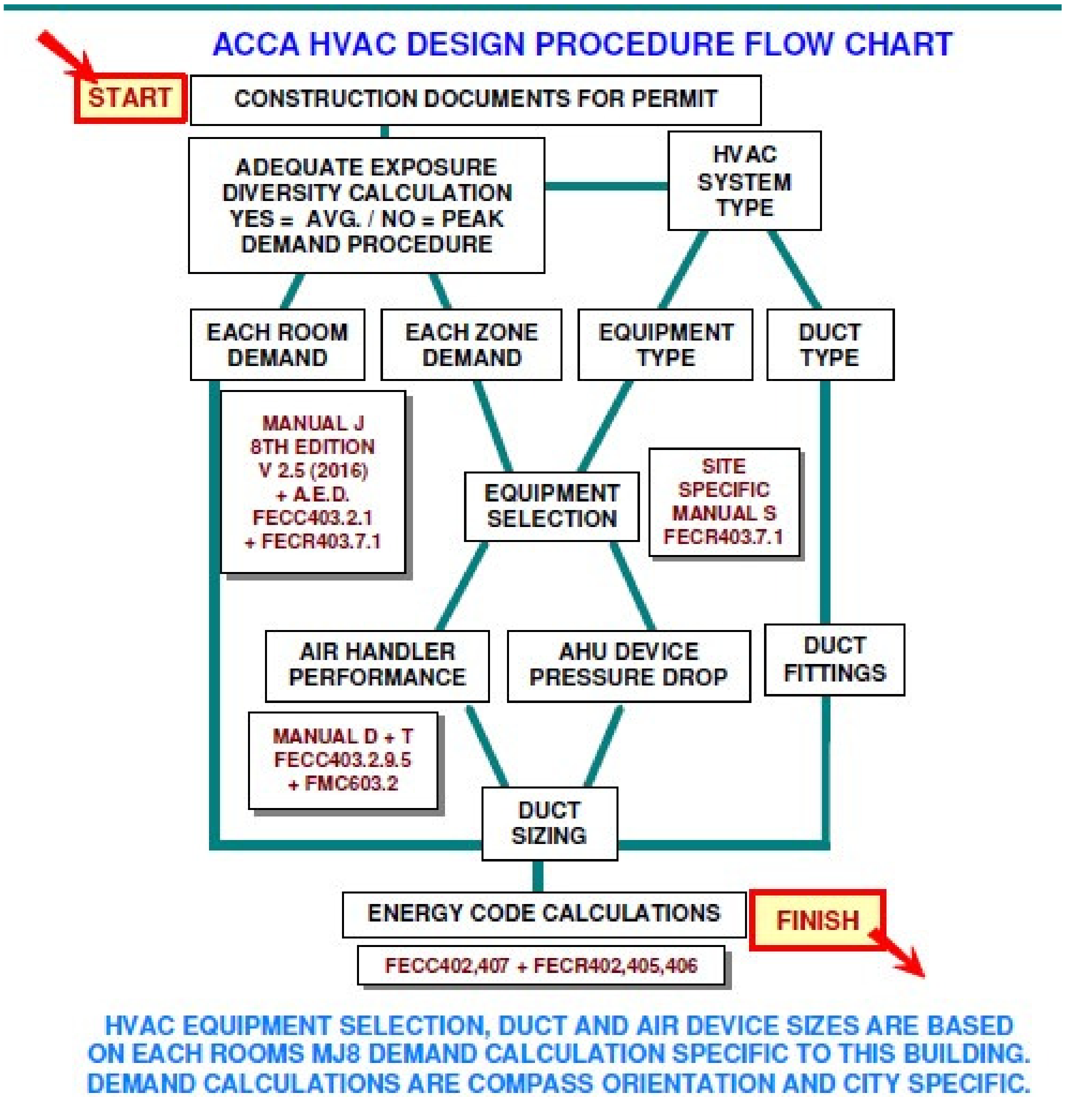
## Spotting a fake HVAC design - 2023

**Spotting a fake HVAC design** is simple for an experienced designer by reviewing the math that makes up an accurate hvac design. Math is the only reliable method to determine each of the HVAC design procedures, the design procedure flow chart below shows the 6 ACCA hvac design manuals along with the final calculation performed – the energy code calculation.



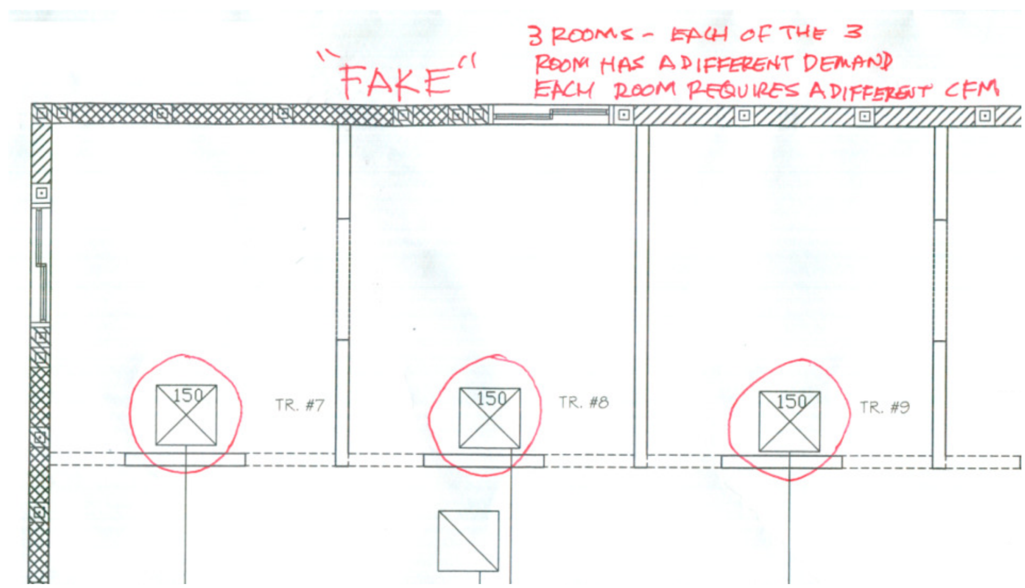

Before the 1980's few HVAC designs were based on any math at all - even though the hvac design manuals have been published since the 1960's. The days of hand held calculators and endless math forms for computing room by room heat load demand calculations are long gone – thankfully – as it could take an entire day to compute a single building.

Prior to computers, most HVAC contractors simply guessed on the hvac using a simple square feet per ton, this inaccurate "design" method of using a square foot per ton allowance had no chance of working well because no two buildings have the same demand based on a simple square foot basis. As a designer in the 1980's - the average square foot per ton, based on thousands of actual heat load demand calculations would vary from 400 to 700 depending mostly on the GFA (glass to floor area) and the glass orientation – (this was long before double pane low e glass) – today we perform 3d intelligent cad energy models that reflect the exact building geometry and building component material make up, resulting in homes that average 700 to 1300 square feet per ton. The square feet per ton for any building is established **after** the room by room heat load demand calculation is performed and not before. A correctly designed hvac system for any building requires many hours performing the 6 calculations now required by the Florida building codes. A properly designed hvac system will contain a lot of math and a scaled hvac drawing that shows this math "graphically". My standard simple home design package will contain about 20 pages of math (Manual's AED,J,D,S,T,ZR + Florida energy code forms) and the intelligent HVAC cad drawing that is data linked to the demand calculations for a precise match.

The **first** item to look at is the room airflow values listed – if the listed cfm values are **neatly rounded up to a value** like “150 cfm” – or any value that would end with a nice rounded number. Rounded values are an indication that no heat load demand calculations were performed on the room and the values were simply guessed at. Room air flow values are derived from the room by room heat load demand calculations and math prevents the values from ending up with a neatly rounded value. **Second** item is the **math documents**, Manual’s AED,J,D,S,T,ZR + Florida energy code forms, be sure they are all provided together in a single package and include the room by room demand calculations.

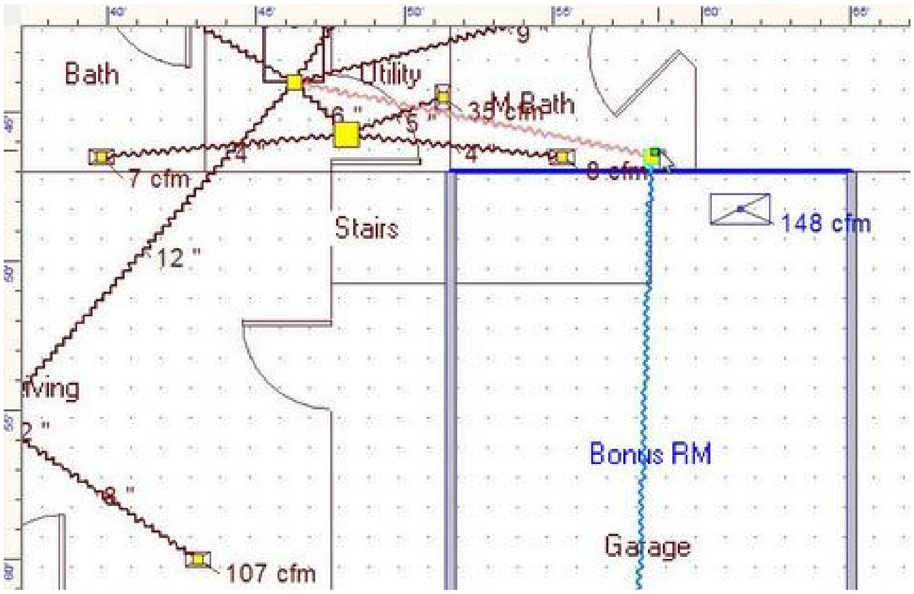
Performing the energy code forms *only* without the supporting hvac design manuals AND scaled HVAC Manual D Duct drawings is surely a fake. **Third**, look for a code compliant **scaled hvac drawing** showing every part and piece of the hvac system, energy calculations rely on math from the prerequisite hvac design manuals, a great example is the amount of duct work square feet for the building, the amount of both supply and return air ducts is required in both the energy code calculation and the heat load demand calculations. This means that a scaled duct design complying with Manual D would be required to establish the real amounts. Also Manual D duct design models every duct path and will determine the one and only “longest duct path” (aka-most restrictive path) from one intake return air grille, through the return and supply duct trunks + plenums to a single supply air discharge. Manual D determines the pressure associated with the most restrictive path and is critical for selecting the indoor air handler. I see many contractors simply guess (.5 TSP is the most common guess shown) on the duct area instead of the required effort of a duct design that truly matches the building. So be sure that your design package includes all 6 ACCA design manuals and a full set of hvac drawings, otherwise it’s a fake based on several guesses!

Here is look at some **fakes – picture below** was sealed by a PE – you can see that all three rooms show the same nicely **rounded cfm value**.

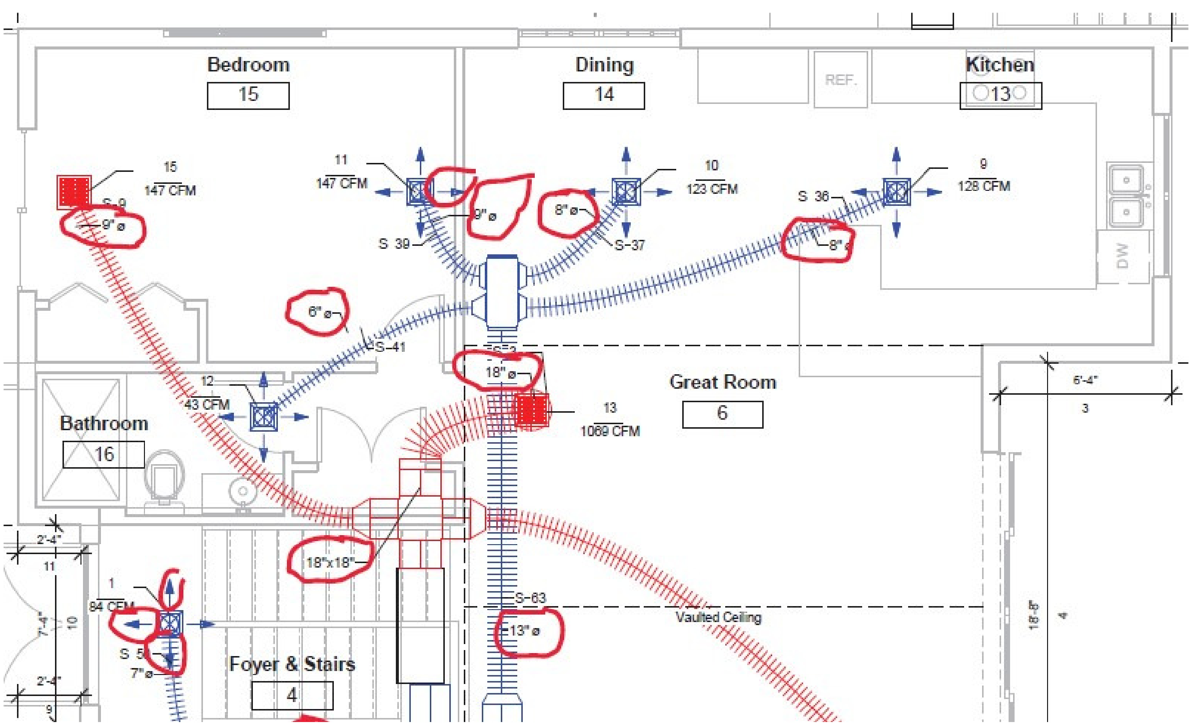



This is a mathematical impossibility because the 3 rooms do not have the same exposure even though each room usage and floor area are the same – so the heat load demand for each room will be significantly different due to the different envelope components; each room’s required air flow value should match the demand calculations on a room-by-room basis. The peer reviewed heat load demand calculations for this building revealed that the corner room required more airflow than the center room with a window, and the room to the right required the least amount of airflow – this was due to the building envelope exposure differences resulting in different room demands. Placing the same air flow for each room will result in large temperature differences within each room – this violates the acca design guides and energy code.

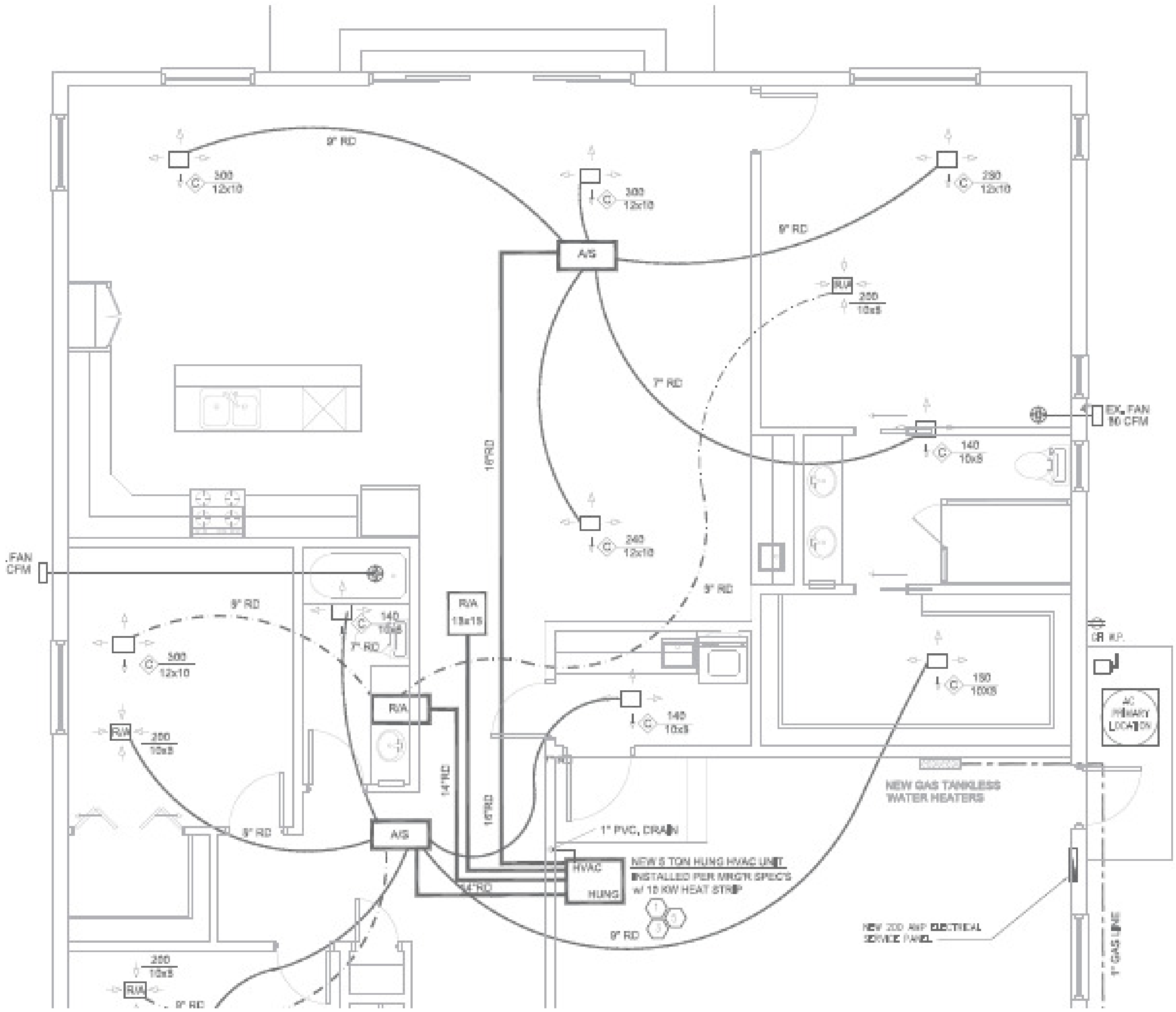
Another fake item to look for is the **"chicken scratch" drawing** – usually provided by the hvac contractor. These fake designs make no attempt to create a duct design that reflects field installation.  The duct fittings shown will not account for the actual fittings being installed – meaning the manual D used for air handler selection would be inaccurate by more than 25% on total static pressure required – and the duct exposure area (for each duct mounting location) used in the duct heat load demand would be incorrect too.



