

Project Information

For: Soufl Const.
 147 Abundance Run, Asheville, NC 28805

Notes:

Design Information

Weather: Asheville Municipal, NC, US

Winter Design Conditions

Outside db 19 °F
 Inside db 70 °F
 Design TD 51 °F

Summer Design Conditions

Outside db 91 °F
 Inside db 75 °F
 Design TD 16 °F
 Daily range M
 Relative humidity 50 %
 Moisture difference 37 gr/lb

Heating Summary

Structure 26616 Btuh
 Ducts 3534 Btuh
 Central vent (SER=50% 56 cfm) 1448 Btuh
 Energy recovery
 Humidification 0 Btuh
 Piping 0 Btuh
 Equipment load 31599 Btuh

Sensible Cooling Equipment Load Sizing

Structure 18082 Btuh
 Ducts 2526 Btuh
 Central vent (SER=50% 56 cfm) 465 Btuh
 Energy recovery
 Blower 0 Btuh
 Use manufacturer's data y
 Rate/swing multiplier 1.00
 Equipment sensible load 21073 Btuh

Infiltration

Method Simplified
 Construction quality Tight
 Fireplaces 1 (Average)

Latent Cooling Equipment Load Sizing

Structure 1547 Btuh
 Ducts 714 Btuh
 Central vent (LER=50% 56 cfm) 653 Btuh
 Energy recovery
 Equipment latent load 2914 Btuh

	Heating	Cooling
Area (ft ²)	2577	2577
Volume (ft ³)	23931	23931
Air changes/hour	0.20	0.08
Equiv. AVF (cfm)	80	32

Equipment Total Load (Sen+Lat) 23987 Btuh
 Req. total capacity at 0.80 SHR 2.2 ton

Heating Equipment Summary

Make Generic
 Trade
 Model SEER 15.0, HSPF 8.5
 AHRI ref
 Efficiency 8.5 HSPF
 Heating input
 Heating output 29851 Btuh @ 47°F
 Temperature rise 29 °F
 Actual air flow 1000 cfm
 Air flow factor 0.033 cfm/Btuh
 Static pressure 0 in H2O
 Space thermostat
 Capacity balance point = 21 °F

Cooling Equipment Summary

Make Generic
 Trade
 Cond SEER 15.0, HSPF 8.5
 Coil
 AHRI ref
 Efficiency 12.8 EER, 15 SEER
 Sensible cooling 24000 Btuh
 Latent cooling 6000 Btuh
 Total cooling 30000 Btuh
 Actual air flow 1000 cfm
 Air flow factor 0.048 cfm/Btuh
 Static pressure 0 in H2O
 Load sensible heat ratio 0.88

Backup:
 Input = 9 kW, Output = 31768 Btuh, 100 AFUE

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

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Outside db	19 °F
Inside db	70 °F
Design TD	51 °F

Summer Design Conditions

Outside db	91 °F
Inside db	75 °F
Design TD	16 °F
Daily range	M
Relative humidity	50 %
Moisture difference	37 gr/lb

Heating Summary

Structure	5890 Btuh
Ducts	0 Btuh
Central vent (14 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	5890 Btuh

Sensible Cooling Equipment Load Sizing

Structure	2195 Btuh
Ducts	0 Btuh
Central vent (14 cfm)	0 Btuh
Blower	0 Btuh
Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	2195 Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Average)

Latent Cooling Equipment Load Sizing

Structure	377 Btuh
Ducts	0 Btuh
Central vent (14 cfm)	0 Btuh
Equipment latent load	377 Btuh
Equipment Total Load (Sen+Lat)	2572 Btuh
Req. total capacity at 0.70 SHR	0.3 ton

	Heating	Cooling
Area (ft ²)	668	668
Volume (ft ³)	4642	4642
Air changes/hour	0.24	0.10
Equiv. AVF (cfm)	19	8

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

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Inside db	70 °F
Design TD	51 °F

Summer Design Conditions

Outside db	91 °F
Inside db	75 °F
Design TD	16 °F
Daily range	M
Relative humidity	50 %
Moisture difference	37 gr/lb

Heating Summary

Structure	15460 Btuh
Ducts	2690 Btuh
Central vent (27 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	18150 Btuh

