Residential System Sizing Calculation

Summary

Charles Ward

Lake City, FL

Project Title:
210100 Ward

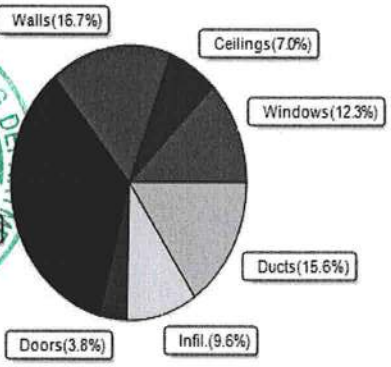
2021-02-15

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	**31968**	**Btuh**	**Total cooling load calculation**	**28984**	**Btuh**
Submitted heating capacity	% of calc	Btuh	Submitted cooling capacity	% of calc	Btuh
Total (Electric Heat Pump)	109.5	35000	Sensible (SHR = 0.75)	106.1	26250
Heat Pump + Auxiliary(0.0kW)	109.5	35000	Latent	205.9	8750
			Total (Electric Heat Pump)	120.8	35000

WINTER CALCULATIONS

Winter Heating Load (for 2093 sqft)

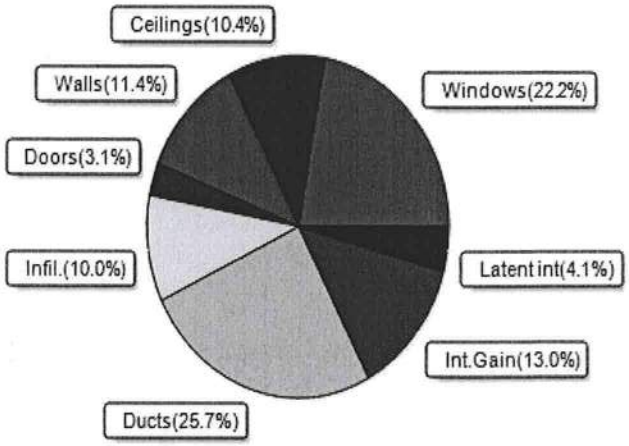
Load component			Load	
Window total	308	sqft	3946	Btuh
Wall total	1507	sqft	5350	Btuh
Door total	76	sqft	1209	Btuh
Ceiling total	2200	sqft	2234	Btuh
Floor total	2093	sqft	11186	Btuh
Infiltration	70	cfm	3065	Btuh
Duct loss			4978	Btuh
Subtotal			**31968**	**Btuh**
Ventilation	0	cfm	0	Btuh
TOTAL HEAT LOSS			**31968**	**Btuh**



SUMMER CALCULATIONS

Summer Cooling Load (for 2093 sqft)

Load component			Load	
Window total	308	sqft	6441	Btuh
Wall total	1507	sqft	3293	Btuh
Door total	76	sqft	907	Btuh
Ceiling total	2200	sqft	3015	Btuh
Floor total			0	Btuh
Infiltration	52	cfm	1092	Btuh
Internal gain			3780	Btuh
Duct gain			6206	Btuh
Sens. Ventilation	0	cfm	0	Btuh
Blower Load			0	Btuh
Total sensible gain			**24734**	**Btuh**
Latent gain(ducts)			1238	Btuh
Latent gain(infiltration)			1812	Btuh
Latent gain(ventilation)			0	Btuh
Latent gain(internal/occupants/other)			1200	Btuh
Total latent gain			**4250**	**Btuh**
TOTAL HEAT GAIN			**28984**	**Btuh**



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EnergyGauge® System Sizing
PREPARED BY: Evan Beamsley
DATE: 2021-02-15

System Sizing Calculations - Winter

Residential Load - Whole House Component Details

Charles Ward

Lake City, FL

Project Title:
210100 Ward
Building Type: User

2021-02-15

Reference City: Gainesville, FL (Defaults) Winter Temperature Difference: 40.0 F (TMY3 99%)