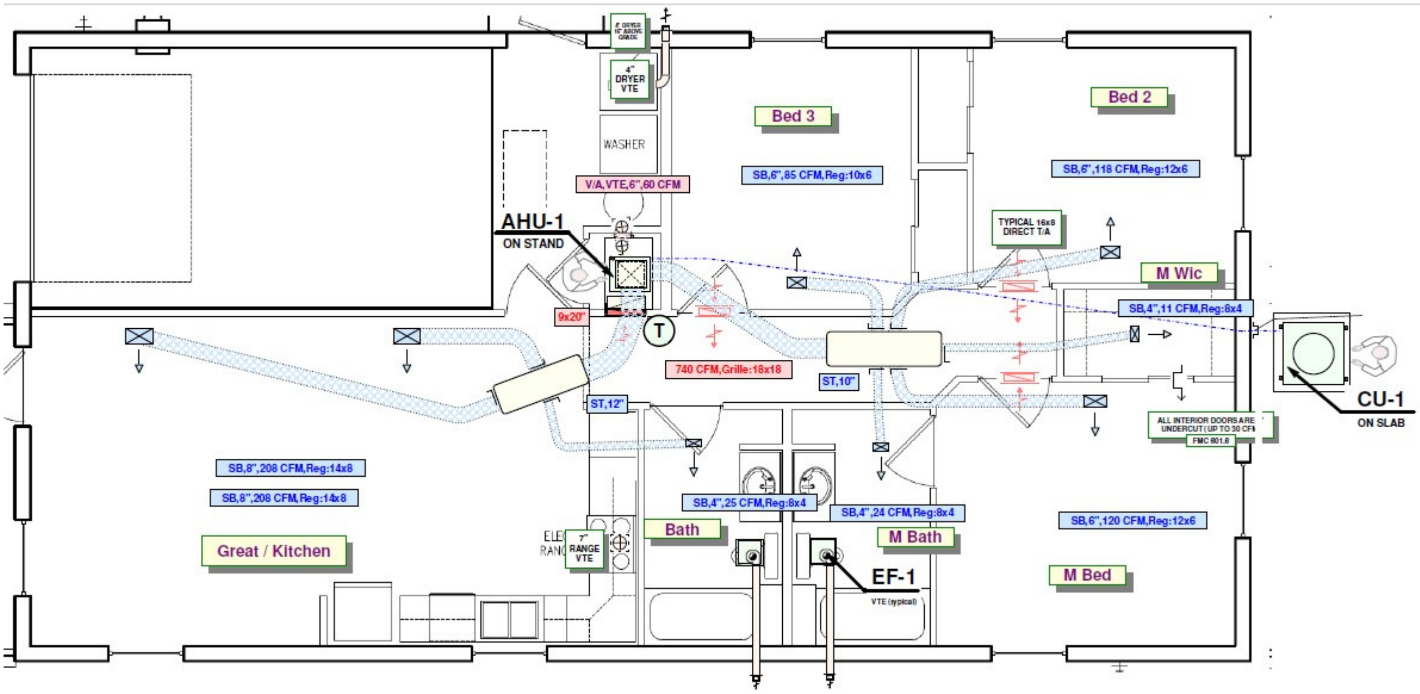

**Above and below: Fake** "chicken scratch" drawing above showing inaccurate allowances for duct fittings – and a "zero" cfm shown in M Bath is not possible as this room has internal heat gains and building envelope heat gains – the improper use of this popular residential  hvac design tool will result in "hot spots"; the computer output is only as accurate as  the designer's input!  This design has no chance of working properly. Below shows improper air device locations in violation with Manual T and Manual D, this drawing is not code or acca compliant.



**Below: fake** hvac design showing a 5-ton hvac unit specified for this home – the home has a 2-ton heat load demand as verified by peer review calculations. Easy to see that no math was performed by looking at the room air flow values, also the duct sketch shows ducts drawn in conflict with Manual D and Manual T. The drawings do not correctly show the entire hvac system with a balance return air system and the air device locations would be suited for a cold climate while in the heating mode (not a cooling dominant duct design as required here in Florida) This sketch is neither code or acca compliant.



**__A correctly designed hvac system__** should look like the drawing below →




Above shows a correctly designed HVAC system featuring a single high wall return air grille.

Design shown includes the room-by-room heat load demands using Manual J 8$^{th}$ edition, Fitting by Fitting duct design using graphic Manual D duct design, HVAC equipment selection using Manual S equipment selection procedure, air device selection using Manual T room air device selection, Manual ZR used (if duct zoning is required or desired), and energy calculations using FSEC energy gauge software tool. You can see the room air flow values exactly match the rooms actual heat load demand – no "rounded off" air flow values – each duct fitting is shown and will match the installation – this accurate cad drawing data links to each ACCA design manual using intelligent 3d cad energy modeling software. Professional hvac designers perform every ACCA design manual (required by Building codes) because these manuals provide essential data needed to produce a complete and accurate comfort system design.

## Spotting fake HVAC Calculations -- Manual's AED,J,D,S,T,ZR:

Listed below are a few examples of Central Florida hvac installers or hvac designers who fell short of performing the 6 ACCA hvac design manuals that make up a code and acca compliant HVAC design. These fake calculations are provided without a full scaled Manual D duct drawing resulting in inaccurate duct heat load demand calculations, improperly selected air handlers, and incorrect Manual S capacity adjustments. In these examples you can see the various ways the "designers" have falsified the heat load demands, in every case the falsifications (aka: "padded") result in the wrong hvac equipment selection. There is no way to accurately complete a heat load demand calculation without a scaled Manual D duct design that accounts for every duct path. The fake documents shown in this study back up the data provided by the DOE and FSEC with respect to hvac contractors who purposely falsify calculations in an attempt to install "bigger is better" hvac equipment – sadly the oversizing rate in Florida is 60%.

**Below** shows an extremely padded heat load demand claiming a modern home with a summer infiltration rate of 339 cfm (infiltration is amount of air in cfm a building envelope naturally leaks)! This of course in not possible, typically a modern home of this size has a natural infiltration rate of about 45 cfm (my home from 1964 has a verified natural infiltration leakage rate of only 27 cfm). This one falsification added about one full ton of cooling capacity to the heat load demand that really does not exist! Also note the incorrect 95-degree summer design outdoor temperature (there are no cities in Florida that use a 95-degree summer design temperature).

Location for weather data: Tampa Internati, FL - Defaults: Latitude(28) Altitude(10 ft.) Temp Range(M)
Humidity data: Interior RH (50%) Outdoor wet bulb (78F) Humidity difference(54gr.)

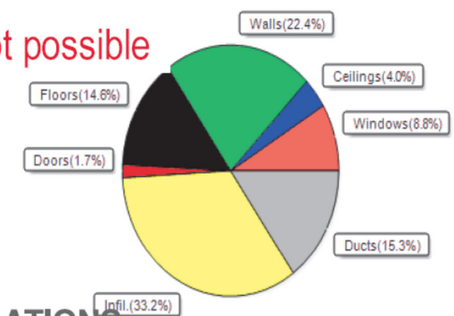
| | | | | | |
|---|---|---|---|---|---|
| Winter design temperature(MJ8 99%) | 43 | F | Summer design temperature(MJ8 99%) | 95 | F |
| Winter setpoint | 70 | F | Summer setpoint | 75 | F |
| Winter temperature difference | 27 | F | Summer temperature difference | 20 | F |
| **Total heating load calculation** | **40382** | **Btuh** | **Total cooling load calculation** | **61434** | **Btuh** |
| Submitted heating capacity | % of calc | Btuh | Submitted cooling capacity | % of calc | Btuh |
| Total (Electric Heat Pump) | 163.4 | 66000 | Sensible (SHR = 0.75) | 114.9 | 49500 |
| Heat Pump + Auxiliary(0.0kW) | 163.4 | 66000 | Latent | 89.9 | 16500 |
| | | | Total (Electric Heat Pump) | 107.4 | 66000 |

## WINTER CALCULATIONS

Winter Heating Load (for 4124 sqft)

| Load component | | | Load | |
|---|---|---|---|---|
| Window total | 364 | sqft | 3538 | Btuh |
| Wall total | 3562 | sqft | 9054 | Btuh |
| Door total | 64 | sqft | 691 | Btuh |
| Ceiling total | 2353 | sqft | 1612 | Btuh |
| Floor total | See detail report | | 5886 | Btuh |
| Infiltration | 452 | cfm | 13410 | Btuh |
| Duct loss | | | 6190 | Btuh |
| **Subtotal** | | | **40382** | **Btuh** |
| Ventilation | 0 | cfm | 0 | Btuh |
| **TOTAL HEAT LOSS** | | | **40382** | **Btuh** |

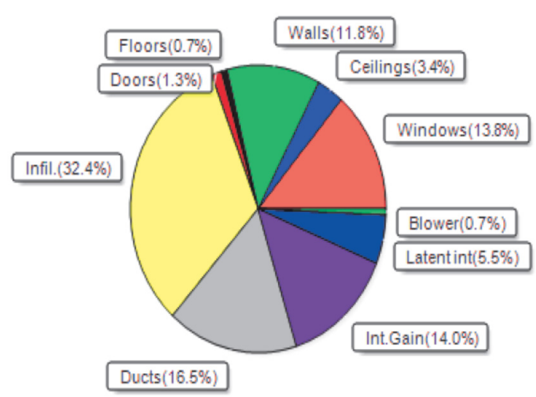
not possible




## SUMMER CALCULATIONS

Summer Cooling Load (for 4124 sqft)

| Load component | | | Load | |
|---|---|---|---|---|
| Window total | 364 | sqft | 8455 | Btuh |
| Wall total | 3562 | sqft | 7231 | Btuh |
| Door total | 64 | sqft | 794 | Btuh |
| Ceiling total | 2353 | sqft | 2090 | Btuh |
| Floor total | | | 438 | Btuh |
| Infiltration | 339 | cfm | 7450 | Btuh |
| Internal gain | | | 8580 | Btuh |
| Duct gain | | | 7635 | Btuh |
| Sens. Ventilation | 0 | cfm | 0 | Btuh |
| Blower Load | | | 400 | Btuh |
| **Total sensible gain** | | | **43073** | **Btuh** |
| Latent gain(ducts) | | | 2527 | Btuh |
| Latent gain(infiltration) | | | 12435 | Btuh |
| Latent gain(ventilation) | | | 0 | Btuh |
| Latent gain(internal/occupants/other) | | | 3400 | Btuh |
| **Total latent gain** | | | **18362** | **Btuh** |
| **TOTAL HEAT GAIN** | | | **61434** | **Btuh** |



**2 docs Below:** shows another fake heat load demand calculation showing that no ducts have been drawn or even guessed at! The Manual J heat load demand would be missing the duct heat load demands and the Manual S equipment selection would be impossible without knowing the required duct pressures to overcome and return air duct temperature rise. These fakes are commonplace in Florida and are typically provided by "designers" or "hvac installers" that offer "**calculations only**" without providing the code and acca required scaled hvac duct drawings. The form below claims air flow cfm with no velocity or duct size! This is neither code or acca compliant.

System 1 Room Load Summary

| No | Room Name | Area SF | Htg Sens Btuh | Min Htg CFM | Run Duct Size | Run Duct Vel | Clg Sens Btuh | Clg Lat Btuh | Min Clg CFM | Act Sys CFM |
|---|---|---|---|---|---|---|---|---|---|---|
| ---Zone 1--- | | | | | | | | | | |
| 1 | Great Room/Lower Stair | 330 | 5,242 | 68 | 1-0 | 0 | 3,286 | 373 | 149 | 163 |
| 2 | Bedroom 1 | 194 | 3,893 | 51 | 1-0 | 0 | 1,816 | 130 | 83 | 90 |
| 3 | Bath 1 | 61 | 642 | 8 | 1-0 | 0 | 399 | 19 | 18 | 20 |
| 4 | Sitting Room | 225 | 3,799 | 49 | 1-0 | 0 | 3,455 | 313 | 157 | 171 |
| 5 | Bath 2 | 47 | 641 | 8 | 1-0 | 0 | 422 | 46 | 19 | 21 |
| 6 | WIC 2 | 30 | 242 | 3 | 1-0 | 0 | 168 | 19 | 8 | 8 |
| 7 | Bedroom 2 | 173 | 894 | 12 | 1-0 | 0 | 1,472 | 41 | 67 | 73 |
| 8 | Upper Stair | 15 | 1,001 | 13 | 1-0 | 0 | 1,097 | 70 | 50 | 54 |
| | Ventilation | | 0 | | | | 457 | 1,051 | | |
| | Duct Latent | | | | | | | 519 | | |
| | System 1 total | 1,074 | 16,356 | 213 | | | 12,573 | 2,581 | 551 | 600 |

Cooling System Summary

| | Cooling Tons | Sensible/Latent Split | Sensible Btuh | Latent Btuh | Total Btuh |
|---|---|---|---|---|---|
| Net Required: | 1.26 | 83% / 17% | 12,573 | 2,581 | 15,154 |
| Recommended: | 1.40 | 75% / 25% | 12,573 | 4,191 | 16,764 |

Lutz, FL 33549 Page 4

System 1 Room Load Summary

| No | Room Name | Area SF | Htg Sens Btuh | Min Htg CFM | Run Duct Size | Run Duct Vel | Clg Sens Btuh | Clg Lat Btuh | Min Clg CFM | Act Sys CFM |
|---|---|---|---|---|---|---|---|---|---|---|
| ---Zone 1--- | | | | | | | | | | |
| 1 | Living / Kitchen | 348 | 4,770 | 62 | 1-0 | 0 | 4,978 | 1,976 | 226 | 226 |
| 2 | Bedroom | 179 | 2,303 | 30 | 1-0 | 0 | 1,516 | 288 | 69 | 69 |
| 3 | Bathroom | 89 | 1,595 | 21 | 1-0 | 0 | 536 | 301 | 24 | 24 |
| | System 1 total | 616 | 8,668 | 113 | | | 7,030 | 2,565 | 320 | 320 |

Cooling System Summary

| | Cooling Tons | Sensible/Latent Split | Sensible Btuh | Latent Btuh | Total Btuh |
|---|---|---|---|---|---|
| Net Required: | 0.80 | 73% / 27% | 7,030 | 2,565 | 9,595 |
| Recommended: | 0.86 | 75% / 25% | 7,695 | 2,565 | 10,260 |

?

really, no duct size can deliver air flow? this doc shows that no duct design was attempted as required by ACCA (the code reference standard for hvac design),the mechanical,and energy codes. It would not be possible to complete the ACCA design guides (J,D,S,T,ZR,AED) without a scaled duct drawing to quantify many items.. square feet of exposed duct for each duct environment, return duct heat rise, air handler airflow setting, duct total static pressure that must be met by the air handler, indoor coil entering wet and dry bulb temps, etc...too much to list - ducts make up a large portion of the demand calculations.
so this entire design package, both the heat load and the energy code forms are incorrect for this building, ..also note that the odds of any hvac system exactly matching the required latent loads are improbable- this is a fake acca calculation.

# Spotting a fake Florida Energy Code Form - 2024

**Spotting a fake energy code form** is simple for an experienced energy rater by reviewing the public record energy code output form that is signed by the energy rater and used for permit acquisition. I have hundreds of these fake forms accumulated over a 20-year period (Florida Building Codes started year 2001). Code officials (plans examiners and site inspectors) are becoming more aware of these fake forms, but not all plan's examiners know how to actually perform the energy code calculations and typically could not spot the most common fakes I list here. Plans examiners do check common energy form entries like the address, living area square feet, building systems (water heating and hvac systems), and signatures. Each falsified example shown below was accepted for permit acquisition!

1) The energy rater signature is required on each energy form and in some jurisdictions the signature must be 3rd party verified. The many fake energy forms sent to me each year typically contain a **signature that is not legible and does not contain any contact information** for the energy rater who performed the calculations. Our energy code allows for this, FECR 103.1.1.1.1 allows any person (yes, an 8-year-old with computer skills) to perform and submit energy code forms for residential buildings! For sure energy code calculations are very complex and require the energy rater to be capable of the prerequisite ACCA hvac design including the 6 ACCA computer generated design guides – manual's AED,J,D,S,T,ZR.

   I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code.

   PREPARED BY: [illegible]
   DATE: 1-22-18

2) Residential occupants are based on the number of bedrooms. ACCA and Energy codes set the maximum occupancy to be one person greater than the number of bedrooms. **This 5 Bedroom home claims 16 occupants**

| Number | Name | Area | Volume | Kitchen | Occupants | Bedrooms | Infil ID | Finished | Cooled | Heated |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Main | 2736 | 32832 | Yes | 8 | 3 | 1 | Yes | Yes | Yes |
| 2 | Great Room | 2688 | 32256 | No | 8 | 2 | 1 | Yes | Yes | Yes |

   (this was falsified in the ACCA manual j heat load in order to achieve the "bigger is better" hvac equipment size – this project has grossly oversized hvac equipment due to this incorrect occupant count. This entry is not code or ACCA compliant.

3) Exterior wall paint color is a critical item in the energy code calculations. I see many energy forms showing **a false value for paint color** (or if using a natural material like brick, the bricks

**WALLS** *(Total Exposed Area = 2512 sq.f*

| √ | # | Ornt | Adjacent To | Wall Type | Space | Cavity R-Value | Width Ft | Width In | Height Ft | Height In | Area sq.ft. | U-Factor | Sheath R-Value | Frm. Frac. | Solar Absor. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ | 1 | W | Garage | Frame - Wood | Interior 1 | 13.0 | 2.6 | 0 | 10.0 | 0 | 25.7 | 0.084 | 0 | 0.23 | 0.01 |
| ___ | 2 | N | Garage | Frame - Wood | Interior 1 | 13.0 | 5.5 | 0 | 10.0 | 0 | 55.0 | 0.084 | 0 | 0.23 | 0.01 |
| ___ | 3 | S | Exterior | Conc. Blk - Int Ins | Interior 1 | 5.0 | 17.5 | 0 | 10.0 | 0 | 175.0 | 0.132 | 0 | 0 | 0.15 |
| ___ | 4 | W | Exterior | Conc. Blk - Int Ins | Interior 1 | 5.0 | 19.5 | 0 | 10.0 | 0 | 195.0 | 0.132 | 0 | 0 | 0.15 |

   natural absorptance factor is used). The energy code sets the very minimum paint color absorptance factor of .21 for lacquer white. Paint colors range from .21 to .35 for light color paint, .36 to .55 for medium color paint, and .56 to .8 for dark color paint. This entry is very important because it can sway the overall energy performance index by 8 points! Also note that interior partition walls that are not subject to direct sunlight use a .01 absorptance factor.