Sensible Cooling Equipment Load Sizing

Structure	13041 Btuh
Ducts	2112 Btuh
Central vent (27 cfm)	0 Btuh
Blower	0 Btuh
Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	15153 Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Average)

Latent Cooling Equipment Load Sizing

Structure	599 Btuh
Ducts	371 Btuh
Central vent (27 cfm)	0 Btuh
Equipment latent load	970 Btuh
Equipment Total Load (Sen+Lat)	16123 Btuh
Req. total capacity at 0.70 SHR	1.8 ton

	Heating	Cooling
Area (ft ²)	1248	1248
Volume (ft ³)	13871	13871
Air changes/hour	0.18	0.07
Equiv. AVF (cfm)	43	17

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

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Inside db	70 °F
Design TD	51 °F

Summer Design Conditions

Outside db	91 °F
Inside db	75 °F
Design TD	16 °F
Daily range	M
Relative humidity	50 %
Moisture difference	37 gr/lb

Heating Summary

Structure	5266 Btuh
Ducts	844 Btuh
Central vent (14 cfm)	0 Btuh
Humidification	0 Btuh
Piping	0 Btuh
Equipment load	6110 Btuh

Sensible Cooling Equipment Load Sizing

Structure	3073 Btuh
Ducts	445 Btuh
Central vent (14 cfm)	0 Btuh
Blower	0 Btuh
Use manufacturer's data	y
Rate/swing multiplier	1.00
Equipment sensible load	3518 Btuh

Infiltration

Method	Simplified
Construction quality	Tight
Fireplaces	1 (Average)

Latent Cooling Equipment Load Sizing

Structure	571 Btuh
Ducts	343 Btuh
Central vent (14 cfm)	0 Btuh
Equipment latent load	914 Btuh
Equipment Total Load (Sen+Lat)	4432 Btuh
Req. total capacity at 0.70 SHR	0.4 ton

	Heating	Cooling
Area (ft ²)	661	661
Volume (ft ³)	5418	5418
Air changes/hour	0.20	0.08
Equiv. AVF (cfm)	18	7

Heating Equipment Summary

Make	n/a
Trade	n/a
Model	n/a
AHRI ref	n/a
Efficiency	n/a
Heating input	
Heating output	0 Btuh
Temperature rise	0 °F
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Space thermostat	n/a

Cooling Equipment Summary

Make	n/a
Trade	n/a
Cond	n/a
Coil	n/a
AHRI ref	n/a
Efficiency	n/a
Sensible cooling	0 Btuh
Latent cooling	0 Btuh
Total cooling	0 Btuh
Actual air flow	0 cfm
Air flow factor	0 cfm/Btuh
Static pressure	0 in H2O
Load sensible heat ratio	0

Calculations approved by ACCA to meet all requirements of Manual J 8th Ed.

Vandemusser Design, PLLC

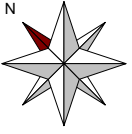
26 Crabapple Ln., Asheville, NC 28804 Phone: 828-348-4723 Fax: 828-253-8347 Email: amy@vandemusser.com Web: www.vandemusser.com

Infiltration Summary

ZONE NAME	Heating				Cooling			
	Volume ft³	ACH	AVF cfm	HTM Btuh/ft²	Volume ft³	ACH	AVF cfm	HTM Btuh/ft²
Bsmt zone	4642	0.24	19	1.2	4642	0.10	8	0.2
Main lev zone	13871	0.18	43	1.2	13871	0.07	17	0.2
Upper zone	5418	0.20	18	1.2	5418	0.08	7	0.2
Entire House	23931	0.20	80	1.2	23931	0.08	32	0.2

