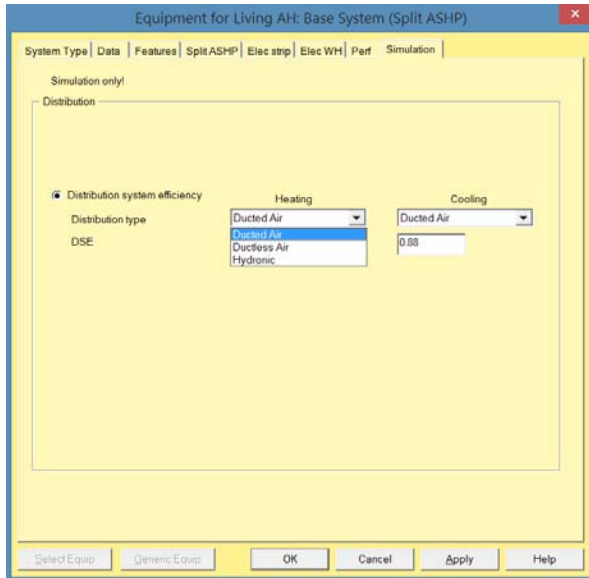


## Right-Energy Review Notes

This document includes the results of limited testing and verification of the Rightsoft software submitted as a simulation tool for demonstrating compliance with Section 405 of the 2014 FL Building Code, Energy Conservation. The testing was limited to some of the basic requirements due to time constraints and did not fully cover all aspects of the 2014 FL Building Code or the TAM.

### General

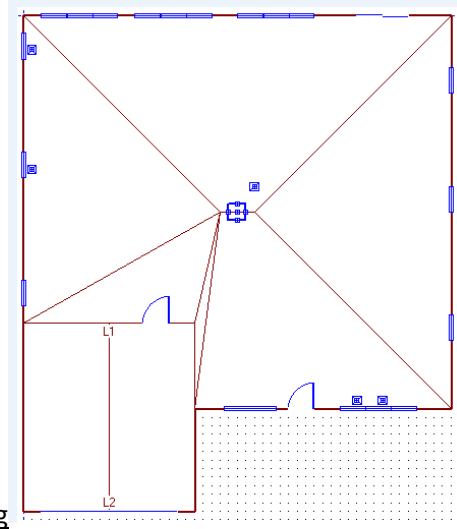
- First page of Form 405-2014 vs. subsequent pages discrepancies (from Right-Energy Florida 2014 Example file). The discrepancies include:
  - o Ceiling R-value 30 on first page vs. 31 on subsequent pages
  - o Multiple walls indicated on first page vs. only one wall on subsequent pages
  - o Multiple windows indicated on first page vs. only one window on subsequent pages
  - o Wall cavity R-values 19 and 15 on first page vs. 0 on subsequent pages
  - o Number of bedrooms = 3 on first page vs. 0 on subsequent pages
  - o Cooling system SEER 14 on first page vs. EER 10.6 on subsequent pages
  - o Hot Water system solar with FEF 7 on first page vs. non-solar with EF 0.96 on subsequent pages
  - o Hot Water system capacity 120 gal. on first page vs. 40 gal. on subsequent pages
  - o Duct R-value 8 on first page vs. 6 on subsequent pages
  - o "Attic ceiling" on first page vs. "No attic" on subsequent pages.
- The Attic section indicates "No attic" and "Unvented" but also has a vent ratio of 1 in 300, while the Ducts section shows the duct location as being "Vented attic."
- The Roof and Attic sections show "0" roof area (although the Ceiling section shows 2100 ft<sup>2</sup>).
- The Infiltration section of the report shows an "ACH" of 5.00 and an "ACH50" of 7.3 (above the max.).
- The Heating System section indicates "Natural Gas Furnace" but shows the efficiency to be "HSPF 8.2."
- Form 405 shows CFM 25out = 0 cfm and Qn = 0 but also shows default leakage.
- What duct leakage is being using for the code calculation and can one enter non-default duct leakage values (Qn<sub>out</sub> or CFM25)? Equipment Distribution screen only shows what appear to be FEC Table R405.5.2(2) default leakage options. Also, how are untested ducts in unconditioned space handled?



- The Duct Loads for Living Attic screen capture that the Results section at the bottom of the screen shows “0” heat loss, sensible gain and latent gain—it’s not clear how to get non-zero values in the Results section.
- Right-Energy Help provides a list of duct leakage rates to correlate with their duct leakage sealing categories (Extreme, Notable, Average, etc.). They only go down to 0.06 cfm/ft<sup>2</sup>; not obvious how to enter lower values.
- No changes in e-Ratio results observed from changing the Duct Sealing entry.
- Hot Water system use shown as 61 gallons.
- It appears that once the solar hot water fields are filled out on the “Florida 2014” calculation sub-screen, the solar characteristics will appear on the first page of Form 405, whether Solar Water Heating credit option check box is checked or not.
- EPL Display Card Index value does not match e-Ratio on Summary screen.
- Mandatory Requirements report section has old R402.4.1.2 (before 2016 Supplement).
- Envelope Leakage Test Report refers to old code (before 2016 Supplement) in two places.
- Air Distribution System Test Report also refers to old code (before 2016 Supplement) in building official signature box

