

Residential System Sizing Calculation



Chad Stright
Lake City, FL

Summary
Project Title:
Robinson Stright

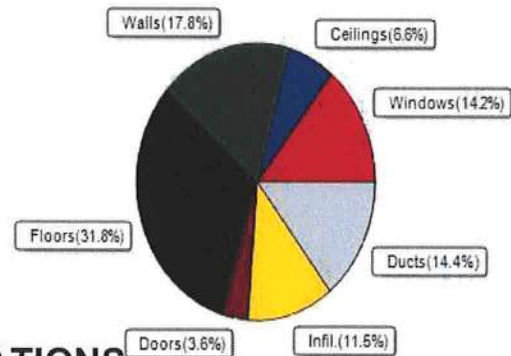
2022-04-22

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	44488 Btuh	Total cooling load calculation	35705 Btuh
Submitted heating capacity	% of calc Btuh	Submitted cooling capacity	% of calc Btuh
Total (Electric Heat Pump)	107.9 48000	Sensible (SHR = 0.75)	120.4 36000
Heat Pump + Auxiliary(0.0kW)	107.9 48000	Latent	206.7 12000
		Total (Electric Heat Pump)	134.4 48000

WINTER CALCULATIONS

Winter Heating Load (for 2700 sqft)

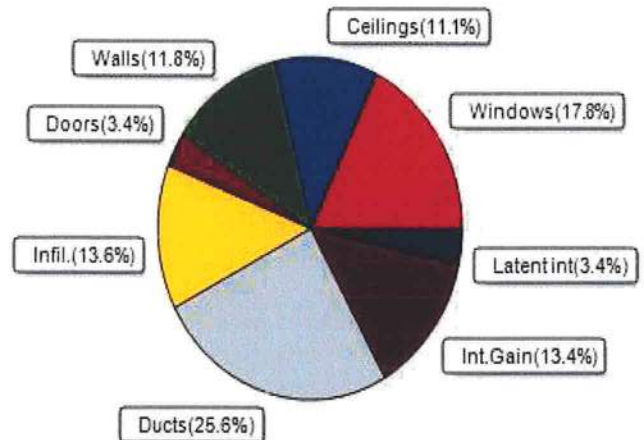
Load component		Load	
Window total	452 sqft	6328	Btuh
Wall total	2564 sqft	7925	Btuh
Door total	100 sqft	1600	Btuh
Ceiling total	2880 sqft	2924	Btuh
Floor total	2700 sqft	14160	Btuh
Infiltration	117 cfm	5130	Btuh
Duct loss		6421	Btuh
Subtotal		44488	Btuh
Ventilation	0 cfm	0	Btuh
TOTAL HEAT LOSS		44488	Btuh



SUMMER CALCULATIONS

Summer Cooling Load (for 2700 sqft)

Load component		Load	
Window total	452 sqft	6363	Btuh
Wall total	2564 sqft	4222	Btuh
Door total	100 sqft	1200	Btuh
Ceiling total	2880 sqft	3947	Btuh
Floor total		0	Btuh
Infiltration	88 cfm	1828	Btuh
Internal gain		4780	Btuh
Duct gain		7560	Btuh
Sens. Ventilation	0 cfm	0	Btuh
Blower Load		0	Btuh
Total sensible gain		29900	Btuh
Latent gain(ducts)		1573	Btuh
Latent gain(infiltration)		3033	Btuh
Latent gain(ventilation)		0	Btuh
Latent gain(internal/occupants/other)		1200	Btuh
Total latent gain		5806	Btuh
TOTAL HEAT GAIN		35705	Btuh



