Sample
HVAC Load Calculations

for

Sample
Sample
Sample

Elite Software

RHVAC Residential HVAC Loads

Prepared By:

Joseph Navarra
HVACR Comfort Pro LLC
46 Mount Ararat Lane
Toms River, New Jersey 08753
848-992-7392
Thursday, September 17, 2020

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.

Project Report

General Project Information

Project Title:	Sample
Designed By:	Joseph Navarra
Project Date:	Monday, August 31, 2020
Project Comment:	ALL DUCT WORK MUST BE SEALED WITH A MASTIC PAST TO A .04% DUCT LOSS OR LESS. DUCT WORKMUST 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
Client Address:	Sample
Client City:	Sample
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 Northwest
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:	1,928	CFM Per Square ft.:	0.564
Square ft. of Room Area:	3,416	Square ft. Per Ton:	679
Volume (ft³):	30,744		

Building Loads

Total Heating Required Including Ventilation Air:	52,297	Btuh	52.297	MBH
Total Sensible Gain:	45,261	Btuh	90	%
Total Latent Gain:	4,764	Btuh	10	%
Total Cooling Required Including Ventilation Air:	50,025	Btuh	4.17	Tons (Based On Sensible + Latent)
			5.03	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	4.17	5.03	679	3,416	45,261	4,764	50,025	52,297	647	1,928	1,928	
System 1 First Floor	2.51	2.95	571	1,685	26,569	3,591	30,161	28,231	349	1,138	1,138	28x8
Supply Duct Latent						202	202					
Return Duct					1,563	234	1,796	1,385				
Zone 1				1,685	25,007	3,156	28,163	26,846	349	1,138	1,138	
1-Lav				39	412	15	427	575	7	19	19	5
2-Mud Room				146	2,754	134	2,888	4,648	60	125	125	7
3-Study				252	5,095	152	5,247	5,058	66	232	232	7,7
4-Foyer/ Open To Below/ Stairs/ Closet				284	1,715	138	1,853	4,418	57	78	78	6
5-Lav				42	27	0	27	116	2	1	1	Not MDD 1--5
6-Bar				73	119	22	141	622	8	5	5	5
7-Family Room				349	5,384	944	6,328	5,607	73	245	245	7,7
8-Dining Room				106	69	0	69	293	4	3	3	5
9-Breakfast				126	1,923	68	1,991	2,486	32	88	88	6
10-Kitchen				267	7,508	1,683	9,191	3,023	39	342	342	7,7,7
System 2 Second Floor	1.66	2.08	834	1,731	18,691	1,173	19,864	24,066	297	790	790	20x8
Supply Duct Latent						174	174					
Return Duct					1,331	200	1,531	1,194				
Zone 1				1,731	17,360	799	18,159	22,872	297	790	790	
11-Bath 2				59	533	24	557	717	9	24	24	5
12-W I C				34	61	0	61	75	1	3	3	Not MDD 1--5
13-Bed Room 2				262	4,002	165	4,167	4,614	60	182	182	7,7
14-Open To Below/ Foyer				217	1,918	120	2,038	3,214	42	87	87	6
15-Hall				182	676	47	723	1,628	21	31	31	5
16-Bath 3				52	286	58	344	1,097	14	13	13	5
17-Bed Room 4				273	3,216	136	3,352	3,706	48	146	146	7,7
18-Stairs				48	230	11	241	522	7	10	10	5
19-W I C				105	185	0	185	229	3	8	8	5
20-Master Bath				159	2,267	92	2,359	2,787	36	103	103	7
21-Master Bed Room				340	3,987	146	4,133	4,283	56	181	181	7,7

Manual S Performance Data - System 1 - First Floor

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	26.569
Outdoor Wet Bulb:	73	Latent Gain:	3.591
Indoor Dry Bulb:	75	Total Gain:	30.161
Indoor RH:	50	Load SHR:	0.88
Supply Airflow:	1,138	Entering Dry Bulb:	76.3
		Entering Wet Bulb:	62.9

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	28.231
Indoor Dry Bulb:	70	Entering Dry Bulb:	66.4
Indoor RH:	30	Supply Airflow:	349

Equipment Performance Data at System Design Conditions

Cooling:
Model Type: Standard Air Conditioner, Model: RA1336AJINA/ RCF3617STMACA, Nominal Capacity: 36.000, Manufacturer: RUUD

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 76.3 °F	
					S/T	Sensible Capacity MBtuh
62.9	1138	90	31	0	0.881	27.3