Component Loads for Whole House

Window	Panes/Type	Frame	U	Orientation	Area(sqft) X	HTM=	Load
1	2, NFRC 0.22	Metal	0.32	N	45.0	12.8	576 Btuh
2	2, NFRC 0.22	Metal	0.32	N	53.3	12.8	683 Btuh
3	2, NFRC 0.22	Metal	0.32	NW	4.0	12.8	51 Btuh
4	2, NFRC 0.22	Metal	0.32	W	27.5	12.8	352 Btuh
5	2, NFRC 0.22	Metal	0.32	N	60.0	12.8	768 Btuh
6	2, NFRC 0.22	Metal	0.32	E	30.0	12.8	384 Btuh
7	2, NFRC 0.22	Metal	0.32	S	24.4	12.8	313 Btuh
8	2, NFRC 0.22	Metal	0.32	S	30.0	12.8	384 Btuh
9	2, NFRC 0.22	Metal	0.32	S	18.0	12.8	230 Btuh
10	2, NFRC 0.22	Metal	0.32	W	16.0	12.8	205 Btuh
	Window Total				308.3(sqft)		3946 Btuh

Walls	Type	Ornt.	Ueff.	R-Value (Cav/Sh)	Area X	HTM=	Load
1	Frame - Wood	- Ext	(0.089)	13.0/0.0	72	3.55	254 Btuh
2	Frame - Wood	- Ext	(0.089)	13.0/0.0	80	3.55	284 Btuh
3	Frame - Wood	- Ext	(0.089)	13.0/0.0	62	3.55	221 Btuh
4	Frame - Wood	- Ext	(0.089)	13.0/0.0	41	3.55	147 Btuh
5	Frame - Wood	- Ext	(0.089)	13.0/0.0	63	3.55	224 Btuh
6	Frame - Wood	- Ext	(0.089)	13.0/0.0	121	3.55	428 Btuh
7	Frame - Wood	- Ext	(0.089)	13.0/0.0	295	3.55	1049 Btuh
8	Frame - Wood	- Adj	(0.089)	13.0/0.0	105	3.55	372 Btuh
9	Frame - Wood	- Adj	(0.089)	13.0/0.0	19	3.55	66 Btuh
10	Frame - Wood	- Adj	(0.089)	13.0/0.0	53	3.55	189 Btuh
11	Frame - Wood	- Adj	(0.089)	13.0/0.0	27	3.55	95 Btuh
12	Frame - Wood	- Ext	(0.089)	13.0/0.0	26	3.55	93 Btuh
13	Frame - Wood	- Ext	(0.089)	13.0/0.0	35	3.55	123 Btuh
14	Frame - Wood	- Ext	(0.089)	13.0/0.0	71	3.55	251 Btuh
15	Frame - Wood	- Ext	(0.089)	13.0/0.0	43	3.55	151 Btuh
16	Frame - Wood	- Ext	(0.089)	13.0/0.0	128	3.55	454 Btuh
17	Frame - Wood	- Ext	(0.089)	13.0/0.0	267	3.55	947 Btuh
	Wall Total				1507(sqft)		5350 Btuh

Doors	Type	Storm	Ueff.	Area X	HTM=	Load
1	Insulated - Exterior,	n	(0.400)	13	16.0	213 Btuh
2	Insulated - Exterior,	n	(0.400)	13	16.0	213 Btuh
3	Insulated - Exterior,	n	(0.400)	18	16.0	284 Btuh
4	Insulated - Garage,	n	(0.400)	18	16.0	284 Btuh
5	Insulated - Exterior,	n	(0.400)	13	16.0	213 Btuh
	Door Total			76(sqft)		1209Btuh

Ceilings	Type/Color/Surface	Ueff.	R-Value	Area X	HTM=	Load
1	Vented Attic/D/Shing	(0.025)	38.0/0.0	2200	1.0	2234 Btuh
	Ceiling Total			2200(sqft)		2234Btuh