8th Edition

EnergyGauge® System Sizing
PREPARED BY: Evan Beamsley
DATE: 2022-04-22

1 Set
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System Sizing Calculations - Winter

Residential Load - Whole House Component Details

Chad Stright

Lake City, FL

Project Title:
Robinson Stright
Building Type: User

2022-04-22

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 0.25	Metal	0.35	N	54.0		14.0	756 Btuh
2	2, NFRC 0.25	Metal	0.35	E	16.0		14.0	224 Btuh
3	2, NFRC 0.25	Metal	0.35	N	36.0		14.0	504 Btuh
4	2, NFRC 0.25	Metal	0.35	N	32.0		14.0	448 Btuh
5	2, NFRC 0.25	Metal	0.35	N	72.0		14.0	1008 Btuh
6	2, NFRC 0.25	Metal	0.35	W	16.0		14.0	224 Btuh
7	2, NFRC 0.25	Metal	0.35	N	18.0		14.0	252 Btuh
8	2, NFRC 0.25	Metal	0.35	E	36.0		14.0	504 Btuh
9	2, NFRC 0.25	Metal	0.35	S	18.0		14.0	252 Btuh
10	2, NFRC 0.25	Metal	0.35	S	8.0		14.0	112 Btuh
11	2, NFRC 0.25	Metal	0.35	S	96.0		14.0	1344 Btuh
12	2, NFRC 0.25	Metal	0.35	S	8.0		14.0	112 Btuh
13	2, NFRC 0.25	Metal	0.35	S	12.0		14.0	168 Btuh
14	2, NFRC 0.25	Metal	0.35	S	8.0		14.0	112 Btuh
15	2, NFRC 0.25	Metal	0.35	N	6.0		14.0	84 Btuh
16	2, NFRC 0.25	Metal	0.35	W	16.0		14.0	224 Btuh
	Window Total				452.0(sqft)			6328 Btuh
Walls	Type	Ornt.	Ueff.	R-Value (Cav/Sh)	Area	X	HTM=	Load
1	Frame - Wood	- Ext	(0.077)	19.0/0.0	131		3.09	405 Btuh
2	Frame - Wood	- Ext	(0.077)	19.0/0.0	138		3.09	426 Btuh
3	Frame - Wood	- Ext	(0.077)	19.0/0.0	264		3.09	816 Btuh
4	Frame - Wood	- Ext	(0.077)	19.0/0.0	138		3.09	426 Btuh
5	Frame - Wood	- Ext	(0.077)	19.0/0.0	162		3.09	501 Btuh
6	Frame - Wood	- Ext	(0.077)	19.0/0.0	440		3.09	1360 Btuh
7	Frame - Wood	- Ext	(0.077)	19.0/0.0	112		3.09	346 Btuh
8	Frame - Wood	- Ext	(0.077)	19.0/0.0	80		3.09	247 Btuh
9	Frame - Wood	- Ext	(0.077)	19.0/0.0	55		3.09	168 Btuh
10	Frame - Wood	- Ext	(0.077)	19.0/0.0	256		3.09	791 Btuh
11	Frame - Wood	- Ext	(0.077)	19.0/0.0	55		3.09	168 Btuh
12	Frame - Wood	- Ext	(0.077)	19.0/0.0	80		3.09	247 Btuh
13	Frame - Wood	- Ext	(0.077)	19.0/0.0	118		3.09	365 Btuh
14	Frame - Wood	- Ext	(0.077)	19.0/0.0	80		3.09	247 Btuh
15	Frame - Wood	- Ext	(0.077)	19.0/0.0	47		3.09	145 Btuh
16	Frame - Wood	- Adj	(0.077)	19.0/0.0	93		3.09	288 Btuh
17	Frame - Wood	- Ext	(0.077)	19.0/0.0	49		3.09	151 Btuh
18	Frame - Wood	- Ext	(0.077)	19.0/0.0	267		3.09	826 Btuh
	Wall Total				2564(sqft)			7925 Btuh

Manual J Winter Calculations

Residential Load - Component Details (continued)

Chad Stright

Lake City, FL

Project Title:
Robinson Stright
Building Type: User

2022-04-22

Doors	Type	Storm Ueff.		Area X	HTM=	Load
1	Insulated - Exterior, n	(0.400)		8	16.0	128 Btuh
2	Insulated - Exterior, n	(0.400)		16	16.0	256 Btuh
3	Insulated - Exterior, n	(0.400)		8	16.0	128 Btuh
4	Insulated - Exterior, n	(0.400)		16	16.0	256 Btuh
5	Insulated - Exterior, n	(0.400)		16	16.0	256 Btuh
6	Insulated - Exterior, n	(0.400)		16	16.0	256 Btuh
7	Insulated - Garage, n	(0.400)		20	16.0	320 Btuh
	Door Total			100(sqft)		1600Btuh
Ceilings	Type/Color/Surface	Ueff.	R-Value	Area X	HTM=	Load
1	Vented Attic/D/Shing	(0.025)	38.0/0.0	2880	1.0	2924 Btuh
	Ceiling Total			2880(sqft)		2924Btuh
Floors	Type	Ueff.	R-Value	Size X	HTM=	Load
1	Slab On Grade	(1.180)	0.0	300.0 ft(perim.)	47.2	14160 Btuh
	Floor Total			2700 sqft		14160 Btuh
Envelope Subtotal:						32937 Btuh
Infiltration	Type	Wholehouse ACH	Volume(cuft)	Wall Ratio	CFM=	Load
	Natural	0.25	28620	1.00	117.2	5130 Btuh
Duct load	Average sealed, R6.0, Supply(Att), Return(Att)				(DLM of 0.169)	6421 Btuh
All Zones	Sensible Subtotal All Zones					44488 Btuh