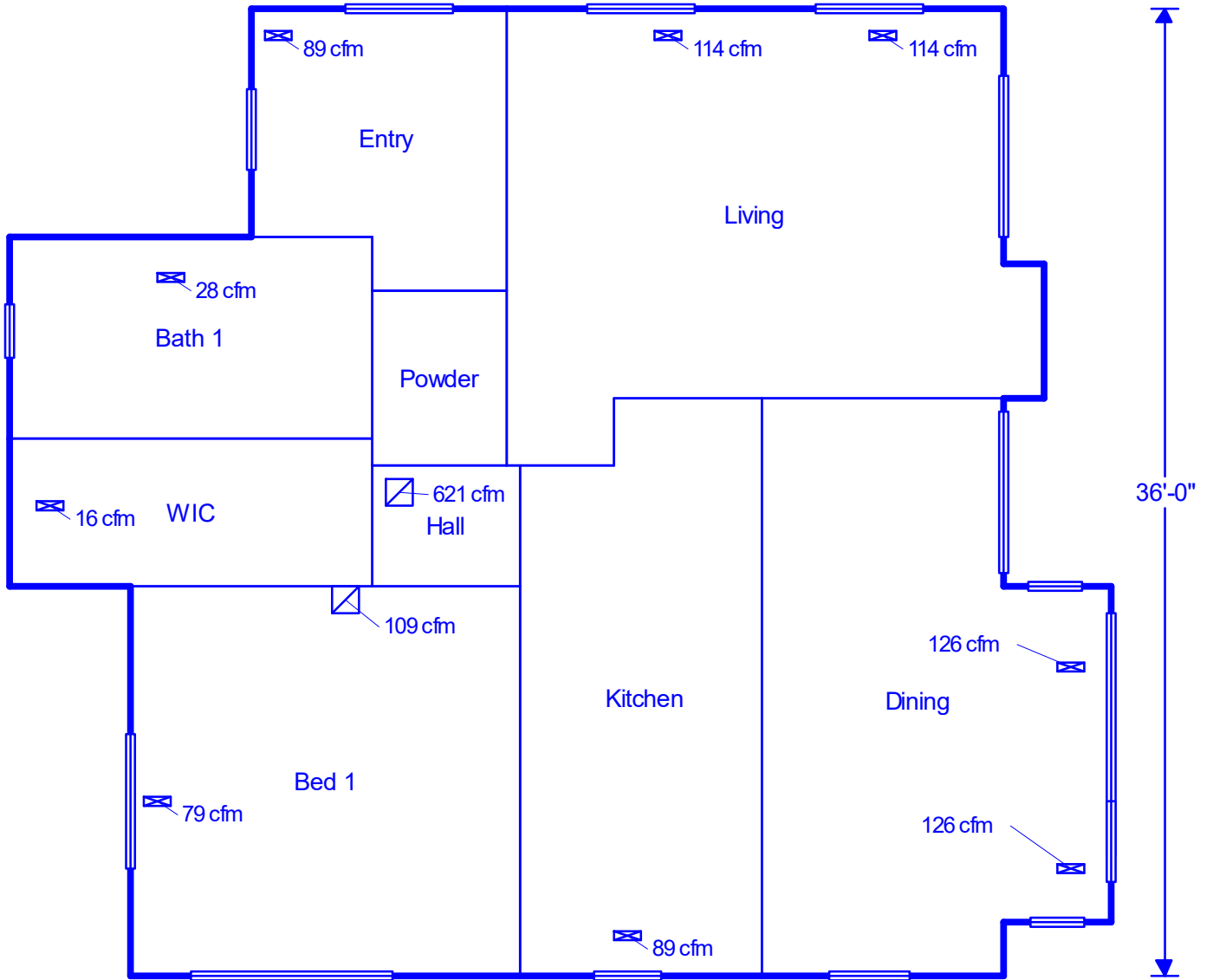
Load and AVF Summary

ROOM NAME	Area ft²	Htg load Btuh	Clg load Btuh	Htg AVF cfm	Clg AVF cfm
Cond bsmt	668	5890	2195	195	105
Bsmt zone	668	5890	2195	195	105
Living	286	6898	3980	229	191
Entry	91	1704	1860	57	89
Powder	33	0	0	0	0
Bath 1	101	855	406	28	19
WIC	74	497	137	16	7
Bed 1	210	1933	1649	64	79
Hall	25	0	0	0	0
Kitchen	185	1145	1850	38	89
Dining	244	5119	5271	170	253
Main lev zone	1248	18150	15153	602	726
Upper Hall	174	1077	711	36	34
Bath 2	104	1490	560	49	27
Bed 3	177	1739	1063	58	51
Bed 2	206	1806	1184	60	57
Upper zone	661	6110	3518	203	169
Entire House	2577	30150	20020	1000	1000