Manual J Winter Calculations

Residential Load - Component Details (continued)

Charles Ward
Lake City, FL

Project Title:
210100 Ward
Building Type: User

2021-02-15

Floors	Type	Ueff.	R-Value	Size X	HTM=	Load
1	Slab On Grade	(1.180)	0.0	237.0 ft(perim.)	47.2	11186 Btuh
	Floor Total			2093 sqft		11186 Btuh
				Envelope Subtotal:		23925 Btuh
Infiltration	Type	Wholehouse ACH	Volume(cuft)	Wall Ratio	CFM=	
	Natural	0.23	18418	1.00	70.0	3065 Btuh
Duct load	Average sealed, R6.0, Supply(Att), Return(Att)			(DLM of 0.184)		4978 Btuh
All Zones			**Sensible Subtotal All Zones**			**31968 Btuh**

WHOLE HOUSE TOTALS

Totals for Heating	Subtotal Sensible Heat Loss	31968 Btuh
	Ventilation Sensible Heat Loss	0 Btuh
	Total Heat Loss	31968 Btuh

EQUIPMENT

1. Electric Heat Pump	#	35000 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)

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System Sizing Calculations - Summer

Residential Load - Whole House Component Details

Charles Ward

Project Title:
210100 Ward

Lake City, FL

2021-02-15

Reference City; Gainesville, FL Temperature Difference: 19.0F(TMY3 99%) Humidity difference: 51gr.

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	0.22, 0.32	No	No	N	1.5ft	5.0ft	45.0	0.0	45.0	11	27	1228	Btuh
2	2 NFRC	0.22, 0.32	No	No	N	9.5ft	0.5ft	53.3	53.3	0.0	11	27	571	Btuh
3	2 NFRC	0.22, 0.32	No	No	NW	9.5ft	0.5ft	4.0	4.0	0.0	11	22	43	Btuh
4	2 NFRC	0.22, 0.32	No	No	W	1.5ft	1.0ft	27.5	27.5	0.0	11	12	294	Btuh
5	2 NFRC	0.22, 0.32	No	No	N	1.5ft	3.0ft	60.0	0.0	60.0	11	27	1637	Btuh
6	2 NFRC	0.22, 0.32	No	No	E	1.5ft	1.0ft	30.0	0.0	30.0	11	11	321	Btuh
7	2 NFRC	0.22, 0.32	No	No	S	11.8f	0.5ft	24.4	24.4	0.0	11	27	262	Btuh
8	2 NFRC	0.22, 0.32	No	No	S	6.0ft	1.0ft	30.0	23.9	6.1	11	27	423	Btuh
9	2 NFRC	0.22, 0.32	No	No	S	1.5ft	1.0ft	18.0	1.5	16.5	11	27	467	Btuh
10	2 NFRC	0.22, 0.32	No	No	W	1.5ft	6.7ft	16.0	7.4	8.6	11	12	186	Btuh
	Excursion												1009	Btuh
	Window Total							308 (sqft)					6441	Btuh

