults) Winter Temperature Difference: 40.0 F (TMY3 99%)
This calculation is for Worst Case. The house has been rotated 270 degrees.

Component Loads for Whole House

Window	Panes/Type	Frame	U	Orientation	Area(sqft) X	HTM=	Load
1	2, NFRC 0.25	Metal	0.35	W	30.0	14.0	420 Btuh
2	2, NFRC 0.25	Metal	0.35	W	20.0	14.0	280 Btuh
3	2, NFRC 0.25	Metal	0.35	W	9.0	14.0	126 Btuh
4	2, NFRC 0.25	Metal	0.35	W	15.0	14.0	210 Btuh
5	2, NFRC 0.25	Metal	0.35	E	15.0	14.0	210 Btuh
6	2, NFRC 0.25	Metal	0.35	E	20.0	14.0	280 Btuh
7	2, NFRC 0.25	Metal	0.35	E	30.0	14.0	420 Btuh
8	2, NFRC 0.25	Metal	0.35	E	16.0	14.0	224 Btuh
9	2, NFRC 0.25	Metal	0.35	S	4.5	14.0	63 Btuh
10	2, NFRC 0.25	Metal	0.35	S	20.0	14.0	280 Btuh
	Window Total				179.5(sqft)		2513 Btuh

Walls	Type	Ornt.	Ueff.	R-Value (Cav/Sh)	Area X	HTM=	Load
1	Frame - Wood	- Ext	(0.077)	19.0/0.0	99	3.09	306 Btuh
2	Frame - Wood	- Ext	(0.077)	19.0/0.0	33	3.09	102 Btuh
3	Frame - Wood	- Ext	(0.077)	19.0/0.0	162	3.09	500 Btuh
4	Frame - Wood	- Ext	(0.077)	19.0/0.0	33	3.09	102 Btuh
5	Frame - Wood	- Ext	(0.077)	19.0/0.0	96	3.09	297 Btuh
6	Frame - Wood	- Ext	(0.077)	19.0/0.0	54	3.09	167 Btuh
7	Frame - Wood	- Adj	(0.077)	19.0/0.0	198	3.09	613 Btuh
8	Frame - Wood	- Ext	(0.077)	19.0/0.0	36	3.09	111 Btuh
9	Frame - Wood	- Ext	(0.077)	19.0/0.0	116	3.09	357 Btuh
10	Frame - Wood	- Ext	(0.077)	19.0/0.0	120	3.09	370 Btuh
11	Frame - Wood	- Ext	(0.077)	19.0/0.0	29	3.09	90 Btuh
12	Frame - Wood	- Ext	(0.077)	19.0/0.0	27	3.09	83 Btuh
13	Frame - Wood	- Ext	(0.077)	19.0/0.0	52	3.09	162 Btuh
14	Frame - Wood	- Ext	(0.077)	19.0/0.0	27	3.09	83 Btuh
15	Frame - Wood	- Ext	(0.077)	19.0/0.0	33	3.09	102 Btuh
16	Frame - Wood	- Ext	(0.077)	19.0/0.0	282	3.09	870 Btuh
	Wall Total				1396(sqft)		4315 Btuh

Doors	Type	Storm	Ueff.	Area X	HTM=	Load
1	Insulated - Exterior,	n	(0.400)	13	16.0	213 Btuh
2	Insulated - Garage,	n	(0.400)	18	16.0	284 Btuh
3	Insulated - Exterior,	n	(0.400)	13	16.0	213 Btuh
	Door Total			44(sqft)		711Btuh

Ceilings	Type/Color/Surface	Ueff.	R-Value	Area X	HTM=	Load
1	Vented Attic/D/Shing	(0.025)	38.0/0.0	1856	1.0	1884 Btuh
	Ceiling Total			1856(sqft)		1884Btuh

Floors	Type	Ueff.	R-Value	Size X	HTM=	Load
1	Slab On Grade	(1.180)	0.0	180.0 ft(perim.)	47.2	8496 Btuh
	Floor Total			1784 sqft		8496 Btuh

Manual J Winter Calculations

Residential Load - Component Details (continued)