Main

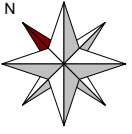
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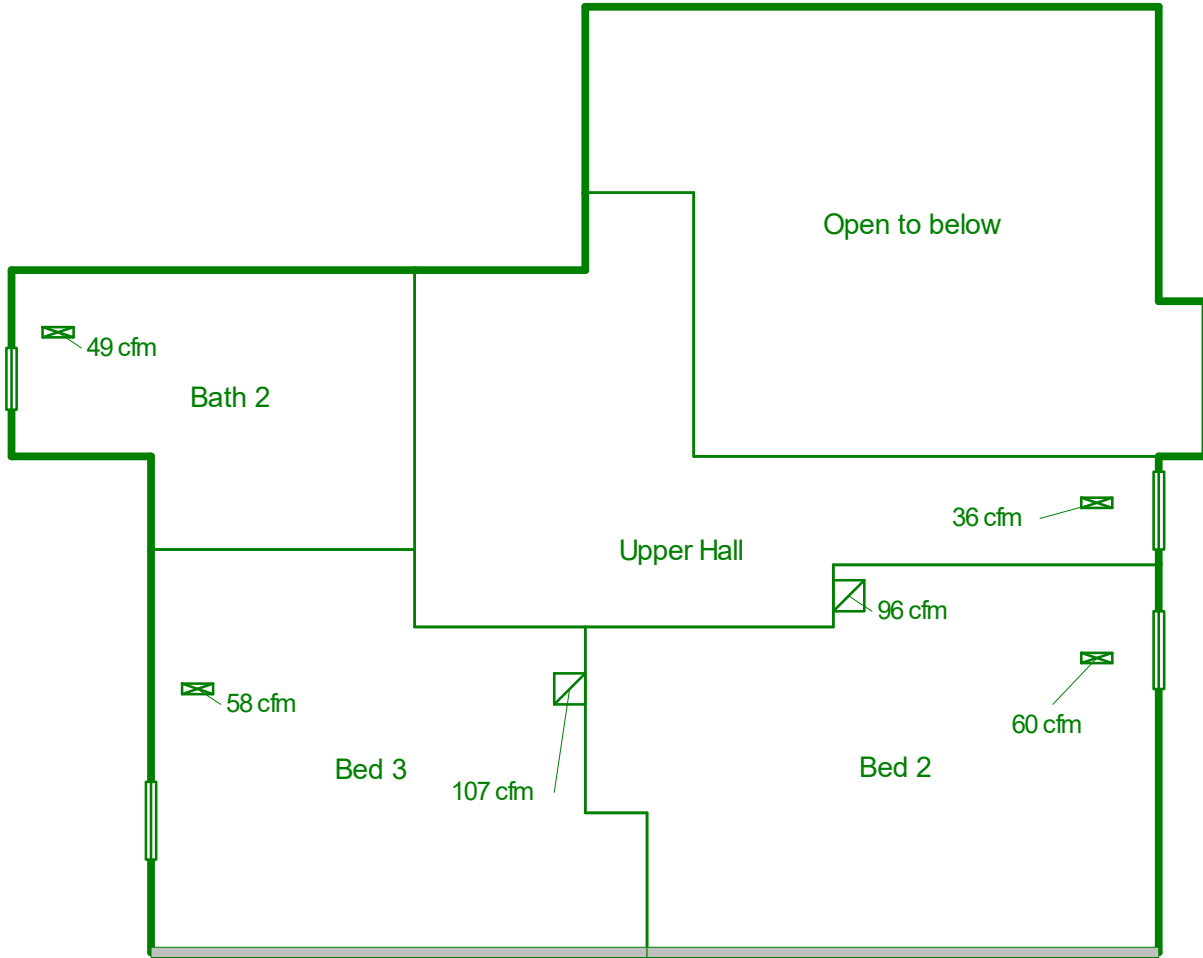
Job #: 23013-01
Performed by Amy Musser for:
Soufl Const.
147 Abundance Run
Asheville, NC 28805

Vandemusser Design, PLLC
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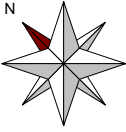
Upstairs



