

*Sample Residence
HVAC Load Calculations*

for

Sample Residence

New Jersey



RHVAC RESIDENTIAL
HVAC LOADS

Prepared By:

Joseph Navarra
HVACR Comfort Pro LLC
46 Mount Ararat Lane
Toms River, New Jersey 08753
848-992-7392
Tuesday, August 4, 2020



Project Report

General Project Information

Project Title: Sample Residence
Designed By: Joseph Navarra
Project Date: Sunday, July 26, 2020
Project Comment: ALL DUCT WORK MUST BE SEALED WITH A MASTIC PAST TO A .04% DUCT LOSS OR LESS. DUCT WORK MUST BE TESTED AND PASS DUCT LEAKAGE TEST. ALL DUCT WORK IN UNCONDITIONED SPACES MUST BE WRAPPED WITH AN R-8 INSULATION VALUE, AND ALL FLEX DUCT MUST HAVE A R-8 INSULATION VALUE IN UNCONDITIONED SPACES. NO RETURN AIR PANNING OF BAYS, WALL CAVITIES, OR FLOOR BEAMS.

Client Name: Sample Residence
Client City: New Jersey
Client Comment: ALL RETURNS MUST BE DUCTED. NO STACK HEADS OR DUCT WORK IN OUT SIDE WALLS OF THE HOME, FLOOR BOOTS AND CEILING BOXES ONLY. HVACR CONTRACTOR TO MAKE CHANGES TO DUCT WORK AS HE SEE NEEDED. HVACR CONTRACTOR MUST TEST & BALANCE SYSTEM TO CORRECT CFM'S REQUIRED.

Company Name: HVACR Comfort Pro LLC
Company Representative: Joseph Navarra
Company Address: 46 Mount Ararat Lane
Company City: Toms River, New Jersey 08753
Company Phone: 848-992-7392
Company Comment:

Design Data

Reference City: Long Branch, New Jersey
Building Orientation: Front door faces Southeast
Daily Temperature Range: Medium
Latitude: 40 Degrees
Elevation: 36 ft.
Altitude Factor: 0.999

	Outdoor Dry Bulb	Outdoor Wet Bulb	Outdoor Rel.Hum	Indoor Rel.Hum	Indoor Dry Bulb	Grains Difference
Winter:	13	11.86	n/a	n/a	70	n/a
Summer:	90	73	45%	50%	75	30

Check Figures

Total Building Supply CFM:	3,177	CFM Per Square ft.:	0.726
Square ft. of Room Area:	4,376	Square ft. Per Ton:	486
Volume (ft ³):	44,122		

Building Loads

Total Heating Required Including Ventilation Air:	155,206 Btuh	155.206 MBH
Total Sensible Gain:	71,892 Btuh	80 %
Total Latent Gain:	17,883 Btuh	20 %
Total Cooling Required Including Ventilation Air:	89,775 Btuh	7.48 Tons (Based On Sensible + Latent)
		9.00 Tons (Based On 75% Sensible Capacity)

Notes

Rhvac is an ACCA approved Manual J, D and S computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
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 according to the manufacturer's performance data at your design conditions.



Load Preview Report

Scope	Net Ton	Rec Ton	ft. ² /Ton	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	7.48	9.00	486	4,376	71,892	17,883	89,775	155,206	1,991	3,177	3,177	
System 1 Basement	0.93	0.93	1,407	1,307	8,361	2,771	11,132	14,402	185	381	381	12x8
Supply Duct Latent						110	110					
Return Duct					0	109	109	168				
Zone 1				1,307	8,361	2,552	10,913	14,234	185	381	381	
1-New Fitness Room				424	2,997	1,444	4,441	4,242	55	136	136	6,6
2-New Multi-Purpose Room				438	3,555	993	4,548	4,337	56	162	162	6,6
3-New Lower Foyer				273	366	43	409	2,351	31	17	17	5
4-New Bath				67	104	26	130	1,042	14	5	5	5
5-New Vestibule				105	1,338	46	1,384	2,261	29	61	61	5
System 2 First Floor Family Room	1.49	1.76	263	462	15,795	2,073	17,868	28,202	367	719	719	18x8
Zone 1				462	15,795	2,073	17,868	28,202	367	719	719	
6-New 2 Story Family Room				462	15,795	2,073	17,868	28,202	367	719	719	7,7,7,7,7,7,7
System 3 First Floor Kitchen & The Rest	3.18	3.94	334	1,316	26,387	11,822	38,209	65,050	846	1,201	1,201	30x8
Zone 1				1,316	26,387	11,822	38,209	65,050	846	1,201	1,201	
7-New Elk				118	5,095	0	5,095	4,259	55	232	232	7,7
8-New Kitchen				591	14,817	11,822	26,640	48,872	636	674	674	7,7,7,7,7
9-New Stairs / Hall				178	1,888	0	1,888	6,111	79	86	86	6
10-Rear Foyer				240	2,816	0	2,816	3,690	48	128	128	5,5,5
11-New Pantry				47	0	0	0	72	1	0	0	0--0
12-Closet				47	826	0	826	777	10	38	38	5
13-New Bath				47	58	0	58	276	4	3	3	5
14-New Mud Room				49	886	0	886	993	13	40	40	5
System 4 Second Floor	1.88	2.37	544	1,290	21,350	1,217	22,566	47,552	594	877	877	22x8
Supply Duct Latent						100	100					
Return Duct					2,084	316	2,399	1,902				
Zone 1				1,290	19,266	801	20,067	45,650	594	877	877	
15-Mezzanee/ Open To Below				546	8,006	403	8,409	26,718	347	364	364	7,7,7
16-New Office/ Study				291	7,633	158	7,791	13,738	179	347	347	7,7,7
17-New W I C				61	1,181	71	1,252	1,711	22	54	54	5
18-New Bath				69	346	71	417	1,184	15	16	16	5
19-Laundry				115	1,351	13	1,364	353	5	61	61	6
20-New Stairs. Hall				162	749	85	834	1,947	25	34	34	5
21-Hall				46	0	0	0	0	0	0	0	0--0



Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
U.35 - .40 SHGC: Glazing-U.35 - .40 SHGS DOUBLE PANE LOW - E, U-value 0.35, SHGC 0.4	977.2	19,502	0	32,333	32,333
U.35 SOLID DOOR: Door-U.35 SOLID DOOR, U-value 0.35	168	3,353	0	1,526	1,526
15A13-0ocw-6: Wall-Basement, , framing with R-13 sill to floor in 2 x 4 cavity, open core, no board insulation, plus interior finish, wood studs, 6' floor depth, U-value 0.055, above grade U-value 0.096	1512.6	6,088	0	665	665
13CA-0fcw: Wall-Block, framing with R-13 in 2 x 4 stud cavity, filled core, wood studs, U-value 0.082	101.7	476	0	100	100
12F-0sw: Wall-Frame, R-21 insulation in 2 x 6 stud cavity, no board insulation, siding finish, wood studs, U-value 0.065	3285.5	12,172	0	3,268	3,268
16B-38: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Vented Attic, No Radiant Barrier, Dark Asphalt Shingles or Dark Metal, Tar and Gravel or Membrane, R-38 insulation, U-value 0.026	462.2	685	0	601	601
R49 INSULATION: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, R49-INSULATION, U-value 0.021	1362.6	1,632	0	1,431	1,431
21A-20: Floor-Basement, Concrete slab, any thickness, 2 or more feet below grade, no insulation below floor, any floor cover, shortest side of floor slab is 20' wide, U-value 0.027	1915.3	2,947	0	0	0
0: Floor-	2068.2	58,944	0	0	0
Subtotals for structure:		105,799	0	39,924	39,924
People:	8		1,600	1,840	3,440
Equipment:			3,819	13,465	17,284
Lighting:	0			0	0
Ductwork:		7,799	635	4,709	5,344
Infiltration: Winter CFM: 664, Summer CFM: 577		41,608	11,829	9,513	21,343
Ventilation: Winter CFM: 0, Summer CFM: 0		0	0	0	0
AED Excursion:		0	0	2,440	2,440
Total Building Load Totals:		155,206	17,883	71,892	89,775

Check Figures

Total Building Supply CFM:	3,177	CFM Per Square ft.:	0.726
Square ft. of Room Area:	4,376	Square ft. Per Ton:	486
Volume (ft³):	44,122		

Building Loads

Total Heating Required Including Ventilation Air:	155,206 Btuh	155.206 MBH
Total Sensible Gain:	71,892 Btuh	80 %
Total Latent Gain:	17,883 Btuh	20 %
Total Cooling Required Including Ventilation Air:	89,775 Btuh	7.48 Tons (Based On Sensible + Latent)
		9.00 Tons (Based On 75% Sensible Capacity)

Notes

Rhvac is an ACCA approved Manual J, D and S computer program.
 Calculations are performed per ACCA Manual J 8th Edition, Version 2, and ACCA Manual D.
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 Be sure to select a unit that meets both sensible and latent loads according to the manufacturer's performance data at your design conditions.