Charles & Beth Matukaitis

Lake City, FL

Project Title:
210086 Matukaitis
Building Type: User

2021-02-18

					Envelope Subtotal:		17920 Btuh
Infiltration	Type Natural	Wholehouse 	ACH 0.23	Volume(cuft) 16413	Wall Ratio 1.00	CFM= 63.5	2780 Btuh
Duct load	Average sealed, R6.0, Supply(Att), Return(Att)					(DLM of 0.205)	4243 Btuh
All Zones					**Sensible Subtotal All Zones**		**24942 Btuh**

WHOLE HOUSE TOTALS

Totals for Heating	Subtotal Sensible Heat Loss Ventilation Sensible Heat Loss Total Heat Loss	24942 Btuh 0 Btuh 24942 Btuh

EQUIPMENT

1. Electric Heat Pump	#	27000 Btuh

Key: Window types - NFRC (Requires U-Factor and Shading coefficient(SHGC) of glass as numerical values)
or - Glass as 'Clear' or 'Tint' (Uses U-Factor and SHGC defaults)
U - (Window U-Factor)
HTM - (ManualJ Heat Transfer Multiplier)

Version 8

System Sizing Calculations - Summer

Residential Load - Whole House Component Details

Charles & Beth Matukaitis

Project Title:
210086 Matukaitis

Lake City, FL

2021-02-18

Reference City: Gainesville, FL Temperature Difference: 19.0F(TMY3 99%) Humidity difference: 51gr.
This calculation is for Worst Case. The house has been rotated 270 degrees.

Component Loads for Whole House

Window	Type* Panes	SHGC	U	InSh	IS	Ornt	Overhang Len	Hgt	Window Area(sqft) Gross	Shaded	Unshaded	HTM Shaded	Unshaded	Load
1	2 NFRC	0.25,	0.35	No	No	W	1.5ft	1.5ft	30.0	0.0	30.0	12	31	923 Btuh
2	2 NFRC	0.25,	0.35	No	No	W	11.5f	1.0ft	20.0	20.0	0.0	12	31	238 Btuh
3	2 NFRC	0.25,	0.35	No	No	W	11.5f	1.0ft	9.0	9.0	0.0	12	31	107 Btuh
4	2 NFRC	0.25,	0.35	No	No	W	1.5ft	1.5ft	15.0	0.0	15.0	12	31	461 Btuh
5	2 NFRC	0.25,	0.35	No	No	E	1.5ft	1.5ft	15.0	0.0	15.0	12	31	461 Btuh
6	2 NFRC	0.25,	0.35	No	No	E	8.5ft	1.0ft	20.0	18.2	1.8	12	31	273 Btuh
7	2 NFRC	0.25,	0.35	No	No	E	8.5ft	1.0ft	30.0	30.0	0.0	12	31	357 Btuh
8	2 NFRC	0.25,	0.35	No	No	E	1.5ft	1.5ft	16.0	0.0	16.0	12	31	492 Btuh
9	2 NFRC	0.25,	0.35	No	No	S	1.5ft	6.5ft	4.5	4.5	0.0	12	14	54 Btuh
10	2 NFRC	0.25,	0.35	No	No	S	1.5ft	7.0ft	20.0	6.1	13.9	12	14	265 Btuh
	Excursion													671 Btuh
	Window Total								180 (sqft)					4303 Btuh