4) Glass envelope components like windows, sliding glass doors, and swinging glass doors are critical items used in the ACCA and energy code calculations. I see most energy forms show **false input data for internal and external shading devices**. Our codes require the hvac design be

**WINDOWS** (Total Exposed Area = 998 sq.ft.)

| √ # | Ornt | Wall ID | Frame | Panes | NFRC | U-Factor | SHGC | Imp | Storm | Total Area (ft²) | Same Units | Width (ft) | Height (ft) | --Overhang-- Depth (ft) | Sep. (ft) | Interior Shade | Screen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | S | 1 | Metal | Low-E Double | Y | 0.69 | 0.22 | N | N | 66.0 | 1 | 6.00 | 11.00 | 8.0 | 0.5 | None | None |
| ___ 2 | S | 2 | Metal | Low-E Double | Y | 0.43 | 0.26 | N | N | 12.0 | 1 | 3.00 | 4.00 | 2.0 | 12.0 | None | None |
| ___ 3 | W | 5 | Metal | Low-E Double | Y | 0.56 | 0.24 | N | N | 46.2 | 2 | 3.00 | 7.70 | 0.0 | 0.0 | None | None |
| ___ 4 | N | 6 | TIM | Low-E Double | Y | 0.56 | 0.37 | N | N | 160.0 | 1 | 16.00 | 10.00 | 16.0 | 1.3 | None | None |
| ___ 5 | W | 7 | TIM | Low-E Double | Y | 0.69 | 0.37 | N | N | 26.2 | 1 | 2.70 | 9.70 | 22.0 | 1.5 | None | None |
| 6 | N | 8 | Metal | Low-E Double | Y | 0.56 | 0.24 | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |

in compliance with the code adopted Manual J heat load calculation procedure. This procedure has mandatory requirements for glass components to include interior shading (default value for new homes is a blind set to a 45-degree angle, 100% coverage, medium color), exterior fixed shading by the building overhang (overhang projection ratio), external or internal insect screen shading based on the window type, exterior screen enclosure shading (pool cages), and ground color reflectance factor. Peer review quantified this home to have grossly oversized cooling equipment due to this false entry, also the frame type for the windows was not consistent with the u factor shown. Approved for permit despite not being code or ACCA compliant.

5) Energy forms with **fake duct values** are for sure the most common in Florida and is commonly

**DUCTS**

| √ Duct # | ---Supply--- Location | R-Value | Area | ---Return--- Location | R-Value | Area | Leakage Type | Air Handler | CFM 25 TOT | CFM 25 OUT | QN | RLF | HVAC # Heat | Cool |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Attic | 6.0 | 508 ft² | Attic | 6.0 | 127 ft² | Default Leakage | Attic | (Default) | (Default) | | | 1 | 1 |
| ___ 2 | Attic | 6.0 | 508 ft² | Attic | 6.0 | 127 ft² | Default Leakage | Attic | (Default) | (Default) | | | 2 | 2 |

accepted by code officials. This duct entry shows a two-story home to have only 2 duct entries and to make It super obvious that the form is a fake – both duct systems miraculously have exactly the same amount of duct exposure area in square feet! This of course is not even possible and peer review using intelligent cad duct design shows the first level had 3 different duct mounting environments (garage, hot attic, enclosed floor joists) with a total of 432 square feet of duct area and the second level had 2 different duct mounting locations (interior closet and hot attic) with a total of 382 square feet. This is a huge difference from the claimed 635 square feet for each duct system and would change the energy performance index by up to 4 points. Also note the R6 duct value shown is not ACCA compliant and the air handler locations are not correct, approved for permit!

6) **No ventilation air** - as required to maintain a healthy indoor environment. Florida mechanical and

**INFILTRATION**

| # | Scope | Method | SLA | CFM 50 | ELA | EqLA | ACH | ACH 50 |
|---|---|---|---|---|---|---|---|---|
| 1 | Wholehouse | Proposed ACH | .0005 | 7113.6 | 390.53 | 734.45 | .375 | 6.5575 |

energy codes require ventilation air for occupants, the minimum allowable rate is 15 cfm of ventilation air required for each occupant. The typical 3-bedroom home requires 60 cfm minimum ventilation air and the mechanical codes show this "fresh outdoor air" be introduced from an approved outdoor location. The operation of exhaust fans, opening of windows, and natural infiltration are not ACCA approved means for ventilation air required for occupant health. Since 2015 when blower door testing became mandatory in Florida, there are no new construction homes that have natural infiltration rates to satisfy the minimum ventilation air rates, opening of windows is not performed by the occupants, and operation of an exhaust fan (this places the building interior on negative pressure and slightly increases the infiltration rate) are all violations of the ACCA design guides. ACCA compliant ventilation air system design is mechanically operated and places a positive pressure on the home interior during operation. This can be accomplished with a run time ventilation air duct connected to the air handler return air plenum or by a dedicated ventilating dehumidifier. An energy form showing only an infiltration entry is not ACCA compliant, check to see your forms contain a ventilation entry showing a run time ventilation rate to match the occupancy.

7) Sometimes the energy rater and builder signature are the same as shown on this fake form, the code officials **approved this form even though it clearly shows many errors**. This form has nearly every entry incorrect as verified by 3rd party peer review. Here are a few of the obvious errors shown: R13 insulation for the block walls did not match the R4 installed, the roof area claimed on this single story home is greater than the living area shown, the NFRC values shown for glass did not match the installed glass, the duct amounts and duct environments claimed did not match this home, the glass area amount shown is half of what is actually installed (5% GFA claimed, 10% GFA installed), and the heating and cooling capacities shown are for a 1/3 ton hvac unit (does not exist). Using this false entry data for this home "passes" the energy code! Peer revies shows this home does not pass the energy code when the correct input data is used, in fact this home required a higher efficient hvac unit in order to legally build this home in Florida.

Project Name: [redacted]
Street:
City, State, Zip:
Owner:
Design Location: FL, Tampa

1436 # is correct

Builder Name: [redacted]
Permit Office:
Permit Number:
Jurisdiction:

14.00 is correct not 15.00

1. New construction or existing — New (From Plans)
2. Single family or multiple family — Single-family
3. Number of units, if multiple family — 1
4. Number of Bedrooms — 3
5. Is this a worst case? — No
6. Conditioned floor area above grade (ft²) — 1531.59997558
Conditioned floor area below grade (ft²) — 0
7. Windows(81.0 sqft.) Description Area
a. U-Factor: Sgl, U=0.95 81.00 ft²
SHGC: SHGC=0.50
b. U-Factor: N/A ft²
SHGC:
c. U-Factor: N/A ft²
SHGC:
d. U-Factor: N/A ft²
SHGC:
Area Weighted Average Overhang Depth: 0.181 ft.
Area Weighted Average SHGC: 0.500
8. Floor Types (1531.6 sqft.) Insulation Area
a. Slab-On-Grade Edge Insulation R=0.0 1531.60 ft²
b. N/A R= ft²
c. N/A R= ft²

9. Wall Types (1409.3 sqft.) Insulation Area
a. Concrete Block - Int Insul, Exterior R=13.0 1409.30 ft²
b. N/A R= ft²
c. N/A R= ft²
d. N/A R= ft²
10. Ceiling Types (1805.9 sqft.) Insulation Area
a. Under Attic (Vented) R=30.0 1805.90 ft²
b. N/A R= ft²
c. N/A R= ft²
11. Ducts R ft²
a. Sup: Attic, Ret: Attic, AH: Main 6 306.31
12. Cooling systems kBtu/hr Efficiency
a. Central Unit correct 23,200 → 4.0 SEER:15.00
13. Heating systems kBtu/hr Efficiency
a. Electric Heat Pump correct 23,200 → 4.0 HSPF:7.70
8.2 correct
14. Hot water systems
a. Electric Cap: 40 gallons
EF: 0.920
b. Conservation features
None
15. Credits CF; Pstat
remove Pstat

with Hillsborough County Construction Codes

Glass/Floor Area: 0.053
Total Proposed Modified Loads: 34.47
Total Standard Reference Loads: 44.79
PASS

permit or approve the violation of any ...

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code.

PREPARED BY:
DATE: 10/21/2015

I hereby certify that this building, as designed, is in compliance with the Florida Energy Code.

OWNER/AGENT:
DATE: 11/5/2015

Review of the plans and specifications covered by this calculation indicates compliance with the Florida Energy Code. Before construction is completed this building will be inspected for compliance with Section 553.908 Florida Statutes.

BUILDING OFFICIAL:
DATE:

GREAT SEAL OF THE STATE OF FLORIDA
IN GOD WE TRUST

What does a modern accurate energy code form look like? Shown below:

# HVAC design and Energy calculations - 8th Edition Codes effective 12/31/2023

## *RESIDENTIAL ENERGY CONSERVATION CODE DOCUMENTATION CHECKLIST*

***Florida Department of Business and Professional Regulation***
***Simulated Performance Alternative (Performance) Method***

***Applications for compliance with the 2023 Florida Building Code, Energy Conservation via the Residential Simulated Performance Alternative shall include:***

- ☑ *This checklist*
- ☑ *Form R405-2023 report*
- ☑ *Input summary checklist that can be used for field verification (usually four pages/may be greater)*
- ☑ *Energy Performance Level (EPL) Display Card (one page)*
- ☑ *HVAC system sizing and selection based on ACCA Manual S or per exceptions provided in Section R403.7*
- ☑ *Mandatory Requirements (five pages)*

***Required prior to CO:***

- ☐ *Air Barrier and Insulation Inspection Component Criteria checklist (Table R402.4.1.1 - one page)*
- ☐ *A completed 2023 Envelope Leakage Test Report (usually one page); exception in R402.4 allows dwelling units of R-2 Occupancies and multiple attached single family dwellings to comply with Section C402.5*
- ☐ *If Form R405 duct leakage type indicates anything other than "default leakage", then a completed 2023 Duct Leakage Test Report - Performance Method (usually one page)*

**Enclosed -> also view the complete ACCA HVAC best practice design package ensuring precise energy calculations.**
**Intelligent CAD HVAC modeling software exactly matches the proposed building construction drawings used for permit.**

- ☑ **Adequate Exposure Diversity Calculations prerequisite to Manual J / FECC R403.7.1**
- ☑ **Manual J 8th Edition V2.5 Room by Room Heat Load Calculations / FECC R403.7.1**
- ☑ **Manual D Graphic Duct Design using Intelligent CAD Smart Ducts / FMC 603.2**
- ☑ **Manual S HVAC Equipment Selection Procedure / FECC R403.7.1**
- ☑ **Manual T Room Air Device Selection Procedure / FMC 603.2**
- ☑ **Manual ZR Thermal Zoning Design when Duct Zone Control is shown / FMC 603.2**
- ☑ **Color CAD HVAC Drawings that exactly match this energy calculation / FBC 107.3.5**

**Manufactured duct R value note: Energy code forms show the minimum duct R value required to pass the energy code 405 performance method for this specific building, HVAC Designs Inc. and ACCA Manual J 8th V2.5 recommends R-8 ducts when mounted outside the building envelope (garage, vented attics, vented floors, exterior) - Installing HVAC contractor may elect to use the minimum R value shown.**

**HVAC equipment efficiencies shown on the energy code forms may reflect the very minimum set by DOE**
**HVAC installer may use any brand, meet or exceed the energy efficiencies shown on the energy code forms.**
**HVAC installer verifies the Manual S cooling equip. selection meets both demands and is < 16% oversized.**

**DURING CONSTRUCTION THE BUILDER MUST MEET OR EXCEED ENERGY EFFICIENCY VALUES SHOWN ON THESE FORMS**

**OWNER / AGENT / BUILDER MUST SIGN + DATE 2 FORMS PRIOR TO PERMIT SUBMISSION:**

**(1) "FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION" + (2) "ENERGY PERFORMANCE LEVEL (EPL) DISPLAY CARD"**

**VERIFIED DIGITAL SIGNATURES MAY BE REQUIRED // CHECK WITH THE CODE OFFICIAL FOR SIGNATURE TYPE + # OF COPIES REQUIRED.**

**Attached energy code calculations and HVAC Design are valid ONLY for the address shown**

FORM R405-2023

# FLORIDA ENERGY EFFICIENCY CODE FOR BUILDING CONSTRUCTION

Florida Department of Business and Professional Regulation - Residential Performance Method

| | | | |
|---|---|---|---|
| Project Name: | SFRAE 3440 s sample | Builder Name: | |
| Street: | sample | Permit Office: | Dunedin |
| City, State, Zip: | Dunedin, FL, 34698 | Permit Number: | |
| Owner: | | Jurisdiction: | 621600 |
| Design Location: | FL, CLEAR_ST_PETERSBURG | County: | Pinellas(Florida Climate Zone 2) |

| | | |
|---|---|---|
| 1. New construction or existing | | New (From Plans) |
| 2. Single family or multiple family | | Detached |
| 3. Number of units, if multiple family | | 1 |
| 4. Number of Bedrooms | | 4 |
| 5. Is this a worst case? | | No |
| 6. Conditioned floor area above grade (ft²) | | 3440 |
| Conditioned floor area below grade (ft²) | | 0 |
| 7. Windows(513.6 sqft.) | Description | Area |
| a. U-Factor: | Dbl, U=0.65 | 160.00 $ft^2$ |
| SHGC: | SHGC=0.21 | |
| b. U-Factor: | Dbl, U=0.26 | 159.16 $ft^2$ |
| SHGC: | SHGC=0.23 | |
| c. U-Factor: | Dbl, U=0.29 | 132.47 $ft^2$ |
| SHGC: | SHGC=0.22 | |
| Area Weighted Average Overhang Depth: | | 9.056 ft |
| Area Weighted Average SHGC: | | 0.221 |
| 8. Skylights | Description | Area |
| U-Factor:(AVG) | N/A | N/A $ft^2$ |
| SHGC(AVG): | N/A | |

| 9. Floor Types | Insulation | Area |
|---|---|---|
| a. Slab-On-Grade Edge Insulation | R= 0.0 | 3440.00 $ft^2$ |
| b. N/A | R= | $ft^2$ |
| c. N/A | R= | $ft^2$ |

| 10. Wall Types(2955.0 sqft.) | Insulation | Area |
|---|---|---|
| a. Concrete Block - Int Insul, Exterior | R=5.0 | 2450.00 $ft^2$ |
| b. Frame - Wood, Adjacent | R=13.0 | 505.00 $ft^2$ |
| c. N/A | | |
| d. N/A | | |

| 11. Ceiling Types(4044.0 sqft.) | Insulation | Area |
|---|---|---|
| a. Roof Deck (Unvented) | R=20.0 | 3440.00 $ft^2$ |
| b. Knee wall to attic (Unvented) | R=0.0 | 604.00 $ft^2$ |
| c. N/A | | |

| | | |
|---|---|---|
| 12. Roof(Comp. Shingles, Unvent) Deck R=20.0 | | 3727 $ft^2$ |
| 13. Ducts, location & insulation level | R | $ft^2$ |
| a. Sup: Therm Zon, Ret: Therm Zon, AH: Therm Zon | 6 | 24 |
| b. Sup: Therm Zon, Ret: Therm Zon, AH: Therm Zon | 6 | 29 |
| c. | | |

| 14. Cooling Systems | kBtu/hr | Efficiency |
|---|---|---|
| a. Central Unit | 19.0 | SEER2:14.60 |
| b. Central Unit | 31.4 | SEER2:14.60 |

| 15. Heating Systems | kBtu/hr | Efficiency |
|---|---|---|
| a. Electric Heat Pump | 19.3 | HSPF2:7.80 |
| b. Electric Heat Pump | 26.8 | HSPF2:7.80 |

16. Hot Water Systems

a. Natural GasTankless — Cap: 1 gallons, EF: 0.820

b. Conservation features — None

17. Credits — Pstat

Glass/Floor Area: 0.149

Total Proposed Modified Loads: 106.60

Total Baseline Loads: 112.55

**PASS**

NOTE: Proposed residence must have annual total normalized Modified Loads that are less than or equal to 95 percent of the annual total loads of the standard reference design in order to comply.

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code.

ACCA HVAC DESIGNS + ENERGY CALCULATIONS
A.E.D. + Manual's J,D,S,T,ZR + Intelligent CAD HVAC Drawings
HVAC DESIGNS INC. FLORIDA B.E.R.S. 884 / 959
NEIL FIMBEL (813) 885-2258 HVACDESIGNS.COM

PREPARED BY:

Neil Fimbel

Digitally signed by Neil Fimbel
Date: 2024.02.02 08:02:19 -05'00'

DATE: ______________________________

I hereby certify that this building, as designed, is in compliance with the Florida Energy Code.

OWNER/AGENT: ______________________________

DATE: ______________________________

Review of the plans and specifications covered by this calculation indicates compliance with the Florida Energy Code. Before construction is completed this building will be inspected for compliance with Section 553.908 Florida Statutes.

GREAT SEAL OF THE STATE OF FLORIDA
IN GOD WE TRUST

BUILDING OFFICIAL: ______________________________

DATE: ______________________________

**- Compliance requires certification by the air handler unit manufacturer that the air handler enclosure qualifies as certified factory-sealed in accordance with R403.3.2.1.**

**- Proposed Qn of 0.080 exceeds the performance method default limit of 0.08 and therefore does not require duct testing. R405 .2.3**

**- Compliance requires an Air Barrier and Insulation Inspection Checklist in accordance with R402.4.1.1 and this project requires a PERFORMANCE envelope leakage test report with envelope leakage no greater than 5.00 ACH50 (R402.4.1.2).**

FORM R405-2023

# INPUT SUMMARY CHECKLIST REPORT

## PROJECT

| | | | | | |
|---|---|---|---|---|---|
| Title: | SFRAE 3440 s sample | | | Address type: | Street Address |
| Building Type: | User | Bedrooms: | 4 | Lot #: | --- |
| Owner: | | Conditioned Area: | 3440 | Block/SubDivision: | --- |
| Builder Home ID: | | Total Stories: | 1 | PlatBook: | --- |
| Builder Name: | | Worst Case: | No | Street: | sample |
| Permit Office: | Dunedin | Rotate Angle: | 0 | County: | Pinellas |
| Jurisdiction: | 621600 | Cross Ventilation: | | City, State, Zip: | Dunedin, FL, 34698 |
| Family Type: | Detached | Whole House Fan: | | | |
| New/Existing: | New (From Plans) | Terrain: | Suburban | | |
| Year Construct: | | Shielding: | Suburban | | |
| Comment: | Install HVAC shown on HVAC Permit Drawings, < 5.0 | | | | |

## CLIMATE

| √ Design Location | Tmy Site | Design Temp 97.5% | Design Temp 2.5% | Int Design Temp Winter | Int Design Temp Summer | Heating Degree Days | Design Moisture | Daily temp Range |
|---|---|---|---|---|---|---|---|---|
| ___ FL, CLEAR_ST_PETERSBUR | FL_ST_PETERSBURG_CLEAR | 39 | 91 | 70 | 75 | 733 | 54 | Medium |

## BLOCKS

| √ Number | Name | Area | Volume |
|---|---|---|---|
| ___ 1 | Block1 | 1295 | 13101 cu ft |
| ___ 2 | Block2 | 2145 | 25596 cu ft |

## SPACES

| √ Number | Name | Area | Volume | Kitchen | Occupants | Bedrooms | Finished | Cooled | Heated |
|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Therm Zone 1 | 1295 | 13101 | No | 0 | 3 | Yes | Yes | Yes |
| ___ 2 | Therm Zone 2 | 2145 | 25596 | Yes | 5 | 1 | Yes | Yes | Yes |