Walls	Type	U-Value	R-Value Cav/Sheath	Area(sqft)	HTM	Load
1	Frame - Wood - Ext	0.09	13.0/0.0	71.7	2.3	162 Btuh
2	Frame - Wood - Ext	0.09	13.0/0.0	80.0	2.3	181 Btuh
3	Frame - Wood - Ext	0.09	13.0/0.0	62.2	2.3	141 Btuh
4	Frame - Wood - Ext	0.09	13.0/0.0	41.3	2.3	94 Btuh
5	Frame - Wood - Ext	0.09	13.0/0.0	63.2	2.3	143 Btuh
6	Frame - Wood - Ext	0.09	13.0/0.0	120.7	2.3	273 Btuh
7	Frame - Wood - Ext	0.09	13.0/0.0	295.3	2.3	668 Btuh
8	Frame - Wood - Adj	0.09	13.0/0.0	104.9	1.7	177 Btuh
9	Frame - Wood - Adj	0.09	13.0/0.0	18.7	1.7	31 Btuh
10	Frame - Wood - Adj	0.09	13.0/0.0	53.3	1.7	90 Btuh
11	Frame - Wood - Adj	0.09	13.0/0.0	26.7	1.7	45 Btuh
12	Frame - Wood - Ext	0.09	13.0/0.0	26.2	2.3	59 Btuh
13	Frame - Wood - Ext	0.09	13.0/0.0	34.7	2.3	78 Btuh
14	Frame - Wood - Ext	0.09	13.0/0.0	70.7	2.3	160 Btuh
15	Frame - Wood - Ext	0.09	13.0/0.0	42.7	2.3	97 Btuh
16	Frame - Wood - Ext	0.09	13.0/0.0	128.0	2.3	290 Btuh
17	Frame - Wood - Ext	0.09	13.0/0.0	266.7	2.3	604 Btuh
	Wall Total			1507 (sqft)		3293 Btuh

Doors	Type	Area (sqft)	HTM	Load
1	Insulated - Exterior	13.3	12.0	160 Btuh
2	Insulated - Exterior	13.3	12.0	160 Btuh
3	Insulated - Exterior	17.8	12.0	213 Btuh
4	Insulated - Garage	17.8	12.0	213 Btuh
5	Insulated - Exterior	13.3	12.0	160 Btuh
	Door Total	76 (sqft)		907 Btuh

Ceilings	Type/Color/Surface	U-Value	R-Value	Area(sqft)	HTM	Load
1	Vented Attic/DarkShingle	0.025	38.0/0.0	2200.0	1.37	3015 Btuh
	Ceiling Total			2200 (sqft)		3015 Btuh

Floors	Type	R-Value	Size	HTM	Load
1	Slab On Grade	0.0	2093 (ft-perimeter)	0.0	0 Btuh
	Floor Total		2093.0 (sqft)		0 Btuh

Manual J Summer Calculations

Residential Load - Component Details (continued)

Charles Ward

Project Title: 210100 Ward

Climate:FL_GAINESVILLE_REGIONAL_A

Lake City, FL

2021-02-15

			Envelope Subtotal:			13656 Btuh
Infiltration	Type	Average ACH	Volume(cuft)	Wall Ratio	CFM=	Load
	Natural	0.17	18418	1	52.5	1092 Btuh
Internal gain		Occupants	Btuh/occupant		Appliance	Load
		6	X 230	+	2400	3780 Btuh
			Sensible Envelope Load:			18528 Btuh
Duct load	Average sealed, Supply(R6.0-Attic), Return(R6.0-Attic)			(DGM of 0.335)		6206 Btuh
			Sensible Load All Zones			**24734 Btuh**

Manual J Summer Calculations

Residential Load - Component Details (continued)

Charles Ward

Project Title: 210100 Ward

Climate:FL_GAINESVILLE_REGIONAL_A

Lake City, FL

2021-02-15

WHOLE HOUSE TOTALS

Whole House Totals for Cooling	**Sensible Envelope Load All Zones**	**18528 Btuh**
	Sensible Duct Load	6206 Btuh
	Total Sensible Zone Loads	**24734 Btuh**
	Sensible ventilation	0 Btuh
	Blower	0 Btuh
	Total sensible gain	**24734 Btuh**
	Latent infiltration gain (for 51 gr. humidity difference)	1812 Btuh
	Latent ventilation gain	0 Btuh
	Latent duct gain	1238 Btuh
	Latent occupant gain (6.0 people @ 200 Btuh per person)	1200 Btuh
	Latent other gain	0 Btuh
	Latent total gain	**4250 Btuh**
	TOTAL GAIN	**28984 Btuh**

EQUIPMENT

1. Central Unit	#	35000 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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