WHOLE HOUSE TOTALS

Totals for Heating	Subtotal Sensible Heat Loss	44488 Btuh
	Ventilation Sensible Heat Loss	0 Btuh
	Total Heat Loss	44488 Btuh

EQUIPMENT

1. Electric Heat Pump	#	48000 Btuh
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Manual J Winter Calculations

Residential Load - Component Details (continued)

Chad Stright

Lake City, FL

Project Title:
Robinson Stright
Building Type: User

2022-04-22

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

Manual J Summer Calculations

Residential Load - Component Details (continued)

Chad Stright

Project Title: Climate:FL_GAINESVILLE_REGIONAL_A
Robinson Stright

Lake City, FL

2022-04-22

Ceilings 1	Type/Color/Surface	U-Value	R-Value	Area(sqft)	HTM	Load
	Vented Attic/DarkShingle	0.025	38.0/0.0	2880.0	1.37	3947 Btuh
	Ceiling Total			2880 (sqft)		3947 Btuh
Floors 1	Type		R-Value	Size	HTM	Load
	Slab On Grade		0.0	2700 (ft-perimeter)	0.0	0 Btuh
	Floor Total			2700.0 (sqft)		0 Btuh
Envelope Subtotal:						15732 Btuh
Infiltration	Type	Average ACH	Volume(cuft)	Wall Ratio	CFM=	Load
	Natural	0.18	28620	1	87.9	1828 Btuh
Internal gain		Occupants	Btuh/occupant	Appliance		Load
		6	X 230	+ 3400		4780 Btuh
Sensible Envelope Load:						22340 Btuh
Duct load	Average sealed, Supply(R6.0-Attic), Return(R6.0-Attic) (DGM of 0.338)					7560 Btuh
Sensible Load All Zones						29900 Btuh

Manual J Summer Calculations

Residential Load - Component Details (continued)

Chad Stright
Lake City, FL

Project Title: Climate:FL_GAINESVILLE_REGIONAL_A
Robinson Stright

2022-04-22

WHOLE HOUSE TOTALS		
Whole House Totals for Cooling	Sensible Envelope Load All Zones	22340 Btuh
	Sensible Duct Load	7560 Btuh
	Total Sensible Zone Loads	29900 Btuh
	Sensible ventilation	0 Btuh
	Blower	0 Btuh
	Total sensible gain	29900 Btuh
	Latent infiltration gain (for 51 gr. humidity difference)	3033 Btuh
	Latent ventilation gain	0 Btuh
	Latent duct gain	1573 Btuh
	Latent occupant gain (6.0 people @ 200 Btuh per person)	1200 Btuh
	Latent other gain	0 Btuh
	Latent total gain	5806 Btuh
	TOTAL GAIN	35705 Btuh

EQUIPMENT		
1. Central Unit	#	48000 Btuh

*Key: Window types (Panels - 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)



Version 8

STRAIT HVAC LOAD ANALYSIS

for

ROBINSON CONSTRUCTION



Prepared By:

DAVID HALL
DAVID HALL'S INC.
PO BOX 244
LAKE CITY FL 32056
386-755-9792
04/03/2022

Project Summary

Project: STRAIT
Client: ROBINSON CONSTRUCTION
Address:
City:
Phone:
Fax:

Company: DAVID HALL'S INC.
Representative: DAVID HALL
Address: PO BOX 244
City: LAKE CITY FL 32056
Phone: 386-755-9792
Fax: 386-755-9100
Comment:

Design Data

Project Name: STRAIT
Reference City: Jacksonville, Florida
Daily Temperature Range: Medium
Latitude: 30 Degrees
Elevation: 26 Feet
Elevation Sensible Adj. Factor: 1.000
Elevation Total Adj. Factor: 1.000