## FLOORS (Total Exposed Area = 3440 sq.ft.)

| √ # | Floor Type | Space | Exposed Perim(ft) | Area | R-Value Perim. | R-Value Joist | U-Factor | Slab Insul. Vert/Horiz | Tile | Wood | Carpet |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Slab-On-Grade Edge Ins | Therm Zone 1 | 121 | 1295 sqft | 0 | --- | 0.710 | 2 (ft)/0 (ft) | 1.00 | 0.00 | 0.00 |
| ___ 2 | Slab-On-Grade Edge Ins | Therm Zone 2 | 178 | 2145 sqft | 0 | --- | 0.710 | 2 (ft)/0 (ft) | 1.00 | 0.00 | 0.00 |

## ROOF

| √ # | Type | Materials | Roof Area | Gable Area | Roof Color | Rad Barr | Solar Absor. | SA Tested | Emitt | Emitt Tested | Deck Insul. | Pitch (deg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Hip | Composition shingles | 3727 ft² | 0 ft² | Medium | N | 0.96 | No | 0.9 | No | 20 | 22.62 |

## ATTIC

| √ # | Type | Ventilation | Vent Ratio (1 in) | Area | RBS | IRCC |
|---|---|---|---|---|---|---|
| ___ 1 | Full attic | Unvented | 0 | 3440 ft² | N | N |

FORM R405-2023

# INPUT SUMMARY CHECKLIST REPORT

## CEILING (Total Exposed Area = 4044 sq.ft.)

| √ # | Ceiling Type | Space | R-Value | Ins. Type | Area | U-Factor | Framing Frac. | Truss Type |
|---|---|---|---|---|---|---|---|---|
| ___ 1 | Flat ceiling under attic(Unvented) | Therm Zone 1 | 0.0 | Blown | 1295.0ft² | 0.039 | 0.11 | Wood |
| ___ 2 | Knee wall to attic(Unvented) | Therm Zone 1 | 0.0 | Blown | 186.0ft² | 0.039 | 0.11 | Wood |
| ___ 3 | Flat ceiling under attic(Unvented) | Therm Zone 2 | 0.0 | Blown | 2145.0ft² | 0.039 | 0.11 | Wood |
| ___ 4 | Knee wall to attic(Unvented) | Therm Zone 2 | 0.0 | Blown | 418.0ft² | 0.039 | 0.11 | Wood |

## WALLS (Total Exposed Area = 2955 sq.ft.)

| √ # | Ornt | Adjacent To | Wall Type | Space | Cavity R-Value | Width Ft | Width In | Height Ft | Height In | Area sq.ft. | U-Factor | Sheath R-Value | Frm. Frac. | Solar Absor. | Below Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 17.0 | 0 | 10.0 | 0 | 170.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 2 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 21.5 | 0 | 10.0 | 0 | 215.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 3 | N | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 19.0 | 0 | 10.0 | 0 | 190.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 4 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 15.0 | 0 | 10.0 | 0 | 150.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 5 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 12.5 | 0 | 10.0 | 0 | 125.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 6 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 12.0 | 0 | 10.0 | 0 | 120.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 7 | S | Garage | Frame - Wood | Therm Zone 1 | 13.0 | 13.0 | 0 | 10.0 | 0 | 130.0 | 0.084 | 0 | 0.23 | 0.01 | 0 % |
| ___ 8 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 4.5 | 0 | 10.0 | 0 | 45.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 9 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 1 | 5.0 | 4.5 | 0 | 10.0 | 0 | 45.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 10 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 18.5 | 0 | 10.0 | 0 | 185.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 11 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 19.5 | 0 | 10.0 | 0 | 195.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 12 | N | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 29.0 | 0 | 10.0 | 0 | 290.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 13 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 15.5 | 0 | 10.0 | 0 | 155.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 14 | E | Garage | Frame - Wood | Therm Zone 2 | 13.0 | 6.5 | 0 | 10.0 | 0 | 65.0 | 0.084 | 0 | 0.23 | 0.01 | 0 % |
| ___ 15 | S | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 8.0 | 0 | 10.0 | 0 | 80.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 16 | E | Garage | Frame - Wood | Therm Zone 2 | 13.0 | 18.5 | 0 | 10.0 | 0 | 185.0 | 0.084 | 0 | 0.23 | 0.01 | 0 % |
| ___ 17 | S | Garage | Frame - Wood | Therm Zone 2 | 13.0 | 12.5 | 0 | 10.0 | 0 | 125.0 | 0.084 | 0 | 0.23 | 0.30 | 0 % |
| ___ 18 | E | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 9.5 | 0 | 10.0 | 0 | 95.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 19 | S | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 15.0 | 0 | 10.0 | 0 | 150.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 20 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 14.0 | 0 | 10.0 | 0 | 140.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 21 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 6.0 | 0 | 10.0 | 0 | 60.0 | 0.132 | 0 | 0 | 0.30 | 0 % |
| ___ 22 | W | Exterior | Conc. Blk - Int Ins | Therm Zone 2 | 5.0 | 4.0 | 0 | 10.0 | 0 | 40.0 | 0.132 | 0 | 0 | 0.30 | 0 % |

## DOORS (Total Exposed Area = 24 sq.ft.)

| √ # | Ornt | Adjacent To | Door Type | Space | Storms | U-Value | Width Ft | Width In | Height Ft | Height In | Area |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | S | | Insulated | Therm Zone 2 | None | 0.35 | 3.00 | 0 | 8.00 | 0 | 24.0ft² |

## WINDOWS (Total Exposed Area = 514 sq.ft.)

| √ # | Ornt | Wall ID | Frame | Panes | NFRC | U-Factor | SHGC | Imp | Storm | Total Area (ft²) | Same Units | Width (ft) | Height (ft) | Overhang Depth (ft) | Overhang Sep. (ft) | Interior Shade | Screen |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | E | 1 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 32.3 | 2 | 3.08 | 5.25 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 2 | W | 2 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 18.5 | 1 | 3.08 | 6.00 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 3 | N | 3 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 37.0 | 2 | 3.08 | 6.00 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 4 | E | 4 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 12.8 | 1 | 3.08 | 4.17 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 5 | E | 5 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 15.9 | 1 | 3.08 | 5.17 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 6 | E | 6 | Vinyl | Low-E Double | Y | 0.29 | 0.22 | N | N | 15.9 | 1 | 3.08 | 5.17 | 2.0 | 2.0 | Drapes/blinds | Ex. 50% |
| ___ 7 | W | 10 | Vinyl | Low-E Double | Y | 0.26 | 0.23 | N | N | 76.0 | 4 | 3.08 | 6.17 | 2.0 | 4.2 | Drapes/blinds | None |
| ___ 8 | W | 11 | Vinyl | Low-E Double | Y | 0.26 | 0.23 | N | N | 26.7 | 4 | 3.08 | 2.17 | 2.0 | 2.0 | None | None |
| ___ 9 | N | 12 | Vinyl | Low-E Double | Y | 0.29 | 0.23 | N | N | 30.0 | 1 | 3.00 | 10.00 | 15.8 | 0.1 | Drapes/blinds | None |
| ___ 10 | N | 12 | TIM | Low-E Double | Y | 0.65 | 0.21 | N | N | 160.0 | 1 | 16.00 | 10.00 | 15.8 | 0.1 | Drapes/blinds | None |
| ___ 11 | S | 15 | Vinyl | Low-E Double | Y | 0.29 | 0.23 | N | N | 32.0 | 1 | 4.00 | 8.00 | 21.5 | 0.7 | Drapes/blinds | None |
| ___ 12 | S | 15 | Vinyl | Low-E Double | Y | 0.26 | 0.23 | N | N | 9.4 | 1 | 1.17 | 8.00 | 21.5 | 0.7 | Drapes/blinds | None |

# INPUT SUMMARY CHECKLIST REPORT

## WINDOWS(Continued)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 13S | 19 | Vinyl | Low-E Double | Y | 0.26 | 0.23 | N | N | 38.0 | 2 | 3.08 | 6.17 | 7.0 | 2.0 | Drapes/blinds | None |
| ___ 14W | 21 | Vinyl | Low-E Double | Y | 0.26 | 0.23 | N | N | 9.0 | 1 | 2.17 | 4.17 | 2.0 | 2.0 | Drapes/blinds | None |

## INFILTRATION

| √ # | Scope | Method | SLA | CFM50 | ELA | EqLA | ACH | ACH50 | Space(s) | Infiltration Test Volume |
|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Wholehouse | Proposed ACH(50) | 0.00036 | 3225 | 176.92 | 332.15 | 0.1271 | 5.0 | All | 38697 cu ft |

## GARAGE

| √ # | Floor Area | Roof Area | Exposed Wall Perimeter | Avg. Wall Height | Exposed Wall Insulation |
|---|---|---|---|---|---|
| ___ 1 | 836 ft² | 836 ft² | 84 ft | 10 ft | 0 |

## MASS

| √ # | Mass Type | Area | Thickness | Furniture Fraction | Space |
|---|---|---|---|---|---|
| ___ 1 | Default(8 lbs/sq.ft.) | 0 ft² | 0 ft | 0.30 | Therm Zone 1 |
| ___ 2 | Default(8 lbs/sq.ft.) | 0 ft² | 0 ft | 0.30 | Therm Zone 2 |

## HEATING SYSTEM

| √ # | System Type | Subtype/Speed | AHRI # | Efficiency | Capacity kBtu/hr | ----Geothermal HeatPump---- Entry | Power | Volt | Current | Ducts | Block |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Electric Heat Pump | Split/Single | 209473642 | HSPF2: 7.80 | 19.3 | | 0.00 | 0.00 | 0.00 | sys#1 | 1 |
| ___ 2 | Electric Heat Pump | Split/Single | 209480451 | HSPF2: 7.80 | 26.8 | | 0.00 | 0.00 | 0.00 | sys#2 | 2 |

## COOLING SYSTEM

| √ # | System Type | Subtype/Speed | AHRI # | Efficiency | Capacity kBtu/hr | Air Flow cfm | SHR | Duct | Block |
|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Central Unit | Split/Single | 209473642 | SEER2:14.6 | 19.0 | 675 | 0.83 | sys#1 | 1 |
| ___ 2 | Central Unit | Split/Single | 209480451 | SEER2:14.6 | 31.4 | 1140 | 0.84 | sys#2 | 2 |

## HOT WATER SYSTEM

| √ # | System Type | Subtype | Location | EF(UEF) | Cap | Use | SetPnt | Fixture Flow | Pipe Ins. | Pipe length |
|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | Natural Gas | Tankless | Exterior | 0.82 (0.82) | 1.00 gal | 70 gal | 120 deg | Standard | None | 99 |

| | Recirculation System | Recirc Control Type | Loop length | Branch length | Pump power | DWHR | Facilities Connected | Equal Flow | DWHR Eff | Other Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1 | No | | NA | NA | NA | No | NA | NA | NA | None |

# INPUT SUMMARY CHECKLIST REPORT

## DUCTS

| √ Duct # | Supply Location | Supply R-Value | Supply Area | Return Location | Return R-Value | Return Area | Leakage Type | Air Handler | CFM 25 TOT | CFM 25 OUT | QN OUT | RLF | HVAC # Heat | HVAC # Cool |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ 1A | Attic | 6.0 | 319 ft² | Attic | 6.0 | 217 ft² | Proposed Qn | Therm Zone | --- | --- | 0.08 | 0.00 | 1 | 1 |
| ___ 1B | Therm Zone 1 | 6.0 | 24 ft² | Therm Zone 1 | 6.0 | 32 ft² | Proposed Qn | Therm Zone | --- | --- | 0.08 | 0.00 | 1 | 1 |
| ___ 2A | Attic | 6.0 | 355 ft² | Attic | 6.0 | 158 ft² | Proposed Qn | Therm Zone | --- | --- | 0.08 | 0.00 | 2 | 2 |
| ___ 2B | Therm Zone 2 | 6.0 | 29 ft² | Therm Zone 2 | 6.0 | 43 ft² | Proposed Qn | Therm Zone | --- | --- | 0.08 | 0.00 | 2 | 2 |

## MECHANICAL VENTILATION

| √ Type | Supply CFM | Exhaust CFM | HRV | Fan | Run Time | Heating System | Cooling System |
|---|---|---|---|---|---|---|---|
| ___ Runtime Vent | 45.0 | 0.0 | 0.0 | 0.0 W | 0 % | 1 - Electric Heat Pump | 1 - Central Unit |
| ___ Runtime Vent | 30.0 | 0.0 | 0.0 | 0.0 W | 0 % | 2 - Electric Heat Pump | 2 - Central Unit |

## TEMPERATURES

Programable Thermostat: Y Ceiling Fans: N

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cooling | [ ] Jan | [ ] Feb | [ ] Mar | [ ] Apr | [ ] May | [X] Jun | [X] Jul | [X] Aug | [X] Sep | [ ] Oct | [ ] Nov | [ ] Dec |
| Heating | [X] Jan | [X] Feb | [X] Mar | [ ] Apr | [ ] May | [ ] Jun | [ ] Jul | [ ] Aug | [ ] Sep | [ ] Oct | [X] Nov | [X] Dec |
| Venting | [ ] Jan | [ ] Feb | [X] Mar | [X] Apr | [ ] May | [ ] Jun | [ ] Jul | [ ] Aug | [ ] Sep | [X] Oct | [X] Nov | [ ] Dec |

√ Thermostat Schedule: HERS 2006 Reference

| Schedule Type | | Hours 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ___ Cooling (WD) | AM | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 80 | 80 | 80 | 80 |
| | PM | 80 | 80 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 |
| ___ Cooling (WEH) | AM | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 |
| | PM | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 | 78 |
| ___ Heating (WD) | AM | 66 | 66 | 66 | 66 | 66 | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| | PM | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 66 | 66 |
| ___ Heating (WEH) | AM | 66 | 66 | 66 | 66 | 66 | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| | PM | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 68 | 66 | 66 |

FORM R405-2023

# ENERGY PERFORMANCE LEVEL (EPL) DISPLAY CARD

## ESTIMATED ENERGY PERFORMANCE INDEX* = 95

The lower the EnergyPerformance Index, the more efficient the home.

sample ,Dunedin,FL,34698

| | |
|---|---|
| 1. New construction or existing | New (From Plans) |
| 2. Single family or multiple family | Detached |
| 3. Number of units, if multiple family | 1 |
| 4. Number of Bedrooms | 4 |
| 5. Is this a worst case? | No |
| 6. Conditioned floor area above grade (ft²) | 3440 |
| Conditioned floor area below grade (ft²) | 0 |

| 7. Windows** | Description | Area |
|---|---|---|
| a. U-Factor: | Dbl, U=0.65 | 160.00 $ft^2$ |
| SHGC: | SHGC=0.21 | |
| b. U-Factor: | Dbl, U=0.26 | 159.16 $ft^2$ |
| SHGC: | SHGC=0.23 | |
| c. U-Factor: | Dbl, U=0.29 | 132.47 $ft^2$ |
| SHGC: | SHGC=0.22 | |
| Area Weighted Average Overhang Depth: | | 9.056 ft |
| Area Weighted Average SHGC: | | 0.221 |

| 8. Skylights | Description | Area |
|---|---|---|
| U-Factor:(AVG) | N/A | N/A $ft^2$ |
| SHGC(AVG): | N/A | |

| 9. Floor Types | Insulation | Area |
|---|---|---|
| a. Slab-On-Grade Edge Insulation | R= 0.0 | 3440.00 $ft^2$ |
| b. N/A | R= | $ft^2$ |
| c. N/A | R= | $ft^2$ |

| 10. Wall Types(2955.0 sqft.) | Insulation | Area |
|---|---|---|
| a. Concrete Block - Int Insul, Exterior | R=5.0 | 2450.00 $ft^2$ |
| b. Frame - Wood, Adjacent | R=13.0 | 505.00 $ft^2$ |
| c. N/A | | |
| d. N/A | | |

| 11. Ceiling Types(4044.0 sqft.) | Insulation | Area |
|---|---|---|
| a. Roof Deck (Unvented) | R=20.0 | 3440.00 $ft^2$ |
| b. Knee wall to attic (Unvented) | R=0.0 | 604.00 $ft^2$ |
| c. N/A | | |

| | | |
|---|---|---|
| 12. Roof(Comp. Shingles, Unvent) Deck | R=20.0 | 3727 $ft^2$ |

| 13. Ducts, location & insulation level | R | $ft^2$ |
|---|---|---|
| a. Sup: Therm Zon, Ret: Therm Zon, AH: Therm Zon | 6 | 24 |
| b. Sup: Therm Zon, Ret: Therm Zon, AH: Therm Zon | 6 | 29 |
| c. | | |

| 14. Cooling Systems | kBtu/hr | Efficiency |
|---|---|---|
| a. Central Unit | 19.0 | SEER2:14.60 |
| b. Central Unit | 31.4 | SEER2:14.60 |

| 15. Heating Systems | kBtu/hr | Efficiency |
|---|---|---|
| a. Electric Heat Pump | 19.3 | HSPF2:7.80 |
| b. Electric Heat Pump | 26.8 | HSPF2:7.80 |

| 16. Hot Water Systems | |
|---|---|
| a. Natural GasTankless | Cap: 1 gallons<br>EF: 0.820 |
| b. Conservation features | None |
| 17. Credits | Pstat |

I certify that this home has complied with the Florida Energy Efficiency Code for Building Construction through the above energy saving features which will be installed (or exceeded) in this home before final inspection. Otherwise, a new EPL Display Card will be completed based on installed Code compliant features.

Builder Signature: ______________________________ Date: ______________________

Address of New Home: sample City/FL Zip: Dunedin,FL,34698

*Note: This is not a Building Energy Rating. If your Index is below 70, your home may qualify for energy efficient mortgage (EEM) incentives if you obtain a Florida Energy Rating. For information about the Florida Building Code, Energy Conservation, contact the Florida Building Commission's support staff.

**Label required by Section R303.1.3 of the Florida Building Code, Energy Conservation, if not DEFAULT.

# Florida Building Code, Energy Conservation, 8th Edition (2023)
# Mandatory Requirements for Residential Performance, Prescriptive and ERI Methods

| ADDRESS: | sample<br>Dunedin, FL 34698 | Permit Number: |
|---|---|---|

## MANDATORY REQUIREMENTS - See individual code sections for full details.

## SECTION R401 GENERAL

☐ **R401.3 Energy Performance Level (EPL) display card - (Mandatory).** The building official shall require that an energy performance level (EPL) display card be completed and certified by the builder to be accurate and correct before final approval of the building for occupancy. Florida law (Section 553.9085, Florida Statutes) requires the EPL display card to be included as an addendum to each sales contract for both presold and nonpresold residential buildings. The EPL display card contains information indicating the energy performance level and efficiencies of components installed in a dwelling unit. The building official shall verify that the EPL display card completed and signed by the builder accurately reflects the plans and specifications submitted to demonstrate code compliance for the building. A copy of the EPL display card can be found in Appendix RD.

