Hung Ma
HVAC Load Calculations

for

Hung Ma
25 Newman Street
Metuchen, New Jersey

Elite Software

RHVAC Residential HVAC Loads

Prepared By:

Lenny Zollner
First Choise Heating & Air Conditioning
120 Liberty Street
Metuchen, New Jersey
848-200-7600
Sunday, September 19, 2021

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:	Hung Ma
Designed By:	Lenny Zollner
Project Date:	Sunday, September 19, 2021
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:	Hung Ma
Client Address:	25 Newman Street
Client City:	Metuchen, 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:	First Choise Heating & Air Conditioning
Company Representative:	Lenny Zollner
Company Address:	120 Liberty Street
Company City:	Metuchen, New Jersey
Company Phone:	848-200-7600
Company Comment:	

Design Data

Reference City:		Long Branch, New Jersey
Building Orientation:		Front door faces East
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:	1,319	CFM Per Square ft.:	0.426
Square ft. of Room Area:	3,094		
Volume (ft³):	24,749		

Building Loads

Total Heating Required Including Ventilation Air:	41,882	Btuh	41.882	MBH
Total Sensible Gain:	32,954	Btuh	86	%
Total Latent Gain:	5,448	Btuh	14	%
Total Cooling Required Including Ventilation Air:	38,402	Btuh		

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	Area	Sen Gain	Lat Gain	Net Gain	Sen Loss	Sys Htg CFM	Sys Clg CFM	Sys Act CFM	Duct Size
Building	3,094	32,954	5,448	38,402	41,882	443	1,319	1,319	
System 1 Second Floor	1,729	14,153	1,290	15,444	21,524	251	591	591	16x8
Ventilation		412	512	924	1,565				
Supply Duct Latent			175	175					
Return Duct		752	112	864	679				
Zone 1	1,729	12,989	491	13,480	19,279	251	591	591	
1-Bed Room 1 Front Right	188	1,823	83	1,906	2,753	36	83	83	7
2-Bath Room Front	61	643	33	676	1,044	14	29	29	5
3-Bed Room 2 Front Left	281	3,324	107	3,431	4,555	59	151	151	7,7
4-Bath 1A	52	372	17	389	744	10	17	17	5
5-Bath 1B	52	346	17	363	637	8	16	16	5
6-Bed Room 3 Rear Left	224	1,858	79	1,937	2,723	35	85	85	7
7-Laundry	45	643	0	643	85	1	29	29	5
8-Hall	228	473	0	473	899	12	22	22	5
9-Master Bath	141	774	36	810	1,278	17	35	35	5
10-Closet	86	134	0	134	162	2	6	6	5
11-Master Bed Room	319	2,432	101	2,533	3,882	50	111	111	6,6
12-Closet	51	168	18	186	516	7	8	8	5
System 2 First Floor	1,364	18,801	4,157	22,958	20,357	192	727	727	18x8
Ventilation		1,071	1,332	2,403	4,070				
Supply Duct Latent			270	270					
Return Duct		1,749	225	1,973	1,529				
Zone 1	1,364	15,981	2,331	18,312	14,758	192	727	727	
13-Entry/ Stairs	220	1,238	0	1,238	2,411	31	56	56	6
14-Bed Room Guest	142	1,848	0	1,848	1,848	24	84	84	7
15-W I C	23	11	0	11	46	1	0	0	
16-Bath	43	74	0	74	288	4	3	3	5
17-Dining Room	156	1,311	0	1,311	1,789	23	60	60	6
18-Kitchen	407	7,661	1,131	8,792	4,434	58	349	349	7,7,7,7
19-PR	34	62	0	62	240	3	3	3	5
20-Family Room	341	3,776	1,200	4,976	3,703	48	172	172	7,7