Manual S Performance Data - System 1 - Basement

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	8.361
Outdoor Wet Bulb:	73	Latent Gain:	2.771
Indoor Dry Bulb:	75	Total Gain:	11.132
Indoor RH:	50	Load SHR:	0.75
Supply Airflow:	381	Entering Dry Bulb:	75
		Entering Wet Bulb:	62.5

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	14.402
Indoor Dry Bulb:	70	Entering Dry Bulb:	69.2
Indoor RH:	30	Supply Airflow:	185

Equipment Performance Data at System Design Conditions

Cooling:

Model Type: Standard Air Conditioner, Model: ASX160181F/ CAPF2430B6, Nominal Capacity: 18.000, Manufacturer: AMANA

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 75 °F	
					S/T	Sensible Capacity MBtuh
62.5	381	90	12.8	0	0.75	9.6

Interpolation Results:

		<u>Load</u>	<u>Percent of Load</u>
Sensible Capacity:	9.600	8.361	115%
Latent Capacity:	3.200	2.771	115%
Total Capacity:	12.800	11.132	115%

Heating:

Model Type: Two Stage Furnace, Model: AMVC960403BNB, Nominal Capacity: 38.400, Manufacturer: AMANA

Results:

		<u>Load</u>	<u>Percent of Load</u>
Heating Capacity:	38.400	14.402	267%



Manual S Performance Data - System 2 - First Floor Family Room

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	15.795
Outdoor Wet Bulb:	73	Latent Gain:	2.073
Indoor Dry Bulb:	75	Total Gain:	17.868
Indoor RH:	50	Load SHR:	0.88
Supply Airflow:	719	Entering Dry Bulb:	75
		Entering Wet Bulb:	62.5

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	28.202
Indoor Dry Bulb:	70	Entering Dry Bulb:	70.0
Indoor RH:	30	Supply Airflow:	367

Equipment Performance Data at System Design Conditions

Cooling:

Model Type: Standard Air Conditioner, Model: ASX160241F/ CAPF3137B6, Nominal Capacity: 24.000, Manufacturer: AMANA

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 75 °F	
					S/T	Sensible Capacity MBtuh
62.5	719	90	20	0	0.885	17.7

Interpolation Results:

		<u>Load</u>	<u>Percent of Load</u>
Sensible Capacity:	17.700	15.795	112%
Latent Capacity:	2.300	2.073	111%
Total Capacity:	20.000	17.868	112%

Heating:

Model Type: Two Stage Furnace, Model: AMVC960403BNB, Nominal Capacity: 38.400, Manufacturer: AMANA

Results:

		<u>Load</u>	<u>Percent of Load</u>
Heating Capacity:	38.400	28.202	136%



Manual S Performance Data - System 3 - First Floor Kitchen & The Rest

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	26.387
Outdoor Wet Bulb:	73	Latent Gain:	11.822
Indoor Dry Bulb:	75	Total Gain:	38.209
Indoor RH:	50	Load SHR:	0.69
Supply Airflow:	1,201	Entering Dry Bulb:	75
		Entering Wet Bulb:	62.5

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	65.050
Indoor Dry Bulb:	70	Entering Dry Bulb:	70.0
Indoor RH:	30	Supply Airflow:	846

Equipment Performance Data at System Design Conditions

Cooling:

Model Type: Two Stage A/C, Model: ASXC160481C/ CAPF4961C6, Nominal Capacity: 48.000, Manufacturer: AMANA

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 75 °F	
					S/T	Sensible Capacity MBtuh
62.5	1201	90	44	0	0.691	30.4

Interpolation Results:

		<u>Load</u>	<u>Percent of Load</u>
Sensible Capacity:	30.400	26.387	115%
Latent Capacity:	13.600	11.822	115%
Total Capacity:	44.000	38.209	115%

Heating:

Model Type: Two Stage Furnace, Model: AMVC0804CNB, Nominal Capacity: 76.800, Manufacturer: AMANA

Results:

		<u>Load</u>	<u>Percent of Load</u>
Heating Capacity:	76.800	65.050	118%



Manual S Performance Data - System 4 - Second Floor

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	21.350
Outdoor Wet Bulb:	73	Latent Gain:	1.217
Indoor Dry Bulb:	75	Total Gain:	22.566
Indoor RH:	50	Load SHR:	0.95
Supply Airflow:	877	Entering Dry Bulb:	77.2
		Entering Wet Bulb:	63.2

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	47.552
Indoor Dry Bulb:	70	Entering Dry Bulb:	67.1
Indoor RH:	30	Supply Airflow:	594

Equipment Performance Data at System Design Conditions

Cooling:

Model Type: Standard Air Conditioner, Model: ASX160301F/ CAPF3636B6, Nominal Capacity: 30.000, Manufacturer: AMANA

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 77.2 °F	
					S/T	Sensible Capacity MBtuh
63.2	877	90	26	0	0.942	24.5

Interpolation Results:

		<u>Load</u>	<u>Percent of Load</u>
Sensible Capacity:	24.500	21.350	115%
Latent Capacity:	1.500	1.217	123%
Total Capacity:	26.000	22.566	115%

Heating:

Model Type: Two Stage Furnace, Model: AMVC960603BNB, Nominal Capacity: 57.600, Manufacturer: AMANA

Results:

		<u>Load</u>	<u>Percent of Load</u>
Heating Capacity:	57.600	47.552	121%