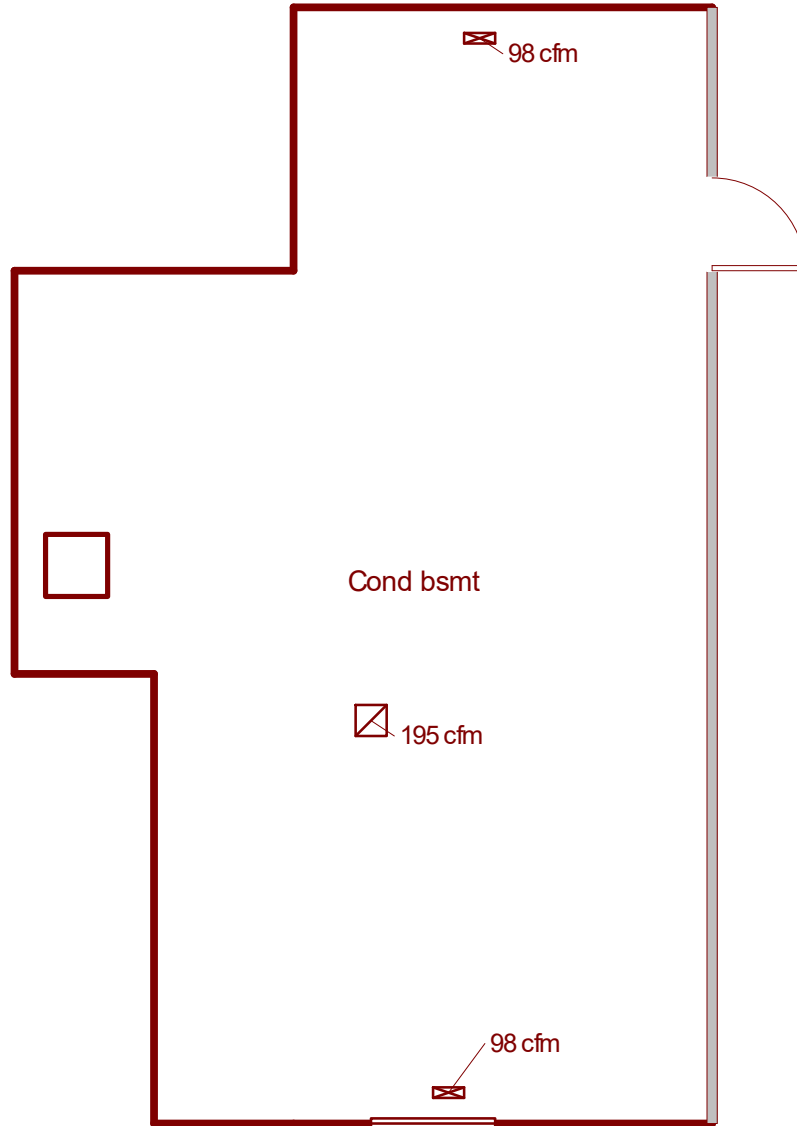
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Basement



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ENERGY STAR Single-Family New Homes National HVAC Design Report, Version 3 / 3.1(Rev. 11)

HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each system design for a house plan, created for either the specific plan configuration (i.e., elevation, option, orientation, & county) of the home to be certified or for a plan that is intended to be built with different configurations (i.e., different elevations, options, and/or orientations). Visit www.energystar.gov/newhomeshvacadesign and see Footnote 2 for more information.
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder or Rater. ³
- Provide the completed National HVAC Design Report to the builder or credentialed HVAC contractor and to the Rater.