	<u>Outdoor Dry Bulb</u>	<u>Outdoor Wet Bulb</u>	<u>Indoor Rel.Hum.</u>	<u>Indoor Dry Bulb</u>	<u>Grains Difference</u>
Winter:	27	N/A	N/A	72	N/A
Summer:	96	78	50%	75	51

Check Figures

Total Building Supply CFM: 1000
Square feet of room area: 2,185
CFM per square foot: 0.458
Square feet per ton: 559.682

Building Loads

Total heating required with outside air: 46,713 Btuh 46.713 MBH
Total sensible gain: 36,073 Btuh 84 %
Total latent gain: 6,735 Btuh 16 %
Total cooling required with outside air: 42,808 Btuh
3.567 Tons (based on sensible + latent)
3.904 Tons (based on 77% sensible capacity)

Notes

Calculations are based on 7th 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.

Miscellaneous Project Data

Project File Name: ROBINSON,STRAIT

System Input Data

---System 1---	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum.	Indoor Dry Bulb	Grains Difference
Winter:	27	N/A	N/A	72	N/A
Summer:	96	78	50%	75	51

External Overhangs

No.	Projection	Offset	No.	Projection	Offset
1	3	1	6	0	0
2	5	0	7	0	0
3	4	0.5	8	0	0
4	0	0	9	0	0
5	0	0	10	0	0

Duct Sizing Inputs

	<u>Runouts</u>	<u>Main Trunk</u>
Duct Material:	Flexible Duct	Galvanized Steel
Roughness Factor:	0.010000	0.000300
Pressure Drop:	0.1000 In.wg/100 Ft.	0.1000 In.wg/100 Ft.
Minimum Velocity:	450.0 Ft./Minute	650.0 Ft./Minute
Maximum Velocity:	750.0 Ft./Minute	900.0 Ft./Minute
Minimum Height:	0 Inches	0 Inches
Maximum Height:	0 Inches	0 Inches

Outside Air Data

	<u>Winter</u>	<u>Summer</u>
Infiltration:	0.900 AC/Hr	0.400 AC/Hr
Volume of Conditioned Space:	X 21832 Cu.Ft.	X 21832 Cu.Ft.
	19,649 Cu.Ft./Hr	8,733 Cu.Ft./Hr
	X 0.0167	X 0.0167
Total Building Infiltration:	327.48 CFM	145.5467 CFM
Total Building Ventilation:	0 CFM	0 CFM
---System 1---		
Infiltration & Ventilation Sensible Gain Multiplier:	23.10 = (1.10 X 21.00 Summer Temp. Difference)	
Infiltration & Ventilation Latent Gain Multiplier:	34.86 = (0.68 X 51.27 Grains Difference)	
Infiltration & Ventilation Sensible Loss Multiplier:	49.50 = (1.10 X 45.00 Winter Temp. Difference)	

Total Building Summary Loads

Component Description	Area Quan	Sen. Loss	Lat. Gain	Sen. Gain	Total Gain
3C Window Double Pane Clear Glass Metal Frame	238	7,767	0	9,424	9,424
8O Glass Door Double Clear Glass Metal Frame	144	4,698	0	4,089	4,089
11C Door Metal Polystyrene Core	15	317	0	173	173
12K Wall R-19 + 1" ExtrPoly Board(R-5.0)	1,813	3,671	0	2,007	2,007
16G Ceiling R-30 Insulation	2,185	3,246	0	3,246	3,246
22A Slab on Grade No Edge Insulation	224	8,162	0	0	0
Subtotals for structure:	4,619	27,861	0	18,939	18,939
Active People:	2	0	460	600	1,060
Inactive People:	0	0	0	0	0
Appliances:	0	0	1,200	1,200	2,400
Lighting:	0	0	0	8,525	8,525
Ductwork:	0	2,642	0	3,448	3,448
Infiltration: Winter CFM: 327.5, Summer CFM: 145.5	397	16,210	5,075	3,361	8,436
Ventilation: Winter CFM: 0.0, Summer CFM: 0.0	0	0	0	0	0
Sensible Gain Total:				36,073	
Temperature Swing Multiplier:				X1.00	
Building Load Totals:		46,713	6,735	36,073	42,808