**Screen and report examples of some of the discrepancies between entries and report:**

- Software input for walls indicates multiple walls and does not match Form R405 which indicates a single wall



Software input - multiple walls on drawing

Form R405 – single wall listed with a length of 20 feet

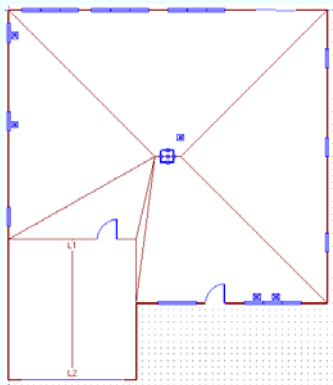
<b>WALLS</b>														
Wall orientation below is as entered. Actual orientation is modified by rotate angle shown in "Project" section above.														
#	Ornt	Adjacent To	Wall Type	Space	Cavity R-Value	Width Ft	In	Height Ft	In	Area	Sheathing R-Value	Framing Fraction	Solar Absor.	Below Grade%
1	n	Exterior	Frm wall, stucco ext,	Living	0	20	0	9	0	180 ft²	0	0.25	0.80	0

-Software input for windows indicates multiple windows and does not match Form R405 which indicates a single window

Software input - multiple windows on load worksheet

Right-J® Worksheet					<<	<	prev zone	next zone	>	>>				
1	ACCA Manual J Eighth Edition			Room name	Living AH			Living						
2				Exposed wall	162.0 ft			162.0 ft						
3				Room height	9.0			9.0 heat/cool						
4				Room dimensions	2100.0 ft <sup>2</sup>			1.0 x 2100.0 ft						
5				Room area	2100.0 ft <sup>2</sup>			2100.0 ft <sup>2</sup>						
	Ty	Construction number <small>Select any cell then click here</small>	U-value	Or	HTM (Btuh/ft <sup>2</sup> )		Area (ft <sup>2</sup> ) or perimeter (ft)		Load (Btuh)		Area (ft <sup>2</sup> ) or perimeter (ft)		Load (Btuh)	
					Heat	Cool	Gross	N/P/S	Heat	Cool	Gross	N/P/S	Heat	Cool
6	W	12A-0sw	0.240	n	0	0	0	0	0	0	0	0	0	0
	LD	11G0	0.540	n	0	0	0	0	0	0	0	0	0	0
•	W	12D-4sw	0.066	n	1.789	1.171	270	175	314	206	270	175	314	206
•	G	2 glazing, clr	0.032	n	0.867	3.942	15	0	13	57	15	0	13	57
11	G	2 glazing, clr	0.032	n	0.867	3.942	30	0	26	118	30	0	26	118
	G	2 glazing, clr	0.032	n	0.867	3.942	30	0	26	118	30	0	26	118
	D	11D0	0.390	n	10.57	12.07	20	20	211	241	20	20	211	241
	W	12A-0sw	0.240	e	0	0	0	0	0	0	0	0	0	0
	W	12D-4sw	0.066	e	1.789	1.171	324	279	499	327	324	279	499	327
	G	2 glazing, clr	0.032	e	0.867	18.74	45	0	39	843	45	0	39	843
	W	12D-4sw	0.066	s	1.789	1.171	450	274	491	322	450	274	491	322
	G	1D-c2owd	0.032	s	0.867	4.481	41	50	35	182	41	25	35	182
	G	2 glazing, clr	0.032	s	0.867	4.140	135	220	117	559	135	110	117	559
	W	12A-0sw	0.240	w	0	0	0	0	0	0	0	0	0	0
	W	12D-4sw	0.066	w	1.789	1.171	414	369	660	432	414	369	660	432
	G	2 glazing, clr	0.032	w	0.867	18.74	45	0	39	843	45	0	39	843
	P	Frm wall, stucc	0.088	-	2.385	1.413	270	249	594	352	270	249	594	352
	LD	11D0	0.390	n	10.57	12.07	21	21	223	255	21	21	223	255

Software input - multiple windows on drawing



Form R405 – single window listed

WINDOWS												
#	Wall ID	Frame	Panels	NFRC	U-Factor	SHGC	Storms	Area	Overhang Depth	Separation	Interior Shade Screening	
1	n 1	None	Single (Clear)	Yes	0.032	0.25	No	15ft <sup>2</sup>	1 ft 0 ft	1 ft 4 ft	Blinds 45°	outdoor

## Right-Energy Equipment Testing Results


- 1) Equipment Test Base.rup file with SEER 14 / HSPF 8.2 HP and 40 gallon EF 0.96 electric water heater. Summary e-Ratio = 1.200; Form 405 e-Ratio = 1.209
- 2) Same as #1 except increased HP efficiency to 17 / 9.5. Summary e-Ratio = 1.039; Form 405 e-Ratio = 1.209
- 3) Same as #2 except 50 gallon EF 3.1 electric water heater. Summary e-Ratio = 0.949; Form 405 e-Ratio = 1.209
- 4) Same as #3 except on Simulation tab, distribution system efficiency Distribution type entry changed from Ducted Air (DSE 0.88) to Ductless Air (DSE 1.00) for both heating and cooling. Summary e-Ratio = 0.949; Form 405 e-Ratio = 1.209

### Notes:

1. Equipment changes affected Summary e-Ratios but did not affect Form 405 e-Ratios.
2. In test #4 above, changing from ducted to ductless air distribution did not change either the Summary of Form 405 e-Ratio; double check project, but appears to be vented attic with ducts in attic so would expect a difference here.