1. Design Overview

1.1 Designer name: Amy Musser Designer company: Vandemusser Design, PLLC Date: 4-11-23
 1.2 Select which party you are providing these design services to: Builder or Credentialed HVAC contractor
 1.3 Name of company you are providing these design services to (if different than Item 1.1): Soufl Const.
 1.4 Area that system serves: Whole-house Upper-level Lower-level Other
 1.5 Is cooling system for a temporary occupant load? Yes No
 1.6 House plan: Check box to indicate whether the system design is site-specific or part of a group:
 Site-specific design. Option(s) & elevation(s) modeled: Custom: 147 Abundance Run
 Group design. Group #: 0 out of 0 total groups for this house plan. Configuration modeled:

2. Dwelling Unit Mechanical Ventilation System Design ("Vent System") & Inlets in Return Duct

Designer Verified

Airflow:

2.1 Ventilation airflow design rate & run-time meet the requirements of ASHRAE 62.2-2010, 2013 or 2016
 2.2 Ventilation airflow rate required by 62.2 for a continuous system: 56 CFM -
 2.3 Design for this system: Vent. airflow rate: 56 CFM Run-time per cycle: 60 minutes Cycle time: 60 minutes -

System Type & Controls:

2.4 Specified system type: Supply Exhaust **Balanced** -
 2.5 Specified control location: (e.g., Master bath, utility room) -
 2.6 Specified controls allow the system to operate automatically, without occupant intervention.
 2.7 Specified controls include a readily-accessible ventilation override and a label has also been specified if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment).
 2.8 For any outdoor air inlet designed to connect to a ducted return of the HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override.

Sound:

2.9 The fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted

Efficiency:

2.10 If Vent System controller operates the HVAC fan, then HVAC fan operation is intermittent and either the fan type in Item 4.7 is ECM / ICM or the controls will reduce the run-time by accounting for HVAC system heating or cooling hours.
 2.11 If bathroom fans are specified as part of the system, then they are ENERGY STAR certified

Air Inlet Location: (Complete this section if system has a specified air inlet location; otherwise check "N/A")

N/A

2.12 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit
 2.13 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from known sources exiting the roof

3. Room-by-Room Heating & Cooling Loads

3.1 Room-by-room loads calculated using: Unabridged ACCA Manual J v8 2013 ASHRAE Fundamentals Other per AHJ -
 3.2 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling
 3.3 Outdoor design temperatures used in loads: (See Footnote 13 and energystar.gov/hvacadestemps)
 County & State, or US Territory, selected: Buncombe, NC Cooling season: 91 °F Heating season: 19 °F -
 3.4 Number of occupants used in loads: 4 -
 3.5 Conditioned floor area used in loads: 2577 Sq. Ft. -
 3.6 Window area used in loads: 361 Sq. Ft. -
 3.7 Predominant window SHGC used in loads: 0.25 -
 3.8 Infiltration rate used in loads: Summer: 0.08 Winter: 0.20 -
 3.9 Mechanical ventilation rate used in loads: 56 CFM -

Loads At Design Conditions (kBtuh)

N NE E SE S SW W NW -

Cooling	3.10 Sensible heat gain (By orientation)	21.4	22.8	23.1	22.4	20.3	21.1	21.0	21.1	-	
	3.11 Latent heat gain (Not by orientation)	2.9									-
	3.12 Total heat gain (By orientation)	24.3	25.7	26.0	25.3	23.2	24.0	23.9	24.0	-	
	3.13 Maximum – minimum total heat gain (Item 3.12) across orientations =	2.8 kBtuh					Variation is ≤ 6 kBtuh				<input checked="" type="checkbox"/>
Heating	3.14 Total heat loss (Not by orientation)	31.6									-

Bold/italic values have been manually overridden



ENERGY STAR Single-Family New Homes National HVAC Design Report, Version 3 / 3.1(Rev. 11)