## SECTION R402 BUILDING THERMAL ENVELOPE

☐ **R402.2.10.1 Slab-on-grade floor insulation installation (Mandatory).** Where installed, the insulation shall extend downward from the top of the slab on the outside or inside of the foundation wall. Insulation located below grade shall be extended the distance provided in Table R402.1.2, or the distance of the proposed design as applicable, by any combination of vertical insulation, insulation extending under the slab or insulation extending out from the building. Insulation extending away from the building shall be protected by pavement or by not less than 10 inches (254 mm) of soil. The top edge of the insulation installed between the exterior wall and the edge of the interior slab shall be permitted to be cut at a 45-degree (0.79 rad) angle away from the exterior wall.

☐ **R402.2.11.1 Crawl space walls insulation installation (Mandatory).** Where crawl space wall insulation is installed, it shall be permanently fastened to the wall and extend downward from the floor to the finished grade level and then vertically and/or horizontally for at least an additional 24 inches (610 mm). Exposed earth in unvented crawl space foundations shall be covered with a continuous Class I vapor retarder in accordance with the Florida Building Code, Building, or Florida Building Code, Residential, as applicable. All joints of the vapor retarder shall overlap by 6 inches (153 mm) and be sealed or taped. The edges of the vapor retarder shall extend not less than 6 inches (153 mm) up the stem wall and shall be attached to the stem wall.

☐ **R402.4 Air leakage (Mandatory).** The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.5.

> **Exception:** Dwelling units of R-2 Occupancies and multiple attached single family dwellings shall be permitted to comply with Section C402.5.

☐ **R402.4.1 Building thermal envelope.** The building thermal envelope shall comply with Sections R402.4.1.1 and R402.4.1.2. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

☐ **R402.4.1.1 Installation.** The components of the building thermal envelope as listed in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria listed in Table R402.4.1.1, as applicable to the method of construction. Where required by the code official, an approved third party shall inspect all components and verify compliance.

☐ **R402.4.1.2 Testing.** The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding seven air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. Dwelling units with an air leakage rate less than three air changes per hour shall be provided with whole-house mechanical ventilation in accordance with Section R403.6.1 of this code and Section M1507.3 of the Florida Building Code, Residential. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380 and reported at a pressure of 0.2 inch w.g. (50 pascals). Testing shall be conducted by either individuals as defined in Section 553.993(5) or (7), Florida Statutes, or individuals licensed as set forth in Section 489.105(3)(f), (g) or (i) or an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

> **Exception:** Testing is not required for additions, alterations, renovations, or repairs, of the building thermal envelope of existing buildings in which the new construction is less than 85 percent of the building thermal envelope.

During testing:
1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.
7. If an attic is both air sealed and insulated at the roof deck, interior access doors and hatches between the conditioned space volume and the attic shall be opened during the test and the volume of the attic shall be added to the conditioned space volume for purposes of reporting an infiltration volume and calculating the air leakage of the home.

☐ **R402.4.2 Fireplaces.** New wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. Where using tight-fitting doors on factory-built fireplaces listed and labeled in accordance with UL 127, the doors shall be tested and listed for the fireplace. Where using tight-fitting doors on masonry fireplaces, the doors shall be listed and labeled in accordance with UL 907.

☐ **R402.4.3 Fenestration air leakage.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m2), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m2), when tested according to NFRC 400 or AAMA/ WDMA/CSA 101/I.S.2/A440 by an accredited, independent laboratory and listed and labeled by the manufacturer.

**Exception:** Site-built windows, skylights and doors.

☐ **R402.4.4 Rooms containing fuel - burning appliances.** In Climate Zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening shall be located outside the building thermal envelope or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.2, where the walls, floors and ceilings shall meet not less than the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

**Exceptions:**

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section R402.4.2 and Section R1006 of the Florida Building Code, Residential.

☐ **R402.4.5 Recessed lighting.** Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as having an air leakage rate not more than 2.0 cfm (0.944 L/s) when tested in accordance with ASTM E283 at a 1.57 psf (75 Pa) pressure differential. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.

☐ **R402.4.6 Air-sealed electrical and communication boxes.** Air-sealed electrical and communication boxes that penetrate the air barrier of the building thermal envelope shall be caulked, taped, gasketed, or otherwise sealed to the air barrier element being penetrated. Air-sealed boxes shall be buried in or surrounded by insulation. Air-sealed boxes shall be marked in accordance with NEMA OS 4. Air-sealed boxes shall be installed in accordance with the manufacturer's instructions.

## SECTION R403 SYSTEMS

**R403.1 Controls**

☐ **R403.1.1 Thermostat provision (Mandatory).** At least one thermostat shall be provided for each separate heating and cooling system

☐ **R403.1.3 Heat pump supplementary heat (Mandatory).** Heat pumps with supplementary electric-resistance heaters shall have controls that limit supplemental heat operation to only those times when one of the following applies:

1. The vapor compression cycle cannot provide the necessary heating energy to satisfy the thermostat setting.
2. The heat pump is operating in defrost mode.
3. The vapor compression cycle malfunctions.
4. The thermostat malfunctions

☐ **R403.3.2 Sealing (Mandatory).** All ducts, air handlers, filter boxes and building cavities that form the primary air containment passageways for air distribution systems shall be considered ducts or plenum chambers, shall be constructed and sealed in accordance with Section C403.2.9.2 of the Commercial Provisions of this code and shall be shown to meet duct tightness criteria below.

Duct tightness shall be verified by testing in accordance with ANSI/RESNET/ICC 380 by either individuals as defined in Section 553.993(5) or (7), Florida Statutes, or individuals licensed as set forth in Section 489.105(3)(f), (g) or (i), Florida Statutes, to be "substantially leak free" in accordance with Section R403.3.3.

☐ **R403.3.2.1 Sealed air handler.** Air handlers shall have a manufacturer's designation for an air leakage of no more than 2 percent of the design airflow rate when tested in accordance with ASHRAE 193.

☐ **R403.3.3 Duct testing (Mandatory).** Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All registers shall be taped or otherwise sealed during the test.

2 Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. Registers shall be taped or otherwise sealed during the test.

**Exceptions;**

1. A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.
2. Duct testing is not mandatory for buildings complying by Section 405 of this code. Duct leakage testing is required for Section R405 compliance where credit is taken for leakage, and a duct air leakage Qn to the outside of less than 0.080 (where Qn = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is indicated in the compliance report for the proposed design.

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official

☐ **R403.3.5 Building cavities (Mandatory).** Building framing cavities shall not be used as ducts or plenums

☐ **R403.4 Mechanical system piping insulation (Mandatory).** Mechanical system piping capable of carrying fluids above 105°F (41°C) or below 55°F (13°C) shall be insulated to a minimum of R-3.

☐ **R403.4.1 Protection of piping insulation.** Piping insulation exposed to weather shall be protected from damage, including that caused by sunlight, moisture, equipment maintenance and wind, and shall provide shielding from solar radiation that can cause degradation of the material. Adhesive tape shall not be permitted.

☐ **R403.5.1 Heated water circulation and temperature maintenance systems (Mandatory).** If heated water circulation systems are installed, they shall be in accordance with Section R403.5.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.5.1.2. Automatic controls, temperature sensors and pumps shall be accessible. Manual controls shall be readily accessible.

☐ **R403.5.1.1 Circulation systems.** Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermosiphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

☐ **R403.5.1.2 Heat trace systems.** Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

☐ **R403.5.2 Demand recirculation water systems (Mandatory).** Where installed, demand recirculation water systems shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the temperature of the water entering the cold water piping to 104ºF (40ºC).

☐ **R403.5.5 Heat traps (Mandatory).** Storage water heaters not equipped with integral heat traps and having vertical pipe risers shall have heat traps installed on both the inlets and outlets. External heat traps shall consist of either a commercially available heat trap or a downward and upward bend of at least 3 ½ inches (89 mm) in the hot water distribution line and cold water line located as close as possible to the storage tank.

**R403.5.6 Water heater efficiencies (Mandatory).**

☐ **R403.5.6.1.1 Automatic controls.** Service water-heating systems shall be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use. The minimum temperature setting range shall be from 100°F to 140°F (38°C to 60°C).

☐ **R403.5.6.1.2 Shut down.** A separate switch or a clearly marked circuit breaker shall be provided to permit the power supplied to electric service systems to be turned off. A separate valve shall be provided to permit the energy supplied to the main burner(s) of combustion types of service water-heating systems to be turned off.

☐ **R403.5.6.2 Water-heating equipment.** Water-heating equipment installed in residential units shall meet the minimum efficiencies of Table C404.2 in Chapter 4 of the Florida Building Code, Energy Conservation, Commercial Provisions, for the type of equipment installed. Equipment used to provide heating functions as part of a combination system shall satisfy all stated requirements for the appropriate water-heating category. Solar water heaters shall meet the criteria of Section R403.5.6.2.1.

☐ **R403.5.6.2.1 Solar water-heating systems.** Solar systems for domestic hot water production are rated by the annual solar energy factor of the system. The solar energy factor of a system shall be determined from the Florida Solar Energy Center Directory of Certified Solar Systems. Solar collectors shall be tested in accordance with ISO Standard 9806, Test Methods for Solar Collectors, and SRCC Standard TM-1, Solar Domestic Hot Water System and Component Test Protocol. Collectors in installed solar water-heating systems should meet the following criteria:

1. Be installed with a tilt angle between 10 degrees and 40 degrees of the horizontal; and
2. Be installed at an orientation within 45 degrees of true south.

☐ **R403.6 Mechanical ventilation (Mandatory).** The building shall be provided with ventilation that meets the requirements of the Florida Building Code, Residential, or Florida Building Code, Mechanical, as applicable, or with other approved means of ventilation including: Natural, Infiltration or Mechanical means. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the ventilation system is not operating.

☐ **R403.6.1 Whole-house mechanical ventilation system fan efficacy.** When installed to function as a whole-house mechanical ventilation system, fans shall meet the efficacy requirements of Table R403.6.1.

**Exception:** Where an air handler that is integral to tested and listed HVAC equipment is used to provide whole-house mechanical ventilation, the air handler shall be powered by an electronically commutated motor.

## TABLE R403.6.1
## WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM FAN EFFICACY

| FAN LOCATION | AIRFLOW RATE MINIMUM (CFM) | MINIMUM EFFICACY[a] (CFM/WATT) | AIRFLOW RATE MAXIMUM (CFM) |
|---|---|---|---|
| HRV or ERV | Any | 1.2 cfm/watt | Any |
| Range hoods | Any | 2.8 cfm/watt | Any |
| In-line fan | Any | 3.8 cfm/watt | Any |
| Bathroom, utility room | 10 | 2.8 cfm/watt | <90 |
| Bathroom, utility room | 90 | 3.5 cfm/watt | Any |

For SI: 1 cfm = 28.3 L/min.

a. When tested in accordance with HVI Standard 916

☐ **R403.6.2 Ventilation Air.** Residential buildings designed to be operated at a positive indoor pressure or for mechanical ventilation shall meet the following criteria:

1. The design air change per hour minimums for residential buildings in ASHRAE 62.2, Ventilation for Acceptable Indoor Air Quality, shall be the maximum rates allowed for residential applications.

2. No ventilation or air-conditioning system make-up air shall be provided to conditioned space from attics, crawlspaces, attached enclosed garages or outdoor spaces adjacent to swimming pools or spas.

3. If ventilation air is drawn from enclosed space(s), then the walls of the space(s) from which air is drawn shall be insulated to a minimum of R-11 and the ceiling shall be insulated to a minimum of R-19, space permitting, or R-10 otherwise.

**R403.7 Heating and cooling equipment.**

☐ **R403.7.1 Equipment sizing (Mandatory).** Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on the equipment loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies, based on building loads for the directional orientation of the building. The manufacturer and model number of the outdoor and indoor units (if split system) shall be submitted along with the sensible and total cooling capacities at the design conditions described in Section R302.1. This Code does not allow designer safety factors, provisions for future expansion or other factors that affect equipment sizing. System sizing calculations shall not include loads created by local intermittent mechanical ventilation such as standard kitchen and bathroom exhaust systems. New or replacement heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed.

☐ **R403.7.1.1 Cooling equipment capacity.** Cooling only equipment shall be selected so that its total capacity is not less than the calculated total load but not more than 1.15 times greater than the total load calculated according to the procedure selected in Section R403.7, or the closest available size provided by the manufacturer's product lines. The corresponding latent capacity of the equipment shall not be less than the calculated latent load.
The published value for AHRI total capacity is a nominal, rating-test value and shall not be used for equipment sizing. Manufacturer's expanded performance data shall be used to select cooling-only equipment. This selection shall be based on the outdoor design dry-bulb temperature for the load calculation (or entering water temperature for water-source equipment), the blower CFM provided by the expanded performance data, the design value for entering wet-bulb temperature and the design value for entering dry-bulb temperature.

Design values for entering wet-bulb and dry-bulb temperatures shall be for the indoor dry bulb and relative humidity used for the load calculation and shall be adjusted for return side gains if the return duct(s) is installed in an unconditioned space.

**Exceptions:**

1. Attached single- and multiple-family residential equipment sizing may be selected so that its cooling capacity is less than the calculated total sensible load but not less than 80 percent of that load.
2. When signed and sealed by a Florida-registered engineer, in attached single- and multiple-family units, the capacity of equipment may be sized in accordance with good design practice.

**R403.7.1.2 Heating equipment capacity.**

☐ **R403.7.1.2.1 Heat pumps.** Heat pump sizing shall be based on the cooling requirements as calculated according to Section R403.7.1.1, and the heat pump total cooling capacity shall not be more than 1.15 times greater than the design cooling load even if the design heating load is 1.15 times greater than the design cooling load.

☐ **R403.7.1.2.2 Electric resistance furnaces.** Electric resistance furnaces shall be sized within 4 kW of the design requirements calculated according to the procedure selected in Section R403.7.1.

☐ **R403.7.1.2.3 Fossil fuel heating equipment.** The capacity of fossil fuel heating equipment with natural draft atmospheric burners shall not be less than the design load calculated in accordance with Section R403.7.1.

☐ **R403.7.1.3 Extra capacity required for special occasions.** Residences requiring excess cooling or heating equipment capacity on an intermittent basis, such as anticipated additional loads caused by major entertainment events, shall have equipment sized or controlled to prevent continuous space cooling or heating within that space by one or more of the following options:

1. A separate cooling or heating system is utilized to provide cooling or heating to the major entertainment areas.
2. A variable capacity system sized for optimum performance during base load periods is utilized.

☐ **R403.8 Systems serving multiple dwelling units (Mandatory).** Systems serving multiple dwelling units shall comply with Sections C403 and C404 of the Florida Building Code, Energy Conservation—Commercial Provisions in lieu of Section R403.

☐ **R403.9 Snow melt and ice system controls (Mandatory).** Snow- and ice-melting systems, supplied through energy service to the building, shall include automatic controls capable of shutting off the system when the pavement temperature is above 50°F (10°C), and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F (4.8°C).

☐ **403.10 Pools and permanent spa energy consumption (Mandatory).** The energy consumption of pools and permanent spas shall be in accordance with Sections R403.10.1 through R403.10.5.

☐ **R403.10.1 Heaters.** The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater mounted on the exterior of the heater, or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater.
Gas-fired heaters shall not be equipped with continuously burning ignition pilots.

☐ **R403.10.2 Time switches.** Time switches or other control methods that can automatically turn off and on according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

**Exceptions:**

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems
3. Where pumps are powered exclusively from on-site renewable generation.

☐ **R403.10.3 Covers.** Outdoor heated swimming pools and outdoor permanent spas shall be equipped with a vapor-retardant cover on or at the water surface or a liquid cover or other means proven to reduce heat loss.

**Exception:**Where more than 70 percent of the energy for heating, computed over an operation season, is from site-recovered energy, such as from a heat pump or solar energy source, covers or other vapor-retardant means shall not be required

☐ **R403.10.4 Gas- and oil-fired pool and spa heaters.** All gas- and oil-fired pool and spa heaters shall have a minimum thermal efficiency of 82 percent for heaters manufactured on or after April 16, 2013, when tested in accordance with ANSI Z 21.56. Pool heaters fired by natural or LP gas shall not have continuously burning pilot lights.

☐ **R403.10.5 Heat pump pool heaters.** Heat pump pool heaters shall have a minimum COP of 4.0 when tested in accordance with AHRI 1160, Table 2, Standard Rating Conditions-Low Air Temperature. A test report from an independent laboratory is required to verify procedure compliance. Geothermal swimming pool heat pumps are not required to meet this standard.

☐ **R403.11 Portable spas (Mandatory).** The energy consumption of electric-powered portable spas shall be controlled by the requirements of APSP-14

☐ **R403.13 Dehumidifiers (Mandatory).** If installed, a dehumidifier shall conform to the following requirements:

1. The minimum rated efficiency of the dehumidifier shall be greater than 1.7 liters/ kWh if the total dehumidifier capacity for the house is less than 75 pints/day and greater than 2.38 liters/kWh if the total dehumidifier capacity for the house is greater than or equal to 75 pints/day.
2. The dehumidifier shall be controlled by a sensor that is installed in a location where it is exposed to mixed house air.
3. Any dehumidifier unit located in unconditioned space that treats air from conditioned space shall be insulated to a minimum of R-2.
4. Condensate disposal shall be in accordance with Section M1411.3.1 of the Florida Building Code, Residential.

☐ **R403.13.1 Ducted dehumidifiers.** Ducted dehumidifiers shall, in addition to conforming to the requirements of Section R403.13, conform to the following requirements:

1. If a ducted dehumidifier is configured with return and supply ducts both connected into the supply side of the cooling system, a backdraft damper shall be installed in the supply air duct between the dehumidifier inlet and outlet duct.
2. If a ducted dehumidifier is configured with only its supply duct connected into the supply side of the central heating and cooling system, a backdraft damper shall be installed in the dehumidifier supply duct between the dehumidifier and central supply duct.
3. A ducted dehumidifier shall not be ducted to or from a central ducted cooling system on the return duct side upstream from the central cooling evaporator coil.
4. Ductwork associated with a dehumidifier located in unconditioned space shall be insulated to a minimum of R-6.

## SECTION R404
## ELECTRICAL POWER AND LIGHTING SYSTEMS

☐ **R404.1 Lighting equipment (Mandatory).** All permanently installed luminaires, excluding those in kitchen appliances, shall have an efficacy of at least 45 lumens-per-watt or shall utilize lamps with an efficacy of not less than 65 lumens-per-watt.

**R404.1.1 Lighting equipment (Mandatory).** Fuel gas lighting systems shall not have continuously burning pilot lights.

## SECTION R405
## SIMULATED PERFORMANCE ALTERNATIVE
## (PERFORMANCE)

☐ **R405.2 Mandatory requirements.** Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6, except site-wrapped supply ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-8.