Interpolation Results:

		Load	Percent of Load
Sensible Capacity:	27.300	26.569	103%
Latent Capacity:	3.700	3.591	103%
Total Capacity:	31.000	30.161	103%

Heating:
Model Type: Natural Gas Furnace, Model: R95T401317MSA, Nominal Capacity: 41.000, Manufacturer: RUUD

Results:

		Load	Percent of Load
Heating Capacity:	41.000	28.231	145%

Manual S Performance Data - System 2 - Second Floor

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	18.691
Outdoor Wet Bulb:	73	Latent Gain:	1.173
Indoor Dry Bulb:	75	Total Gain:	19.864
Indoor RH:	50	Load SHR:	0.94
Supply Airflow:	790	Entering Dry Bulb:	76.5
		Entering Wet Bulb:	63

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	24.066
Indoor Dry Bulb:	70	Entering Dry Bulb:	66.3
Indoor RH:	30	Supply Airflow:	297

Equipment Performance Data at System Design Conditions

Cooling:
Model Type: Standard Air Conditioner, Model: RA1330AJINA/ RCF3617STMACA, Nominal Capacity: 30.000, Manufacturer: RUUD

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 76.5 °F	
					S/T	Sensible Capacity MBtuh
63	790	90	22	0	0.941	20.7

Interpolation Results:

		Load	Percent of Load
Sensible Capacity:	20.700	18.691	111%
Latent Capacity:	1.300	1.173	111%
Total Capacity:	22.000	19.864	111%

Heating:
Model Type: Natural Gas Furnace, Model: R95T401317MSA, Nominal Capacity: 41.000, Manufacturer: RUUD

Results:

		Load	Percent of Load
Heating Capacity:	41.000	24.066	170%

Residential Plans Examiner Review Form for HVAC System Design (Loads, Equipment, Ducts)

Form RPER 1.01 8 Mar 10

County, Town, Municipality, Jurisdiction Header Information

Contractor: JOSEPH NAVARRA

Mechanical License #: 19HC00194800

Building Plan #: Sys. 1

Home Address (Street or Lot#, Block, Subdivision): SAMPLE ADDRESS

REQUIRED ATTACHMENTS[1]	ATTACHED
Manual J1 Form (and supporting worksheets):	Yes ☒ No ☐
or MJ1AE Form[2] (and supporting worksheets):	Yes ☒ No ☐
OEM performance data (heating, cooling, blower):	Yes ☒ No ☐
Manual D Friction Rate Worksheet:	Yes ☒ No ☐
Duct distribution system sketch:	Yes ☒ No ☐

HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

Winter Design Conditions

Outdoor temperature	13	°F
Indoor temperature	70	°F
Total heat loss	28231	Btu/h

Summer Design Conditions

Outdoor temperature	90	°F
Indoor temperature	75	°F
Grains difference	30 △ Gr @ 50	% Rh
Sensible heat gain	26569	Btu/h
Latent heat gain	3591	Btu/h
Total heat gain	30161	Btu/h

Building Construction Information

Building

Orientation (Front door faces): Northwest
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms: 0

Conditioned floor area: 1685 Sq Ft

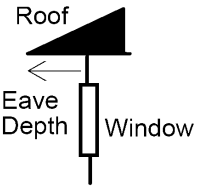
Number of occupants: 4

Windows

Eave overhang depth: 0 Ft

Internal shade (Blinds, drapes, etc):

Number of skylights: 0



HVAC EQUIPMENT SELECTION (IRC M1401.3)

Heating Equipment Data

Equipment type: Furnace
Furnace, Heat pump, Boiler, etc.

Model: R95T401317MSA

Heating output capacity: 41000 Btu/h
Heat pumps - capacity at winter design outdoor conditions

Auxiliary heat output capacity: Btu/h

Cooling Equipment Data

Equipment type: Standard Air Conditioner
Air Conditioner, Heat pump, etc

Model: RA1336AJINA/ RCF3617STAMCA

Sensible cooling capacity: Btu/h

Latent cooling capacity: Btu/h

Total cooling capacity: 36000 Btu/h

Blower Data

Heating CFM: 1138 CFM

Cooling CFM: 1138 CFM

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow: 1138 CFM

External Static Pressure (ESP): 0.62 IWC

Component Pressure Losses (CPL): 0.29 IWC

Available Static Pressure (ASP): 0.331 IWC
ASP = ESP - CPL

Longest supply duct: 175 Ft

Longest return duct: 303 Ft

Total Effective Length (TEL): 478 Ft

Friction Rate: 0.07 IWC
Friction Rate = (ASP × 100) ÷ TEL

Duct Materials Used (circle)

Trunk Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

Branch Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

I declare the load calculation, equipment selection, and duct system design were rigorously performed based on the building plan listed above, I understand the claims made on these forms will be subject to review and verification.