4. Heating & Cooling Equipment Selection										Designer Verified
4.1 Equipment selected per ACCA Manual S (see Footnote 25 & 26).										<input checked="" type="checkbox"/>
Air Conditioner / Heat Pump (Complete if air conditioner or heat pump will be installed; otherwise check "N/A")										<input type="checkbox"/> N/A
4.2 Equipment type: <input type="checkbox"/> Cooling-only air conditioner or <input checked="" type="checkbox"/> Cooling & heating heat pump										-
4.3 Condenser manufacturer & model: Generic SEER 15.0, HSPF 8.5										-
4.4 Evaporator / fan coil manufacturer & model: Generic										-
4.5 AHRI reference #:										-
4.6 AHRI listed efficiency: 12.82/ 15 EER / SEER Air-source heat pump: 8.5 HSPF Ground-source heat pump: COP										-
4.7 Evaporator fan type: <input type="checkbox"/> PSC <input checked="" type="checkbox"/> ECM / ICM <input type="checkbox"/> Other:										-
4.8 Compressor type: <input type="checkbox"/> Single-speed <input checked="" type="checkbox"/> Two-speed <input type="checkbox"/> Variable-speed										-
4.9 Latent capacity at design conditions, from OEM expanded performance data: 0 kBtuh										-
4.10 Sensible capacity at design conditions, from OEM expanded performance data: 0 kBtuh										-
4.11 Total capacity at design conditions, from OEM expanded performance data: 0 kBtuh										-
4.12 Air-source heat pump capacity: At 17°F: 22.8 kBtuh At 47°F: 29.9 kBtuh <input type="checkbox"/> N/A										-
4.13 Cooling sizing % = Total capacity (Item 4.11) divided by maximum total heat gain (Item 3.12): 0 %										-
4.14 Complete this Item if Condition B Climate will be used to select sizing limit in Item 4.15. Otherwise, check "N/A": <input checked="" type="checkbox"/> N/A										-
4.14.1 Load sensible heat ratio = Max. sensible heat gain (Item 3.10) / Max. total heat gain (Item 3.12) = 89%										-
4.14.2 HDD / CDD ratio (Visit energystar.gov/hvacdesigntemps to determine this value for the design location) = 1.2										-
4.15 Check box of applicable cooling sizing limit from chart below:										-
Equipment Type (Per Item 4.2) & Climate Condition (Per Item 4.14)		Compressor Type (Per Item 4.8)								
		Single-Speed		Two-Speed		Variable-Speed				
For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate		<input type="checkbox"/> Recommended: 90 – 115% Allowed: 90 – 130%		<input type="checkbox"/> Recommended: 90 – 120% Allowed: 90 – 140%		<input type="checkbox"/> Recommended: 90 – 130% Allowed: 90 – 160%				
For Cooling Mode of Heat Pump in Condition B Climate		<input type="checkbox"/> 90% - 100%, plus 15 kBtuh		<input type="checkbox"/> 90% - 100%, plus 15 kBtuh		<input type="checkbox"/> 90% - 100%, plus 15 kBtuh				
4.16 Cooling sizing % (4.13) is within cooling sizing limit (4.15)										<input type="checkbox"/>
Furnace (Complete if furnace will be installed; otherwise check "N/A")										<input checked="" type="checkbox"/> N/A
4.17 Furnace manufacturer & model:										-
4.18 Listed efficiency: AFUE										-
4.19 Total capacity: kBtuh										-
4.20 Heating sizing % = Total capacity (Item 4.19) divided by total heat loss (Item 3.14): 0%										-
4.21 Check box of applicable heating sizing limit from chart below:										-
When Used for Heating Only					When Paired With Cooling					
<input type="checkbox"/> 100 - 140%					<input type="checkbox"/> Recommended: 100 – 140% Allowed: 100 – 400%					
4.22 Heating sizing % (4.20) is within heating sizing limit (4.21)										<input type="checkbox"/>
5. Duct Design (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A")										<input type="checkbox"/> N/A
5.1 Duct system designed for the equipment selected in Section 4, per ACCA Manual D										done by installer <input checked="" type="checkbox"/>
5.2 Design HVAC fan airflow: Cooling mode 1000 CFM Heating mode 1000 CFM										-
5.3 Design HVAC fan speed setting (e.g., low, medium, high): Cooling mode Medium Heating mode Medium										-
5.4 Design total external static pressure (corresponding to the mode with the higher airflow in Item 5.2): 0 IWC										-
5.5 Room-by-room design airflows documented below (which must sum to the mode with the higher airflow in Item 5.2)										-
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)
1	Bath 1	19	12	Powder	0	23				
2	Bath 2	27	13	Upper Hall	34	24				
3	Bed 1	79	14	WIC	7	25				
4	Bed 2	57	15			26				
5	Bed 3	51	16			27				
6	Cond bsmt	105	17			28				
7	Dining	253	18			29				
8	Entry	89	19			30				
9	Hall	0	20			31				
10	Kitchen	89	21			32				
11	Living	191	22					Total for all rooms		1000