☐ **R405.2.1 Ceiling insulation.** Ceilings shall have an insulation level of at least R-19, space permitting. For the purposes of this code, types of ceiling construction that are considered to have inadequate space to install R-19 include single assembly ceilings of the exposed deck and beam type and concrete deck roofs. Such ceiling assemblies shall be insulated to at least a level of R-10.

☐ **R405.2.2 Building air leakage testing.** Building or dwelling air leakage testing shall be in accordance with Sections R402.4 through R402.4.1.2. If an air leakage rate below seven air changes per hour at a pressure of 0.2 inch w.g. (50 pascals) is specified for the proposed design, testing shall verify the air leakage rate does not exceed the air leakage rate of the proposed design instead of seven air changes per hour.

☐ **R405.2.3 Duct air leakage testing.** In cases where duct air leakage lower than the default Qn to outside of 0.080 (where Qn = duct leakage to the outside in cfm per 100 square feet of conditioned floor area tested at 25 Pascals) is specified for the proposed design, testing in accordance with Section R403.3.2 shall verify a duct air leakage rate not exceeding the leakage rate of the proposed design. Otherwise, in accordance with Section R403.3.3, duct testing is not mandatory for buildings complying by Section R405.

## SECTION R406
## ENERGY RATING INDEX
## COMPLIANCE ALTERNATIVE

☐ **R406.2 Mandatory requirements.** Compliance with this section requires that the provisions identified in Sections R401 through R404 labeled as "mandatory" and Section R403.5.3 of the 2015 International Energy Conservation Code be met. For buildings that do not utilize on-site renewable power production for compliance with this section, the building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 International Energy Conservation Code. For buildings that utilize on-site renewable power production for compliance with this section, the building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table R402.1.2 or Table R402.1.4 of the 2015 International Energy Conservation Code.

> **Exception:** Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

☐ **R406.2.1 Site-wrapped supply ducts.** Site-wrapped supply ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-8.

# 2023 - AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA-TABLE 402.4.1.1[a]

| | | | |
|---|---|---|---|
| Project Name: | SFRAE 3440 s sample | Builder Name: | |
| Street: | sample | Permit Office: | Dunedin |
| City, State, Zip: | Dunedin, FL, 34698 | Permit Number: | |
| Owner: | | Jurisdiction: | 621600 |
| Design Location: | FL, CLEAR_ST_PETERSBURG | County: | Pinellas(Florida Climate Zone 2) |

| COMPONENT | AIR BARRIER CRITERIA | INSULATION INSTALLATION CRITERIA | CHECK |
|---|---|---|---|
| General requirements | A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. | Air-permeable insulation shall not be used as a sealing material. | |
| Ceiling/attic | The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed. | The insulation in any dropped ceiling/soffit shall be aligned with the air barrier. | |
| Walls | The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed. | Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. | |
| Windows, skylights and doors | The space between window/door jambs and framing, and skylights and framing shall be sealed. | | |
| Rim joists | Rim joists shall include the air barrier. | Rim joists shall be insulated. | |
| Floors (including above-garage and cantilevered floors) | The air barrier shall be installed at any exposed edge of insulation. | Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking, or floor framing cavity insulation shall be permitted to be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extends from the bottom to the top of all perimeter floor framing members. | |
| Crawl space walls | Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped. | Where provided instead of floor insulation, insulation shall be permanently attached to the crawlspace walls. | |
| Shafts, penetrations | Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed. | | |
| Narrow cavities | | Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity spaces. | |
| Garage separation | Air sealing shall be provided between the garage and conditioned spaces. | | |
| Recessed lighting | Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface. | Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated. | |
| Plumbing and wiring | | Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring. | |
| Shower/tub on exterior wall | The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs. | Exterior walls adjacent to showers and tubs shall be insulated. | |
| Electrical, communication, and other equipment boxes, housings, and enclosures | Boxes, housings, and enclosures that penetrate the air barrier shall be caulked, taped, gasketed, or otherwise sealed to the air barrier element being penetrated. All concealed openings into the box, housing, or enclosure shall be sealed. The continuity of the air barrier shall be maintained around boxes, housings, and enclosures that penetrate the air barrier. Alternatively, air-sealed boxes shall be installed in accordance with R402.4.6 | Boxes, housings, and enclosures shall be buried in or surrounded by tightly fitted insulation. | |
| HVAC register boots | HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the sub-floor, wall covering or ceiling penetrated by the boot. | | |
| Concealed sprinklers | When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids voids between fire sprinkler cover plates and walls or ceilings. | | |

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

# Envelope Leakage Test Report (Blower Door Test)
## Residential Prescriptive, Performance or ERI Method Compliance
## 2023 Florida Building Code, Energy Conservation, 8th Edition

| Jurisdiction: 621600 | Permit #: |
|---|---|

### Job Information

Builder: Community: Lot: NA

Address: sample

City: Dunedin State: FL Zip: 34698

### Air Leakage Test Results

*Passing results must meet either the Performance, Prescriptive, or ERI Method*

○ **PRESCRIPTIVE METHOD-**The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 7 air changes per hour at a pressure of 0.2 inch w.g. (50 Pascals) in Climate Zones 1 and 2.

● **PERFORMANCE or ERI METHOD-**The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding the selected ACH(50) value, as shown on Form R405-2023 (Performance) or R406-2023 (ERI), section labeled as infiltration, sub-section ACH50.

*ACH(50) specified on Form R405-2023-Energy Calc (Performance) or R406-2023 (ERI):* 5.000

______ x 60 ÷ 38697 = ______

CFM(50) Building Volume ACH(50)

☐ **PASS**

☐ When ACH(50) is less than 3, Mechanical Ventilation installation must be verified by building department.

Method for calculating building volume:

○ Retrieved from architectural plans

● Code software calculated

○ Field measured and calculated

**R402.4.1.2 Testing.** The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding seven air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. Dwelling units with an air leakage rate less than three air changes per hour shall be provided with whole-house mechanical ventilation in accordance with Section R403.6.1 of this code and Section M1507.3 if the *Florida Building Code, Residential.* Testing shall be conducted in accordance with ANSI/RESNET/ICC 380 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Testing shall be conducted by either individuals as defined in Section 553.993(5) or (7), *Florida Statues*,or individuals licensed as set forth in Section 489.105(3)(f), (g), or (i) or an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official.* Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope.*

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, back draft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.
7. If an attic is both sealed and insulated at the roof deck, interior access doors and hatches between the conditioned space volume and the attic shall be opened during the test and the volume of the attic shall be added to the conditioned space volume for purposes of reporting the infiltration volume and calculating the air leakage of the home.

### Testing Company

Company Name: ______________________ Phone: ______________

I hereby verify that the above Air Leakage results are in accordance with the 2023 8th Edition Florida Building Code Energy Conservation requirements according to the compliance method selected above.

Signature of Tester: ______________________ Date of Test: ______________

Printed Name of Tester: ______________________

License/Certification #: ______________________ Issuing Authority: ______________

# ACCA HVAC DESIGN PROCEDURES

**Adequate Exposure Diversity Calculations** were first performed on the building to determine if standard single stage cooling equipment with a single thermostat will provide comfort in each room of the building served by the cooling system. Buildings have AED when the peak hour fenestration heat load does not exceed the average fenestration load by more than 30%, allowing a single thermostat to provide comfort – defined as plus or minus 3 degrees of the thermostat setting. For buildings that do not have AED a duct zoning system would be required to maintain comfort in each thermal zone served by each cooling system, a typical modern building will have 4 thermostats per cooling system. For buildings that do not have AED with a calculation exceeding 50%, a variable capacity cooling unit is required. This AED calculation is performed prior to the ACCA hvac design manuals and determines which Manual J procedure is used, peak load or average load, each procedure produces a unique duct design and hvac equipment selection.

**Manual ZR** is used when buildings that do not have adequate exposure diversity to divide rooms with similar use patterns but with balanced exposures into thermal zones, each thermal zone has a dedicated thermostat capable of providing comfort anytime with a maximum of 30 thermal zones per cooling system. Manual ZR is also used on multilevel buildings served by a single cooling system, providing at least one thermostat per living level, each thermal zone duct system is sized based on the peak heat load resulting in a larger duct system capable of meeting the peak heat load conditions at the peak hour per thermal zone.

**Manual D,T** duct design cad tool data links each rooms information from the Manual J heat load procedure to size the ducts in accordance with Manual D duct design and Manual T air device selection procedure. The precise graphic Manual D CAD tool uses actual duct area and duct mounting environment for each duct, duct section, and duct fittings. The software data links duct information to Manual J for precise duct heat loads, pressures, velocities, and heat rise for use in the manual S equipment selection procedure. This scaled duct design provides critical data for the air handler selection and energy code calculations.

**Manual J** is completed once the Manual D duct design is finalized, the Manual J accounts for building peak heat loads specific to the geographical location and the building envelope components. This manual J design guide references the supporting ACCA manuals AED,D,S,T,ZR – all are performed before the designer can complete the manual J heat load calculations, specify a comfort system, and perform the energy code calculations. Intelligent CAD software data links the ACCA design guides to the energy code software.

**Manual S** hvac equipment selection procedure is performed once the Manual J heat load and supporting ACCA hvac design guides AED,J,D,T,ZR results are known. Manual S procedure requires the designer to adjust the AHRI listed cooling equipment capacity for the actual site conditions and the buildings unique duct system to ensure the cooling equipment capacity selected is not oversized by more than 15% above the Manual J heat load total cooling demand. Manual S quantifies the ideal air handler fan speed setting, the specific indoor coil conditions, supply and return duct heat rise, the converted unused latent capacity, the actual sensible heat ratio of the cooling equipment, and adjusted cooling capacity for oversized variable capacity equipment.

*** Design procedures shown above are required by codes and ensure precise energy code calculations ***

# Project Report

## General Project Information

| | |
|---|---|
| **Project Title:** | **SFRAE 3440 s Sample** |
| **Project Date:** | **Thursday, January 25, 2024** |
| **Project Comment:** | **Install HVAC shown on HVAC Permit Drawings, < 5.0 ach/50 Bldg. Envelope Construction + Mechanical Ventilation Air + Mastic Sealed Ducts - R6 Installed inside Bldg. Envelope - R8 Installed Exterior of Bldg. Envelope. 77% SHR average for AHRI test conditions - view Manual S site specific interpolation results.** |
| **Company Name:** | **HVAC Designs Inc** |
| **Company Representative:** | **Neil Fimbel** |
| **Company Address:** | **7701 W Hanna Ave** |
| **Company City:** | **Tampa FL 33615** |
| **Company Phone:** | **(813) 885-2258** |
| **Company E-Mail Address:** | **neil@hvacdesigns.com** |
| **Company Website:** | **www.hvacdesigns.com** |
| **Company Comment:** | **Graphic Intelligent HVAC CAD Designs = ACCA Manual's AED,J,D,S,T,ZR + Energy Code Compliance (HVAC) Contractor #____________________ ______________________________________** |

## Design Data

| | | |
|---|---|---|
| **Reference City:** | | **Dunedin, Florida** |
| **Building Orientation:** | | **Front Door faces South** |
| **Daily Temperature Range:** | | **Low** |
| **Latitude:** | **28** | **Degrees** |
| **Elevation:** | **11** | **ft.** |
| **Altitude Factor:** | **1.000** | |

| | Outdoor Dry Bulb | Outdoor Wet Bulb | Outdoor Rel.Hum | Indoor Rel.Hum | Indoor Dry Bulb | Grains Difference |
|---|---|---|---|---|---|---|
| **Winter:** | 46 | 44.1 | n/a | n/a | 70 | n/a |
| **Summer:** | 92 | 78 | 54% | 45% | 75 | 64 |

## Check Figures

| | | | |
|---|---|---|---|
| **Total Building Supply CFM:** | **1,815** | **CFM Per Square ft.:** | **0.528** |
| **Square ft. of Room Area:** | **3,440** | **Square ft. Per Ton:** | **912** |
| **Volume (ft³):** | **38,709** | | |

## Building Loads

| | | | | |
|---|---|---|---|---|
| **Total Heating Required Including Ventilation Air:** | **32,537** | **Btuh** | **32.537** | **MBH** |
| **Total Sensible Gain:** | **39,617** | **Btuh** | **88** | **%** |
| **Total Latent Gain:** | **5,639** | **Btuh** | **12** | **%** |
| **Total Cooling Required Including Ventilation Air:** | **45,255** | **Btuh** | **3.77** | **Tons (Based On Sensible + Latent)** |

## Notes

**Rhvac is an ACCA approved Manual J, D and S computer program.**
**Calculations are performed per ACCA Manual J 8th Edition, Version 2.50, 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.**