Walls	Type	U-Value	R-Value Cav/Sheath	Area(sqft)	HTM	Load
1	Frame - Wood - Ext	0.08	19.0/0.0	99.0	1.7	164 Btuh
2	Frame - Wood - Ext	0.08	19.0/0.0	33.0	1.7	55 Btuh
3	Frame - Wood - Ext	0.08	19.0/0.0	161.7	1.7	267 Btuh
4	Frame - Wood - Ext	0.08	19.0/0.0	33.0	1.7	55 Btuh
5	Frame - Wood - Ext	0.08	19.0/0.0	96.0	1.7	159 Btuh
6	Frame - Wood - Ext	0.08	19.0/0.0	54.0	1.7	89 Btuh
7	Frame - Wood - Adj	0.08	19.0/0.0	198.2	1.5	291 Btuh
8	Frame - Wood - Ext	0.08	19.0/0.0	36.0	1.7	60 Btuh
9	Frame - Wood - Ext	0.08	19.0/0.0	115.5	1.7	191 Btuh
10	Frame - Wood - Ext	0.08	19.0/0.0	119.7	1.7	198 Btuh
11	Frame - Wood - Ext	0.08	19.0/0.0	29.3	1.7	48 Btuh
12	Frame - Wood - Ext	0.08	19.0/0.0	27.0	1.7	45 Btuh
13	Frame - Wood - Ext	0.08	19.0/0.0	52.3	1.7	86 Btuh
14	Frame - Wood - Ext	0.08	19.0/0.0	27.0	1.7	45 Btuh
15	Frame - Wood - Ext	0.08	19.0/0.0	33.0	1.7	55 Btuh
16	Frame - Wood - Ext	0.08	19.0/0.0	281.5	1.7	466 Btuh
	Wall Total			1396 (sqft)		2272 Btuh

Doors	Type	Area (sqft)	HTM	Load
1	Insulated - Exterior	13.3	12.0	160 Btuh
2	Insulated - Garage	17.8	12.0	213 Btuh
3	Insulated - Exterior	13.3	12.0	160 Btuh
	Door Total	44 (sqft)		533 Btuh

Ceilings	Type/Color/Surface	U-Value	R-Value	Area(sqft)	HTM	Load
1	Vented Attic/DarkShingle	0.025	38.0/0.0	1856.0	1.37	2544 Btuh
	Ceiling Total			1856 (sqft)		2544 Btuh

Floors	Type	R-Value	Size	HTM	Load
1	Slab On Grade	0.0	1784 (ft-perimeter)	0.0	0 Btuh
	Floor Total		1784.0 (sqft)		0 Btuh

	Envelope Subtotal:	9652 Btuh

Manual J Summer Calculations

Residential Load - Component Details (continued)

Charles & Beth Matukaitis

Project Title: 210086 Matukaitis

Climate:FL_GAINESVILLE_REGIONAL_A

Lake City, FL

2021-02-18

Infiltration	Type Natural	Average ACH 0.17	Volume(cuft) 16413	Wall Ratio 1		CFM= 47.6	Load 990	Btuh
Internal gain		Occupants 6	Btuh/occupant X 230		+	Appliance 2400	Load 3780	Btuh
					Sensible Envelope Load:		14422	Btuh
Duct load	Average sealed, Supply(R6.0-Attic), Return(R6.0-Attic)				(DGM of 0.363)		5232	Btuh
					Sensible Load All Zones		**19654**	**Btuh**

Manual J Summer Calculations

Residential Load - Component Details (continued)

Charles & Beth Matukaitis

Project Title: 210086 Matukaitis

Climate:FL_GAINESVILLE_REGIONAL_A

Lake City, FL

2021-02-18

WHOLE HOUSE TOTALS

	Sensible Envelope Load All Zones	**14422 Btuh**
	Sensible Duct Load	5232 Btuh
	Total Sensible Zone Loads	**19654 Btuh**
	Sensible ventilation	0 Btuh
	Blower	0 Btuh
Whole House	**Total sensible gain**	**19654 Btuh**
Totals for Cooling	Latent infiltration gain (for 51 gr. humidity difference)	1643 Btuh
	Latent ventilation gain	0 Btuh
	Latent duct gain	1048 Btuh
	Latent occupant gain (6.0 people @ 200 Btuh per person)	1200 Btuh
	Latent other gain	0 Btuh
	Latent total gain	**3891 Btuh**
	TOTAL GAIN	**23545 Btuh**

EQUIPMENT

1. Central Unit	#	27000 Btuh

*Key: Window types (Panes - Number and type of panes of glass)
(SHGC - Shading coefficient of glass as SHGC numerical value)
(U - Window U-Factor)
(InSh - Interior shading device: none(No), Blinds(B), Draperies(D) or Roller Shades(R))
- For Blinds: Assume medium color, half closed
For Draperies: Assume medium weave, half closed
For Roller shades: Assume translucent, half closed
(IS - Insect screen: none(N), Full(F) or Half(½))
(Ornt - compass orientation)

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