Check Figures

Total Building Supply CFM:	1000	CFM per square foot:	0.458
Square feet of room area:	2,185	Square feet per ton:	559.682

Building Loads

Total heating required with outside air:	46,713 Btuh	46.713 MBH
Total sensible gain:	36,073 Btuh	84 %
Total latent gain:	6,735 Btuh	16 %
Total cooling required with outside air:	42,808 Btuh	3.567 Tons (based on sensible + latent)
		3.904 Tons (based on 77% sensible capacity)

Notes

Calculations are based on 7th 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 #1 Summary Loads

Component Description	Area Quan	Sen. Loss	Lat. Gain	Sen. Gain	Total Gain
3C Window Double Pane Clear Glass Metal Frame	238	7,767	0	9,424	9,424
8O Glass Door Double Clear Glass Metal Frame	144	4,698	0	4,089	4,089
11C Door Metal Polystyrene Core	15	317	0	173	173
12K Wall R-19 + 1" ExtrPoly Board(R-5.0)	1,813	3,671	0	2,007	2,007
16G Ceiling R-30 Insulation	2,185	3,246	0	3,246	3,246
22A Slab on Grade No Edge Insulation	224	8,162	0	0	0
Subtotals for structure:	4,619	27,861	0	18,939	18,939
Active People:	2	0	460	600	1,060
Inactive People:	0	0	0	0	0
Appliances:	0	0	1,200	1,200	2,400
Lighting:	0	0		8,525	
Ductwork:	0	2,642	0	3,448	3,448
Infiltration: Winter CFM: 327.5, Summer CFM: 145.5	397	16,210	5,075	3,361	8,436
Ventilation: Winter CFM: 0.0, Summer CFM: 0.0	0	0	0	0	0
Sensible Gain Total:				36,073	
Temperature Swing Multiplier:				X1.00	
System Load Totals:		46,713	6,735	36,073	42,808

Check Figures

Supply CFM:	1,000	CFM per square foot:	0.458
Square feet of room area:	2,185	Square feet per ton:	559.682

System Loads

Total heating required with outside air:	46,713 Btuh	46.713 MBH
Total sensible gain:	36,073 Btuh	84 %
Total latent gain:	6,735 Btuh	16 %
Total cooling required with outside air:	42,808 Btuh	3.567 Tons (based on sensible + latent)
		3.904 Tons (based on 77% sensible capacity)

Notes

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 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.

Room Load Summary Reports

System #1 Room Load Summary

No	Room Name	Area SF	Htg Sens Btuh	Htg Nom CFM	Run Duct Size	Run Duct Vel	Clg Sens Btuh	Clg Lat Btuh	Clg Nom CFM	Zone Adj Fact	Clg Adj CFM	Air Sys CFM
---Zone 1---												
1	Laundry Room	128	3,498	75	1-5	452	2,222	153	62	1.25	126	62
2	Hall	82	166	4	1-3	499	884	0	25	1.00	40	25
3	Rear Vest	25	1,280	27	1-3	446	789	192	22	1.00	36	22
4	Master Bath	195	2,337	50	1-5	537	2,643	205	73	1.25	150	73
5	Master Closet	123	230	5	1-3	538	952	0	26	1.00	43	26
6	Pantry	42	103	2	1-3	462	818	0	23	1.00	37	23
7	Kitchen	285	8,238	176	2-6	451	6,389	2,504	177	1.00	290	177
8	Great Room	588	20,215	433	3-6	562	11,941	2,991	331	1.00	543	331
9	Bedroom #2	146	3,010	64	1-4	601	1,892	230	52	1.00	86	52
10	1/2 Bath	49	918	20	2-2	640	1,007	0	28	1.00	46	28
11	Bath#2 & 3	160	835	18	2-2	717	1,128	0	31	1.00	51	31
12	Bedroom #3	206	2,384	51	1-5	495	2,435	230	68	1.00	111	68
13	Office/playroom	156	3,499	75	1-5	604	2,973	230	82	1.00	135	82
System 1 Totals		2185	46,713	1,000			36,073	6,735	1,000		1,695	1,000
												Main Trunk Size: 16x12 in.

System #1 Cooling System Summary

	Cooling Tons	Sensible/Latent Split	Sensible Btuh	Latent Btuh	Total Btuh
Net Required:	3.567	84%/16%	36,073	6,735	42,808
Recommended:	3.904	77%/23%	36,073	10,775	46,848