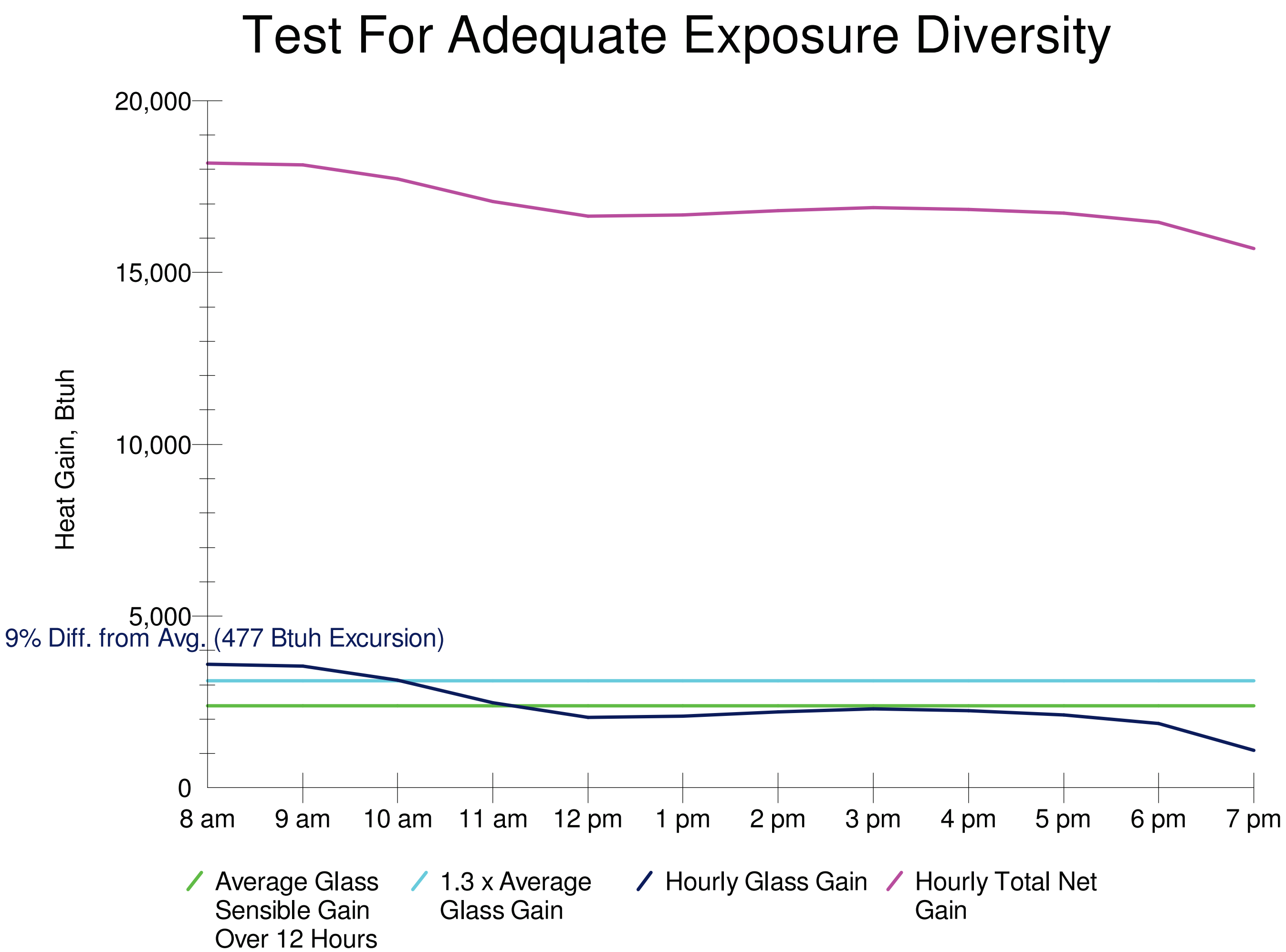
# Duct Size Preview

| Room or Duct Name | Source | Minimum Velocity | Maximum Velocity | Rough. Factor | Design L/100 | SP Loss | Duct Velocity | Duct Length | Htg Flow | Clg Flow | Act. Flow | Duct Size | Reg Size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| System 1 | | | | | | | | | | | | | |
| Supply Runouts | | | | | | | | | | | | | |
| Zone 1 | | | | | | | | | | | | | |
| 1-M Bed (SB, SB) | GMDD | 600<br>600 | 700<br>700 | 0.01<br>0.01 | 0.08<br>0.08 | 0.045<br>0.039 | 568.8<br>568.8 | 12.349<br>9.971 | 327 | 304 | 304 | 7<br>7 | 12x8<br>12x8 |
| 5-M Bath (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.034 | 448.2 | 6.481 | 85 | 88 | 88 | 6 | 10x6 |
| 8-M Wic (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.009 | 229.2 | 7.424 | 13 | 20 | 20 | 4 | 8x4 |
| Zone 2 | | | | | | | | | | | | | |
| 2-Bed 2 (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.044 | 488.9 | 13.243 | 74 | 96 | 96 | 6 | 12x6 |
| 3-Bed 3 | Built-In | 600 | 700 | 0.01 | 0.1 | | 615.5 | | 119 | 121 | 121 | 1--6 | |
| 6-Bath Lav (SB, SB) | GMDD | 600<br>600 | 700<br>700 | 0.01<br>0.01 | 0.08<br>0.08 | 0.002<br>0.002 | 103.1<br>103.1 | 6.7<br>6 | 10 | 19 | 19 | 4<br>4 | 8x4<br>8x4 |
| 9-Wic (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.004 | 160.4 | 5.736 | 23 | 14 | 14 | 4 | 8x4 |
| 10-Wic (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.004 | 160.4 | 6.1 | 23 | 14 | 14 | 4 | 8x4 |
| Other Ducts in System 1 | | | | | | | | | | | | | |
| Supply Main Trunk (SP1) | GMDD | 700 | 900 | 0.003 | 0.08 | 0.194 | 827.3 | 6 | 559 | 563 | 563 | 7x14 | |
| RB | GMDD | 600 | 700 | 0.01 | 0.08 | 0.042 | 662.1 | 6 | 0 | 0 | 130 | 6 | 12x12 |
| RB | GMDD | 600 | 700 | 0.01 | 0.08 | 0.036 | 496.6 | 34.549 | 0 | 0 | 390 | 12 | 18x18 |
| RB | GMDD | 600 | 700 | 0.01 | 0.08 | 0.062 | 560.2 | 15.55 | 0 | 0 | 110 | 6 | 12x12 |
| RT-G | GMDD | 600 | 700 | 0.01 | 0.08 | 0.039 | 589.3 | 12.5 | 630 | 630 | 630 | 14 | |
| ST-M | GMDD | 600 | 700 | 0.01 | 0.08 | 0.062 | 524.6 | 44.585 | 426 | 412 | 412 | 12 | |
| ST-K | GMDD | 600 | 700 | 0.01 | 0.08 | 0.014 | 269.5 | 20.017 | 133 | 147 | 147 | 10 | |
| V/A, VTE | GMDD | 600 | 700 | 0.01 | 0.08 | 0.011 | 229.2 | 18.54 | 0 | 0 | 45 | 6 | 6x6 |
| RP1 | GMDD | 600 | 700 | 0.003 | 0.08 | 0.076 | 694.3 | 8 | 675 | 675 | 675 | 10x14 | |
| System 2 | | | | | | | | | | | | | |
| Supply Runouts | | | | | | | | | | | | | |
| Zone 1 | | | | | | | | | | | | | |
| 13-Living Dining (SB, SB, SB) | GMDD | 600<br>600<br>600 | 700<br>700<br>700 | 0.01<br>0.01<br>0.01 | 0.08<br>0.08<br>0.08 | 0.059<br>0.036<br>0.045 | 584<br>584<br>584 | 25.623<br>6.313<br>12.565 | 587 | 774 | 774 | 9<br>9<br>9 | 14x10<br>14x10<br>14x10 |
| Zone 2 | | | | | | | | | | | | | |
| 12-Kitchen (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.029 | 546.3 | 3.97 | 94 | 146 | 146 | 7 | 12x8 |
| 14-Pantry (SB, SB) | GMDD | 600<br>600 | 700<br>700 | 0.01<br>0.01 | 0.08<br>0.08 | 0.001<br>0.001 | 57.3<br>57.3 | 7.3<br>13.5 | 6 | 10 | 10 | 4<br>4 | 8x4<br>8x4 |
| 15-Foyer (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.032 | 407.4 | 13.14 | 80 | 80 | 80 | 6 | 10x6 |
| 16-Laundry (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.029 | 519.5 | 5.662 | 140 | 102 | 102 | 6 | 12x6 |
| Zone 3 | | | | | | | | | | | | | |
| 4-Bed 4 | Built-In | 600 | 700 | 0.01 | 0.1 | | 678.7 | | 182 | 133 | 133 | 1--6 | |
| 7-Bath (SB) | GMDD | 600 | 700 | 0.01 | 0.08 | 0.029 | 492.8 | 4.05 | 33 | 43 | 43 | 4 | 8x4 |
| 11-Wic (SB, SB) | GMDD | 600<br>600 | 700<br>700 | 0.01<br>0.01 | 0.08<br>0.08 | 0.001<br>0.001 | 68.8<br>68.8 | 9.2<br>10.31 | 19 | 12 | 12 | 4<br>4 | 8x4<br>8x4 |
| Other Ducts in System 2 | | | | | | | | | | | | | |
| Supply Main Trunk (SP2) | GMDD | 700 | 900 | 0.003 | 0.08 | 0.182 | 720 | 6 | 958 | 1,020 | 1,020 | 12x17 | |
| RB | GMDD | 600 | 700 | 0.01 | 0.08 | 0.057 | 698.3 | 17.418 | 50 | 50 | 975 | 16 | 30x18 |
| RB | GMDD | 600 | 700 | 0.01 | 0.08 | 0.135 | 687.6 | 32.625 | 0 | 0 | 135 | 6 | 12x12 |
| V/A, VTE | GMDD | 600 | 700 | 0.01 | 0.08 | 0.006 | 152.8 | 20.673 | 0 | 0 | 30 | 6 | 6x6 |
| ST-J | GMDD | 600 | 700 | 0.01 | 0.08 | 0.041 | 610.6 | 7 | 317 | 333 | 333 | 10 | |
| ST-L | GMDD | 600 | 700 | 0.01 | 0.08 | 0.043 | 554.3 | 19.929 | 588 | 774 | 774 | 16 | |
| ST-G | GMDD | 600 | 700 | 0.01 | 0.08 | 0.002 | 100.8 | 28.518 | 53 | 55 | 55 | 10 | |
| RP2 | GMDD | 600 | 700 | 0.003 | 0.08 | 0.063 | 641.2 | 8 | 1,140 | 1,140 | 1,140 | 16x16 | |

## Summary

| | | | | | |
|---|---|---|---|---|---|
| **System 1** | | | | | |
| **Heating Flow:** | 675 | **Design Friction Rate:** | 0.101 | **TEL Return:** | 178.9 |
| **Cooling Flow:** | 675 | **Total Cumulative SP Loss:** | 0.479 | **TEL Supply:** | 137.3 |
| **Fan ESP:** | 0.479 | **Device SP Loss:** | 0.16 | **TEL Total:** | 316.2 |
| **Fan SP Available:** | 0.319 | **Return Loss Added to Supply:** | 0.178 | | |
| **System 2** | | | | | |
| **Heating Flow:** | 1140 | **Design Friction Rate:** | 0.097 | **TEL Return:** | 174.9 |
| **Cooling Flow:** | 1140 | **Total Cumulative SP Loss:** | 0.483 | **TEL Supply:** | 159.3 |
| **Fan ESP:** | 0.483 | **Device SP Loss:** | 0.16 | **TEL Total:** | 334.1 |
| **Fan SP Available:** | 0.323 | **Return Loss Added to Supply:** | 0.198 | | |

# System 1 - Therm Zone 1 - Adequate Exposure Diversity Test



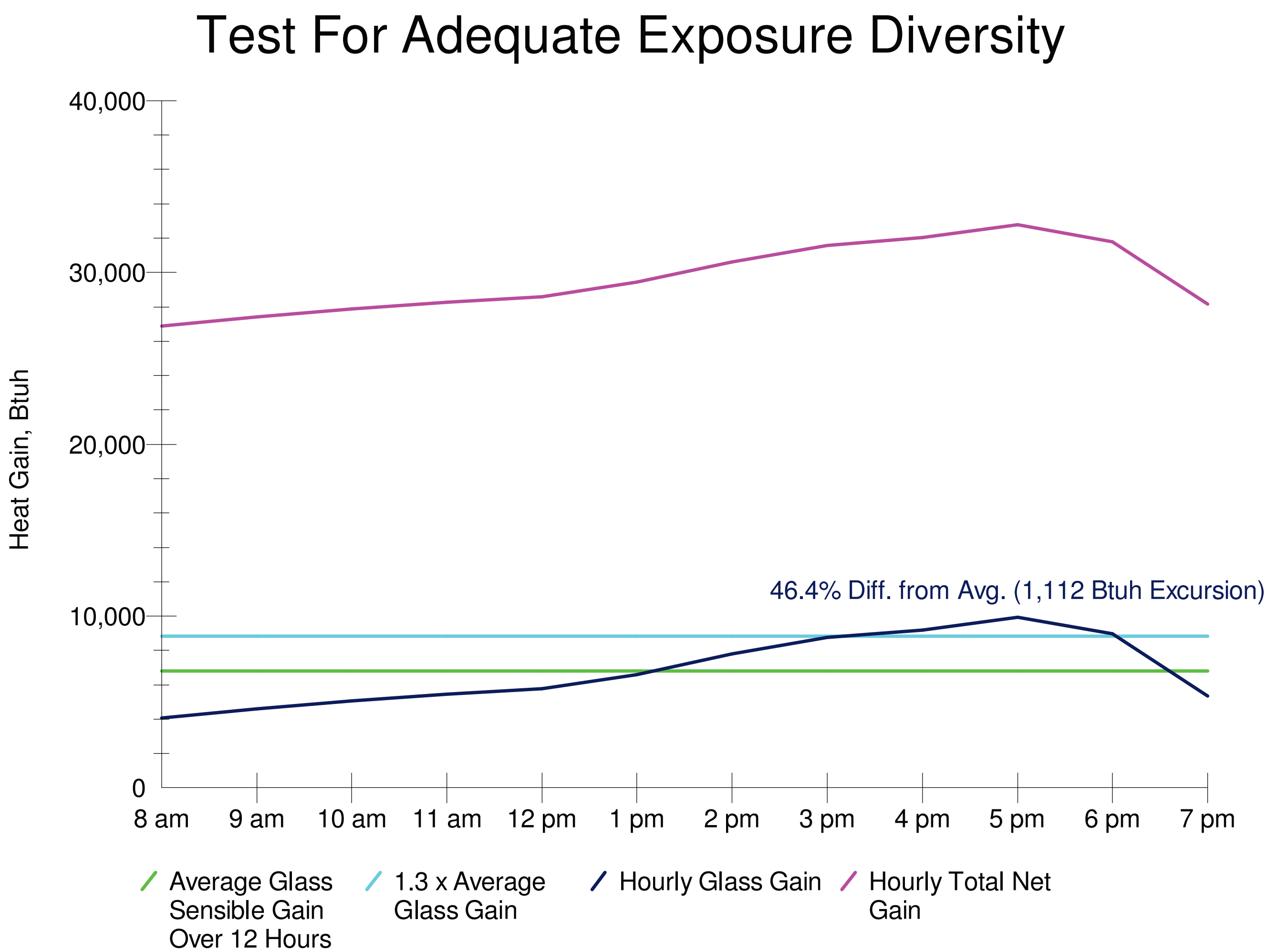

## AED Calculation Summary

**--- SYSTEM DOES NOT HAVE ADEQUATE EXPOSURE DIVERSITY. ---**

**System is on N, E, S, W rosette.**
**Peak load exceeds 12-hour average load by 49.9%.**
**AED Excursion (amount by which peak exceeds 1.3 x average): 477 Btuh**

**Definition: A system has adequate exposure diversity if the peak-hour glass load for the entire conditioned space does not exceed the average glass load for the entire conditioned space by more than 30 percent.**

# System 2 - Therm Zone 2 - Adequate Exposure Diversity Test




## AED Calculation Summary

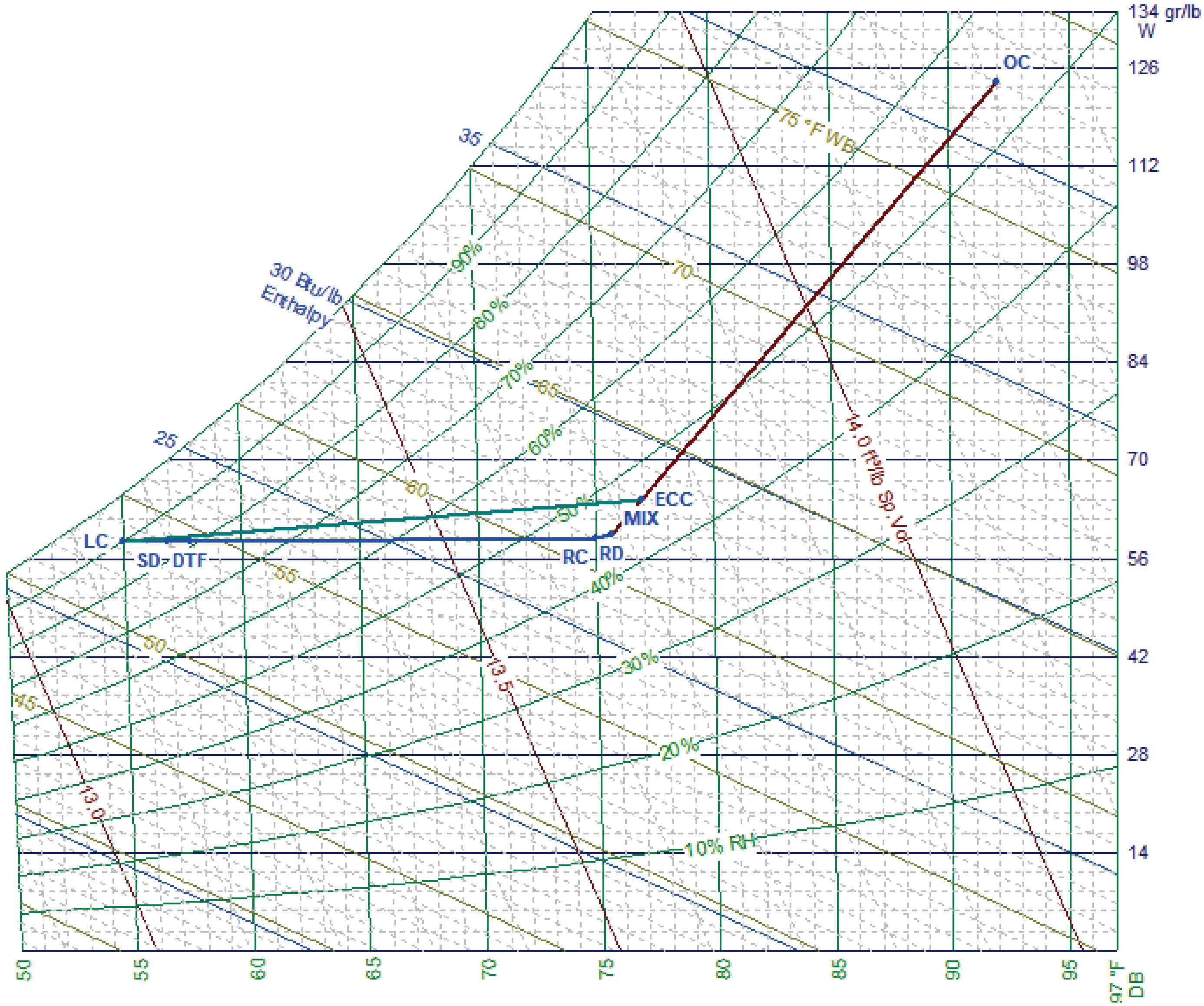
**--- SYSTEM DOES NOT HAVE ADEQUATE EXPOSURE DIVERSITY. ---**

**System is on N, E, S, W rosette.**
**Peak load exceeds 12-hour average load by 46.4%.**
**AED Excursion (amount by which peak exceeds 1.3 x average): 1,112 Btuh**

**Definition: A system has adequate exposure diversity if the peak-hour glass load for the entire conditioned space does not exceed the average glass load for the entire conditioned space by more than 30 percent.**

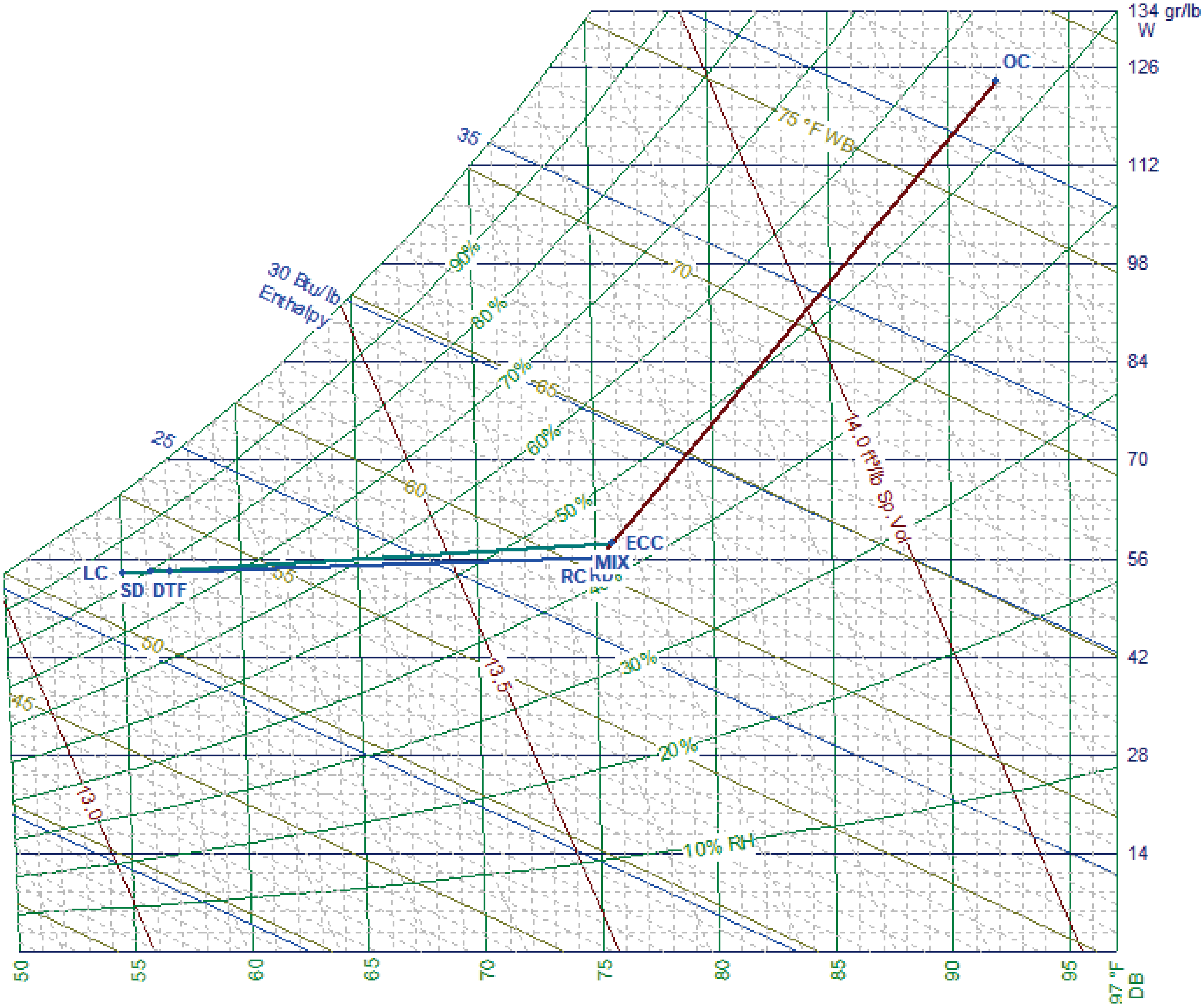
# System 1 - Therm Zone 1 - Psychrometric Chart

| Name | Description | DB | WB | Name | Description | DB | WB |
|---|---|---|---|---|---|---|---|
| RC | Room Condition | 75 | 61.1 | OC | Outdoor Condition | 92 | 78 |
| LC | Leaving Coil Condition | 55 | 53.3 | ECC | Entering Coil Condition | 76.9 | 62.9 |
| SD | Supply Duct Gain | 56.9 | 54.1 | DTF | Draw-thru Fan S.Gain | 57.8 | 54.5 |
| RD | Return Duct Gain | 75.7 | 61.4 | MIX | Mixed Air Point | 76.9 | 62.9 |
| RML | Return Misc Latent | n/a | n/a | ML | Supply Misc Latent | n/a | n/a |
| RMS | Return Misc Sensible | n/a | n/a | MS | Supply Misc Sensible | n/a | n/a |
| HRV | Heat Recovery Ventilator | n/a | n/a | | | | |