Total Building Summary Loads

Component Description	Area Quan	Sen Loss	Lat Gain	Sen Gain	Total Gain
U.24-.25 SHGC: Glazing-U.24 - .25 SHGC DOUBLE PANE LOW - E, U-value 0.24, SHGC 0.25	433.8	5,930	0	9,614	9,614
U.25 - .25 SHGC: Glazing-U.25 - .25 SHGC DOUBLE PANE LOW E, U-value 0.25, SHGC 0.25	24.3	347	0	664	664
U.23 - .28 SHGC: Glazing-U.23 - .28 SHGC DOUBLE PANE LOW - E, U-value 0.23, SHGC 0.28	90	1,181	0	2,184	2,184
U.24 SOLID DOOR: Door-U.24 SOLID DOOR, U-value 0.24	42	574	0	262	262
R-17.5 CLOSED CELL: Wall-Frame, Custom, R17.5 CLOSED CELL SPRAY FOAM R7 PER INCH X 2.5" = R17.5, U-value 0.068	2213.3	8,577	0	2,619	2,619
R49-BATT INS: Roof/Ceiling-Under Attic with Insulation on Attic Floor (also use for Knee Walls and Partition Ceilings), Custom, R49-BATT INSULATION, U-value 0.026	2511.7	3,723	0	3,266	3,266
19A-30p: Floor-Over enclosed crawl space, No insulation on exposed walls, sealed or vented space, passive, R-30 blanket, U-value 0.033	1645.5	2,612	0	687	687
19A-30p: Floor-Over enclosed crawl space, No insulation on exposed walls, sealed or vented space, passive, R-30 blanket, U-value 0.034	280.9	456	0	120	120
Subtotals for structure:		23,400	0	19,416	19,416
People:	6		1,200	1,380	2,580
Equipment:			1,131	4,262	5,393
Lighting:	0			0	0
Ductwork:		9,118	782	5,388	6,169
Infiltration: Winter CFM: 60, Summer CFM: 24		3,728	491	393	884
Ventilation: Winter CFM: 90, Summer CFM: 90		5,636	1,844	1,483	3,327
AED Excursion:		0	0	633	633
Total Building Load Totals:		41,882	5,448	32,954	38,402

Check Figures

Total Building Supply CFM:	1,319	CFM Per Square ft.:	0.426
Square ft. of Room Area:	3,094		
Volume (ft³):	24,749		

Building Loads

Total Heating Required Including Ventilation Air:	41,882	Btuh	41.882	MBH
Total Sensible Gain:	32,954	Btuh	86	%
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Total Cooling Required Including Ventilation Air:	38,402	Btuh		

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.

Manual S Performance Data - System 1 - Second Floor

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	14.153
Outdoor Wet Bulb:	73	Latent Gain:	1.290
Indoor Dry Bulb:	75	Total Gain:	15.444
Indoor RH:	50	Load SHR:	0.92
Supply Airflow:	591	Entering Dry Bulb:	76.8
		Entering Wet Bulb:	63.4

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	21.524
Indoor Dry Bulb:	70	Entering Dry Bulb:	62.1
Indoor RH:	30	Supply Airflow:	251

Equipment Performance Data at System Design Conditions

Cooling:
Model Type: Standard Air Conditioner, Model: RA1624AJ1NB/ RCF2417STAMCA
Nominal Capacity: 24.000, Manufacturer: RHEEM

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 76.8 °F	
					S/T	Sensible Capacity MBtuh
63.4	591	90	17.8	0	0.916	16.3

Interpolation Results:

		Load	Percent of Load
Sensible Capacity:	16.300	14.153	115%
Latent Capacity:	1.500	1.290	116%
Total Capacity:	17.800	15.444	115%

Heating:
Model Type: Two Stage Furnace, Model: RA96TA0402317MSA, Nominal Capacity: 41.000, Manufacturer: RHEEM

Results:

		Load	Percent of Load
Heating Capacity:	41.000	21.524	190%

Manual S Performance Data - System 2 - First Floor

Loads and Design Conditions

Cooling:

Outdoor Dry Bulb:	90	Sensible Gain:	18.801
Outdoor Wet Bulb:	73	Latent Gain:	4.157
Indoor Dry Bulb:	75	Total Gain:	22.958
Indoor RH:	50	Load SHR:	0.82
Supply Airflow:	727	Entering Dry Bulb:	78.5
		Entering Wet Bulb:	64.3

Heating:

Outdoor Dry Bulb:	13	Sensible Loss:	20.357
Indoor Dry Bulb:	70	Entering Dry Bulb:	45.9
Indoor RH:	30	Supply Airflow:	192