Contractor's Printed Name: JOSEPH NAVARRA Date: 09/17/2020

Contractor's Signature:

Reserved for use by County, Town, Municipality, or Authority having jurisdiction.

[1] The AHJ shall have the discretion to accept Required Attachments printed from approved ACCA software vendors, see list on page 2 of instructions.
[2] If abridged version of Manual J is used for load calculation, then verify residence meets requirements, see Abridged Edition Checklist on page 13 of instructions.

Residential Plans Examiner Review Form for HVAC System Design (Loads, Equipment, Ducts)

Form RPER 1.01 8 Mar 10

County, Town, Municipality, Jurisdiction Header Information

Contractor: JOSEPH NAVARRA

Mechanical License #: 19HC00194800

Building Plan #: Sys. 2

Home Address (Street or Lot#, Block, Subdivision): SAMPLE ADDRESS

REQUIRED ATTACHMENTS[1]	ATTACHED
Manual J1 Form (and supporting worksheets):	Yes ☒ No ☐
or MJ1AE Form[2] (and supporting worksheets):	Yes ☒ No ☐
OEM performance data (heating, cooling, blower):	Yes ☒ No ☐
Manual D Friction Rate Worksheet:	Yes ☒ No ☐
Duct distribution system sketch:	Yes ☒ No ☐

HVAC LOAD CALCULATION (IRC M1401.3)

Design Conditions

Winter Design Conditions

Outdoor temperature	13	°F
Indoor temperature	70	°F
Total heat loss	24066	Btu/h

Summer Design Conditions

Outdoor temperature	90	°F
Indoor temperature	75	°F
Grains difference	30 △ Gr @ 50	% Rh
Sensible heat gain	18691	Btu/h
Latent heat gain	1173	Btu/h
Total heat gain	19864	Btu/h

Building Construction Information

Building

Orientation (Front door faces): Northwest
North, East, West, South, Northeast, Northwest, Southeast, Southwest

Number of bedrooms: 3

Conditioned floor area: 1731 Sq Ft

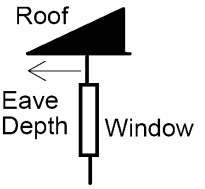
Number of occupants: 0

Windows

Eave overhang depth: 0 Ft

Internal shade (Blinds, drapes, etc):

Number of skylights: 0



HVAC EQUIPMENT SELECTION (IRC M1401.3)

Heating Equipment Data

Equipment type: Furnace
Furnace, Heat pump, Boiler, etc.

Model: R95T401317MSA

Heating output capacity: 41000 Btu/h
Heat pumps - capacity at winter design outdoor conditions

Auxiliary heat output capacity: Btu/h

Cooling Equipment Data

Equipment type: Standard Air Conditioner
Air Conditioner, Heat pump, etc

Model: RA1336AJINA/ RCF3617STAMCA

Sensible cooling capacity: Btu/h

Latent cooling capacity: Btu/h

Total cooling capacity: 30000 Btu/h

Blower Data

Heating CFM: 790 CFM

Cooling CFM: 790 CFM

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow	786 CFM	Longest supply duct:	124 Ft		
External Static Pressure (ESP)	0.53 IWC	Longest return duct:	226 Ft		
Component Pressure Losses (CPL)	0.29 IWC	**Total Effective Length (TEL)**	350 Ft		
Available Static Pressure (ASP)	0.24 IWC	**Friction Rate:**	0.07 IWC		
ASP = ESP - CPL		Friction Rate = (ASP × 100) ÷ TEL			

Duct Materials Used (circle)

Trunk Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

Branch Duct: Duct board, Flex, Sheet metal, Lined sheet metal, Other (specify)

I declare the load calculation, equipment selection, and duct system design were rigorously performed based on the building plan listed above, I understand the claims made on these forms will be subject to review and verification.

Contractor's Printed Name: JOSEPH NAVARRA Date: 09/17/2020

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Form generated by ACCA-approved Manual J Eighth Edition Version 2 Elite Software Rhvac program.