# System 2 - Therm Zone 2 - Psychrometric Chart

| Name | Description | DB | WB | Name | Description | DB | WB |
|---|---|---|---|---|---|---|---|
| RC | Room Condition | 75 | 60.5 | OC | Outdoor Condition | 92 | 78 |
| LC | Leaving Coil Condition | 55 | 52.1 | ECC | Entering Coil Condition | 75.7 | 61.2 |
| SD | Supply Duct Gain | 56.2 | 52.7 | DTF | Draw-thru Fan S.Gain | 57 | 53 |
| RD | Return Duct Gain | 75.3 | 60.6 | MIX | Mixed Air Point | 75.7 | 61.2 |
| RML | Return Misc Latent | n/a | n/a | ML | Supply Misc Latent | n/a | n/a |
| RMS | Return Misc Sensible | n/a | n/a | MS | Supply Misc Sensible | n/a | n/a |
| HRV | Heat Recovery Ventilator | n/a | n/a | | | | |



# Total Building Summary Loads

| Component Description | Area Quan | Sen Loss | Lat Gain | Sen Gain | Total Gain |
|---|---|---|---|---|---|
| SH2922: Glazing-Two Pane Low E Window Single Hung, ground reflectance = 0.23, outdoor insect screen with 50% coverage, medium color blinds at 45° with 100% coverage, U-value 0.29, SHGC 0.22 | 132.5 | 924 | 0 | 2,225 | 2,225 |
| FIX2623: Glazing-Two Pane Low E Window Fixed, ground reflectance = 0.23, medium color blinds at 45° with 100% coverage, U-value 0.26, SHGC 0.23 | 85.1 | 532 | 0 | 1,960 | 1,960 |
| FIX2623: Glazing-Two Pane Low E Window Fixed, ground reflectance = 0.23, U-value 0.26, SHGC 0.23 | 26.7 | 168 | 0 | 764 | 764 |
| FD2923: Glazing-Two Pane Low E Swing Glass Door, ground reflectance = 0.32, medium color blinds at 45° with 100% coverage, U-value 0.29, SHGC 0.23 | 62 | 432 | 0 | 467 | 467 |
| SD6521: Glazing-Two Pane Low E Sliding Glass Door, ground reflectance = 0.32, medium color blinds at 45° with 100% coverage, U-value 0.65, SHGC 0.21 | 160 | 2,496 | 0 | 2,148 | 2,148 |
| *FIX2623: Glazing-Two Pane Low E Window Fixed, ground reflectance = 0.32, medium color blinds at 45° with 100% coverage, U-value 0.26, SHGC 0.23 | 47.4 | 296 | 0 | 332 | 332 |
| DI FG M: Door-Insulated Door F/G or Metal, U-value 0.35 | 24 | 210 | 0 | 336 | 336 |
| CMU5: Wall-Block, Custom, R-5 continuous + any finish, U-value 0.125 | 1936.4 | 5,809 | 0 | 5,666 | 5,666 |
| WF13: Part-Frame, Custom, R-13 wood + any finish, U-value 0.091 | 481 | 1,095 | 0 | 1,751 | 1,751 |
| UVA20DS-ad: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Custom, R-20 Unvented, dark asphalt, U-value 0.05 | 3816 | 4,579 | 0 | 8,778 | 8,778 |
| UVABW/C20: Roof/Ceiling-Roof Joists Between Roof Deck and Ceiling or Foam Encapsulated Roof Joists, Custom, R-20 Unvent Attic Break Wall or Ceil, U-value 0.057 | 604 | 826 | 0 | 1,584 | 1,584 |
| SOG0: Floor-Slab on grade, Custom, R-0 any finish, U-value 1.18 | 299 | 8,468 | 0 | 0 | 0 |
| Subtotals for structure: | | 25,835 | 0 | 26,011 | 26,011 |
| People: | 5 | | 1,000 | 1,250 | 2,250 |
| Equipment: | | | 770 | 4,071 | 4,841 |
| Lighting: | 0 | | | 0 | 0 |
| Ductwork: | | 4,723 | 591 | 3,681 | 4,272 |
| Infiltration: Winter CFM: 0, Summer CFM: 0 | | 0 | 0 | 0 | 0 |
| Ventilation: Winter CFM: 75, Summer CFM: 75 | | 1,979 | 3,333 | 1,402 | 4,734 |
| Blower Heat Gain, 473 watts: | | 0 | 0 | 1,614 | 1,614 |
| AED Excursion: | | 0 | 0 | 1,589 | 1,589 |
| Total Building Load Totals: | | 32,537 | 5,694 | 39,618 | 45,312 |

## Check Figures

| | | | |
|---|---|---|---|
| Total Building Supply CFM: | 1,815 | CFM Per Square ft.: | 0.528 |
| Square ft. of Room Area: | 3,440 | Square ft. Per Ton: | 911 |
| Volume ($ft^3$): | 38,709 | | |

## Building Loads

| | | | | |
|---|---|---|---|---|
| Total Heating Required Including Ventilation Air: | 32,537 | Btuh | 32.537 | MBH |
| Total Sensible Gain: | 39,618 | Btuh | 87 | % |
| Total Latent Gain: | 5,694 | Btuh | 13 | % |
| Total Cooling Required Including Ventilation Air: | 45,312 | Btuh | 3.78 | Tons (Based On Sensible + Latent) |

## Notes

Rhvac is an ACCA approved Manual J, D and S computer program.
Calculations are performed per ACCA Manual J 8th Edition, Version 2.50, 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 - Therm Zone 1

## Loads and Design Conditions

**Cooling:**

| | | | |
|---|---|---|---|
| Outdoor Dry Bulb: | 92 | Sensible Gain: | 14,390 |
| Outdoor Wet Bulb: | 78 | Latent Gain: | 2,426 |
| Indoor Dry Bulb: | 75 | Total Gain: | 16,817 |
| Indoor RH: | 45 | Load SHR: | 0.86 |
| Supply Airflow: | 675 | Entering Dry Bulb: | 76.8 |
| | | Entering Wet Bulb: | 63.9 |

**Heating:**

| | | | |
|---|---|---|---|
| Outdoor Dry Bulb: | 46 | Sensible Loss: | 12,886 |
| Indoor Dry Bulb: | 70 | Entering Dry Bulb: | 68.0 |
| Indoor RH: | 30 | Supply Airflow: | 675 |

## Equipment Performance Data at System Design Conditions

This system's equipment was selected in accordance with ACCA Manual S.

**Cooling:**
Model Type: Air Source Heat Pump, Outdoor Model: 4A6H4018N, Indoor Model: TEM6A0B24H
, AHRI Reference Number: 209473642Nominal Capacity: 19,300, Manufacturer: American Standard

**Interpolation Results:**

| | | Load | Percent of Load |
|---|---|---|---|
| **Sensible Capacity:** | **15,709** | **14,390** | **109%** |
| **Latent Capacity:** | **3,299** | **2,426** | **136%** |
| **Total Capacity:** | **19,008** | **16,817** | **113%** |

**Heating:**
Model Type: Air Source Heat Pump, Model: 4A6H4018N, Nominal Capacity: 19,300, Manufacturer: American Standard

**Results:**

| | | Load | Percent of Load |
|---|---|---|---|
| **Heating Capacity:** | **19,300** | **12,886** | **150%** |

# Manual S Performance Data - System 2 - Therm Zone 2

## Loads and Design Conditions

**Cooling:**

| | | | |
|---|---|---|---|
| Outdoor Dry Bulb: | 92 | Sensible Gain: | 25,228 |
| Outdoor Wet Bulb: | 78 | Latent Gain: | 3,267 |
| Indoor Dry Bulb: | 75 | Total Gain: | 28,495 |
| Indoor RH: | 43 | Load SHR: | 0.89 |
| Supply Airflow: | 1,140 | Entering Dry Bulb: | 75.7 |
| | | Entering Wet Bulb: | 63.1 |

**Heating:**

| | | | |
|---|---|---|---|
| Outdoor Dry Bulb: | 46 | Sensible Loss: | 19,651 |
| Indoor Dry Bulb: | 70 | Entering Dry Bulb: | 69.2 |
| Indoor RH: | 30 | Supply Airflow: | 1,140 |

## Equipment Performance Data at System Design Conditions

This system's equipment was selected in accordance with ACCA Manual S.

**Cooling:**
Model Type: Air Source Heat Pump, Outdoor Model: 4A6H4030N, Indoor Model: TEM6A0B30H
, AHRI Reference Number: 209480451Nominal Capacity: 28,600, Manufacturer: American Standard

**Interpolation Results:**

| | | Load | Percent of Load |
|---|---|---|---|
| **Sensible Capacity:** | **26,456** | **25,228** | **105%** |
| **Latent Capacity:** | **4,899** | **3,267** | **150%** |
| **Total Capacity:** | **31,356** | **28,495** | **110%** |

**Heating:**
Model Type: Air Source Heat Pump, Model: 4A6H4030N, Nominal Capacity: 26,800, Manufacturer: American Standard

**Results:**

| | | Load | Percent of Load |
|---|---|---|---|
| **Heating Capacity:** | **26,800** | **19,651** | **136%** |

# System 1 Room Load Summary

| No | Room Name | Area SF | Htg Sens Btuh | Min Htg CFM | Run Duct Size | Run Duct Vel | Clg Sens Btuh | Clg Lat Btuh | Min Clg CFM | Act Sys CFM |
|---|---|---|---|---|---|---|---|---|---|---|
| ---Zone 1--- | | | | | | | | | | |
| 1 | M Bed | 371 | 5,507 | 125 | 2-7 | 568 | 6,222 | 0 | 296 | 304 |
| 5 | M Bath | 210 | 1,427 | 32 | 1-6 | 450 | 1,808 | 60 | 86 | 88 |
| 8 | M Wic | 154 | 224 | 5 | 1-4 | 229 | 409 | 0 | 19 | 20 |
| | Zone 1 subtotal | 735 | 7,159 | 163 | | | 8,439 | 60 | 401 | 412 |
| ---Zone 2--- | | | | | | | | | | |
| 2 | Bed 2 | 189 | 1,253 | 28 | 1-6 | 488 | 1,964 | 0 | 93 | 96 |
| 3 | Bed 3 | 182 | 1,995 | 45 | 1-6 | 615 | 2,475 | 0 | 118 | 121 |
| 6 | Bath Lav | 117 | 170 | 4 | 2-4 | 106 | 380 | 60 | 18 | 19 |
| 9 | Wic | 36 | 388 | 9 | 1-4 | 158 | 283 | 0 | 13 | 14 |
| 10 | Wic | 36 | 388 | 9 | 1-4 | 158 | 283 | 0 | 13 | 14 |
| | Zone 2 subtotal | 560 | 4,193 | 95 | | | 5,386 | 60 | 256 | 263 |
| | Ventilation | | 1,188 | | | | 841 | 1,968 | | |
| | Blower Power | | | | | | 621 | | | |
| | Duct Latent | | | | | | | 111 | | |
| | Return Duct | | 347 | | | | 470 | 228 | | |
| | System 1 total | 1,295 | 12,886 | 258 | | | 14,390 | 2,426 | 595 | 675 |

| | | |
|---|---|---|
| System 1 Main Trunk Size: | 10x15 | in. |
| Velocity: | 648 | ft./min |
| Loss per 100 ft.: | 0.104 | in.wg |

**Note: Since the system is multizone, the Peak Fenestration Gain Procedure was used to determine glass sensible gains at the room and zone levels, so the sums of the zone sensible gains and airflows for cooling shown above are not intended to equal the totals at the system level. Room and zone sensible gains and cooling CFM values are for the hour in which the glass sensible gain for the zone is at its peak. Sensible gains at the system level are based on the "Average Load Procedure + Excursion" method.**

## Cooling System Summary

| | Cooling Tons | Sensible/Latent Split | Sensible Btuh | Latent Btuh | Total Btuh |
|---|---|---|---|---|---|
| Net Required: | 1.40 | 86% / 14% | 14,390 | 2,426 | 16,817 |
| Actual: | 1.61 | 77% / 23% | 14,861 | 4,439 | 19,300 |

## Equipment Data

| | Heating System | Cooling System |
|---|---|---|
| Type: | Air Source Heat Pump | Air Source Heat Pump |
| Model: | 4A6H4018N | 4A6H4018N |
| Indoor Model: | | TEM6A0B24H |
| Brand: | | "Actual:" shown above is AHRI rated, view Manual S and energy forms for capacity adjustments and minimum efficiencies, any brand may be used. |
| Description: | HSPF2 / SEER2 shown below | HSPF2 / SEER2 shown below |
| Efficiency: | 7.8 HSPF | 14.6 SEER |
| Comment : | | 0 |
| Sound: | 0 | 0 |
| Capacity: | 19,300 Btuh | 19,300 Btuh |
| Adjusted Capacity: | n/a | 19,008 Btuh |
| Sensible Capacity: | n/a | 14,861 Btuh |
| Adjusted Sensible Capacity: | n/a | 15,709 Btuh |
| Latent Capacity: | n/a | 4,439 Btuh |
| Adjusted Latent Capacity: | n/a | 3,299 Btuh |
| AHRI Reference No.: | n/a | 209473642 |

This system's equipment was selected in accordance with ACCA Manual S.
Manual S equipment sizing data: SODB: 92F, SOWB: 78F, WODB: 46F, SIDB: 75F, SIRH: 45%, WIDB: 70F, Sen. gain: 14,390 Btuh, Lat. gain: 2,426 Btuh, Sen. loss: 12,886 Btuh, Entering clg. coil DB: 76.8F, Entering clg. coil WB: 62.6F, Entering htg. coil DB: 68F, Clg. coil TD: 20F, Htg. coil TD: 40F, Req. clg. airflow: 595 CFM, Req. htg. airflow: 258 CFM

# System 2 Room Load Summary

| No | Room Name | Area SF | Htg Sens Btuh | Min Htg CFM | Run Duct Size | Run Duct Vel | Clg Sens Btuh | Clg Lat Btuh | Min Clg CFM | Act Sys CFM |
|---|---|---|---|---|---|---|---|---|---|---|
| ---Zone 1--- | | | | | | | | | | |
| 13 | Living Dining | 1,002 | 9,582 | 218 | 3-9 | 584 | 16,439 | 1,000 | 774 | 774 |
| | Zone 1 subtotal | 1,002 | 9,582 | 218 | | | 16,439 | 1,000 | 774 | 774 |
| ---Zone 2--- | | | | | | | | | | |
| 12 | Kitchen | 364 | 1,531 | 35 | 1-7 | 546 | 3,095 | 500 | 146 | 146 |
| 14 | Pantry | 72 | 97 | 2 | 1-4 | 117 | 217 | 30 | 10 | 10 |
| 15 | Foyer | 150 | 1,300 | 30 | 1-6 | 408 | 1,701 | 0 | 80 | 80 |
| 16 | Laundry | 231 | 2,280 | 52 | 1-6 | 522 | 2,175 | 60 | 102 | 102 |
| | Zone 2 subtotal | 818 | 5,208 | 118 | | | 7,188 | 590 | 339 | 339 |
| ---Zone 3--- | | | | | | | | | | |
| 4 | Bed 4 | 210 | 2,978 | 68 | 1-6 | 679 | 2,829 | 0 | 133 | 133 |
| 7 | Bath | 78 | 535 | 12 | 1-4 | 492 | 911 | 60 | 43 | 43 |
| 11 | Wic | 38 | 315 | 7 | 1-4 | 140 | 258 | 0 | 12 | 12 |
| | Zone 3 subtotal | 326 | 3,828 | 87 | | | 3,999 | 60 | 188 | 188 |
| | Ventilation | | 792 | | | | 561 | 1,365 | | |
| | Blower Power | | | | | | 993 | | | |
| | Duct Latent | | | | | | | 136 | | |
| | Return Duct | | 242 | | | | 323 | 116 | | |
| | System 2 total | 2,146 | 19,651 | 423 | | | 25,228 | 3,267 | 1,107 | 1,140 |

| | | |
|---|---|---|
| System 2 Main Trunk Size: | 16x16 | in. |
| Velocity: | 641 | ft./min |
| Loss per 100 ft.: | 0.070 | in.wg |

Note: Since the system is multizone, the Peak Fenestration Gain Procedure was used to determine glass sensible gains at the room and zone levels, so the sums of the zone sensible gains and airflows for cooling shown above are not intended to equal the totals at the system level. Room and zone sensible gains and cooling CFM values are for the hour in which the glass sensible gain for the zone is at its peak. Sensible gains at the system level are based on the "Average Load Procedure + Excursion" method.

## Cooling System Summary

| | Cooling Tons | Sensible/Latent Split | Sensible Btuh | Latent Btuh | Total Btuh |
|---|---|---|---|---|---|
| Net Required: | 2.37 | 89% / 11% | 25,228 | 3,267 | 28,495 |
| Actual: | 2.38 | 77% / 23% | 22,022 | 6,578 | 28,600 |

## Equipment Data

| | Heating System | Cooling System |
|---|---|---|
| Type: | Air Source Heat Pump | Air Source Heat Pump |
| Model: | 4A6H4030N | 4A6H4030N |
| Indoor Model: | | TEM6A0B30H |
| Brand: | | "Actual:" shown above is AHRI rated, view Manual S and energy forms for capacity adjustments and minimum efficiencies, any brand may be used. |
| Description: | HSPF2 / SEER2 shown below | HSPF2 / SEER2 shown below |
| Efficiency: | 7.8 HSPF | 14.6 SEER |
| Comment : | | 0 |
| Sound: | 0 | 0 |
| Capacity: | 26,800 Btuh | 28,600 Btuh |
| Adjusted Capacity: | n/a | 31,356 Btuh |
| Sensible Capacity: | n/a | 22,022 Btuh |
| Adjusted Sensible Capacity: | n/a | 26,456 Btuh |
| Latent Capacity: | n/a | 6,578 Btuh |
| Adjusted Latent Capacity: | n/a | 4,900 Btuh |
| AHRI Reference No.: | n/a | 209480451 |

This system's equipment was selected in accordance with ACCA Manual S.
Manual S equipment sizing data: SODB: 92F, SOWB: 78F, WODB: 46F, SIDB: 75F, SIRH: 43%, WIDB: 70F, Sen. gain: 25,228 Btuh, Lat. gain: 3,267 Btuh, Sen. loss: 19,651 Btuh, Entering clg. coil DB: 75.7F, Entering clg. coil WB: 61.1F, Entering htg. coil DB: 69.2F, Clg. coil TD: 20F, Htg. coil TD: 40F, Req. clg. airflow: 1107 CFM, Req. htg. airflow: 423 CFM