Equipment Performance Data at System Design Conditions

Cooling:
Model Type: Standard Air Conditioner, Model: RA1630AJ1NB/ RCF3617STAMCA
Nominal Capacity: 30.000, Manufacturer: RHEEM

Entered Interpolation Data:

EWB °F	Air Flow CFM	ODB °F	Total Capacity MBtuh	Power Input kW	EDB 78.5 °F	
					S/T	Sensible Capacity MBtuh
64.3	727	90	26.5	0	0.815	21.6

Interpolation Results:

		Load	Percent of Load
Sensible Capacity:	21.600	18.801	115%
Latent Capacity:	4.900	4.157	118%
Total Capacity:	26.500	22.958	115%

Heating:
Model Type: Two Stage Furnace, Model: RA96TA0402317MSA, Nominal Capacity: 41.000, Manufacturer: RHEEM

Results:

		Load	Percent of Load
Heating Capacity:	41.000	20.357	201%

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: Lenny Zollner

Mechanical License #:

Building Plan #: HUNG MA Sys. 1

Home Address (Street or Lot#, Block, Subdivision): 25 Newman Street , Metuchen, New Jersey

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	21524	Btu/h

Summer Design Conditions

Outdoor temperature	90	°F
Indoor temperature	75	°F
Grains difference	30 △ Gr @ 50	% Rh
Sensible heat gain	14153	Btu/h
Latent heat gain	1290	Btu/h
Total heat gain	15444	Btu/h

Building Construction Information

Building

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

Number of bedrooms: 4

Conditioned floor area: 1729 Sq Ft

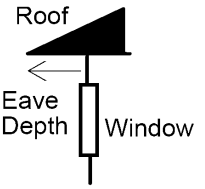
Number of occupants: 0

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: RA96TA0402317MSA

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: RA1624AJ1NB/ RCF2417STAMCA

Sensible cooling capacity: 16300 Btu/h

Latent cooling capacity: 1500 Btu/h

Total cooling capacity: 17800 Btu/h

Blower Data

Heating CFM: 591 CFM

Cooling CFM: 591 CFM

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow: 592 CFM

External Static Pressure (ESP): 0.41 IWC

Component Pressure Losses (CPL): 0.29 IWC

Available Static Pressure (ASP): 0.116 IWC
ASP = ESP - CPL

Longest supply duct: -7 Ft

Longest return duct: 210 Ft

Total Effective Length (TEL): 203 Ft

Friction Rate: 0.06 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: Lenny Zollner Date: 09/19/2021

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: Lenny Zollner

Mechanical License #:

Building Plan #: HUNG MA Sys. 2

Home Address (Street or Lot#, Block, Subdivision): 25 Newman Street , Metuchen, New Jersey

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	20357	Btu/h

Summer Design Conditions

Outdoor temperature	90	°F
Indoor temperature	75	°F
Grains difference	30 △ Gr @ 50	% Rh
Sensible heat gain	18801	Btu/h
Latent heat gain	4157	Btu/h
Total heat gain	22958	Btu/h

Building Construction Information

Building

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

Number of bedrooms: 1

Conditioned floor area: 1364 Sq Ft

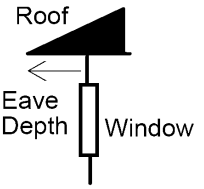
Number of occupants: 6

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: RA96TA0402317MSA

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: RA1630AJ1NB/ RCF3617STAMCA

Sensible cooling capacity: 21600 Btu/h

Latent cooling capacity: 4900 Btu/h

Total cooling capacity: 26500 Btu/h

Blower Data

Heating CFM: 727 CFM

Cooling CFM: 727 CFM

HVAC DUCT DISTRIBUTION SYSTEM DESIGN (IRC M1601.1)

Design airflow: 726 CFM

External Static Pressure (ESP): 0.57 IWC

Component Pressure Losses (CPL): 0.29 IWC

Available Static Pressure (ASP): 0.276 IWC
ASP = ESP - CPL

Longest supply duct: 147 Ft

Longest return duct: 297 Ft

Total Effective Length (TEL): 444 Ft

Friction Rate: 0.06 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.

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