### Duct Loads for Living ✕

Supply		Return	
Location Vented attic		Location Vented attic	
Roof material	Roof color	Roof material	Roof color
<input type="radio"/> Asphalt shingle	<input checked="" type="radio"/> Dark	<input type="radio"/> Asphalt shingle	<input checked="" type="radio"/> Dark
<input type="radio"/> Tar and gravel	<input type="radio"/> Light	<input type="radio"/> Tar and gravel	<input type="radio"/> Light
<input type="radio"/> Metal or membrane	<input type="radio"/> White	<input type="radio"/> Metal or membrane	<input type="radio"/> White
<input type="radio"/> Wood shake	<input type="checkbox"/> Radiant barrier	<input type="radio"/> Wood shake	<input type="checkbox"/> Radiant barrier
<input checked="" type="radio"/> Tile, slate, or concrete		<input checked="" type="radio"/> Tile, slate, or concrete	
Configuration Radial, perimeter outlets		Configuration Radial	
Sealing Average	Insul R 8.0 ft <sup>2</sup> ·F/Btuh	Sealing Average	Insul R 8.0 ft <sup>2</sup> ·F/Btuh
Heating discharge air temperature 100 °F			
Ambient temperature	Surface area	Ambient temperature	Surface area
Heat [54] °F	[289.3] ft <sup>2</sup>	Heat [54] °F	[89.0] ft <sup>2</sup>
Cool [106] °F		Cool [106] °F	



Results

Description: Supply: Vented attic (dark tile, slate, or concrete roof), radial, perimeter outlets, average sealing, R-8  
Return: Vented attic (dark tile, slate, or concrete roof), radial, average sealing, R-8

Heat loss [23.9] %    Sensible gain [23.4] %    Latent gain [1191] Btuh

Help                      OK                      Cancel

## Wall, Window and “Right Energy Florida 2014” Sub-Screen Testing Results

- 5) Max SHGC Limit Test using Wall and Window Test Base.rup file w/ SHGC = 0.25 Windows. Summary e-Ratio = 1.020; Form 405 e-Ratio = 1.014
- 6) Same as #5 except SHGC = 0.53 windows (file name: Wall and Window Test 053 Windows.rup). Summary e-Ratio = 1.262; Form 405 e-Ratio = 1.259
- 7) Same as #6 except high R-value wall insulation plus insulating sheathing (file name: Wall and Window Test 053 Windows and High R-value Walls.rup). Summary e-Ratio = 1.200; Form 405 e-Ratio = 1.209
- 8) Same as #7 except changes made to Right-Energy Florida 2014 sub-screen (working from file name: Florida 2014 Sub-Screen.rup):
  - a. From Cool Roof unchecked SA 0.60 to Cool Roof checked SA 0.60. Summary e-Ratio = 1.200; Form 405 e-Ratio = 1.209
  - b. Cool Roof from Cool Roof checked SA 0.60 to Cool Roof checked SA 0.35. Summary e-Ratio = 1.200; Form 405 e-Ratio = 1.209
  - c. Same as “b” plus Radiant Barrier (0.06) box checked. Summary e-Ratio = 1.200; Form 405 e-Ratio = 1.209
  - d. Same as “c” plus Ceiling Fan box checked. Summary e-Ratio = **1.183**; Form 405 e-Ratio = **1.209**
  - e. Same as “d” plus Water Heater Recovery box checked. Summary e-Ratio = **1.152**; Form 405 e-Ratio = **1.209**
  - f. Same as “e” but unchecked Water Heater Recovery box and instead checked Solar Water Heating box (FEF 7.0). Summary e-Ratio = **1.061**; Form 405 e-Ratio = **1.209**
  - g. Same as “f” plus checked “Unvented Attic” box. Summary e-Ratio = **1.061**; Form 405 e-Ratio = **1.209**

### Notes:

1. Results show that window SHGC changes affect both Summary and Form 405 e-Ratios similarly.
2. Results show that wall insulation changes affect both the Summary and Form 405 e-Ratios similarly.
3. Changes made to the Right-Energy Florida 2014 sub-screen produce a mixed bag of results—cool roof and radiant barrier entries don’t appear to affect Summary or Form 405 results; checking the ceiling fan box or water heater recovery box changes the Summary e-Ratio but not the Form 405 e-Ratio.
4. Appears that no Right-Energy Florida 2014 sub-screen changes affect the Form 405 e-Ratio.

### Florida Energy Code Standard Reference Design Auto-Generation Tests

- The software does not appear to provide a report for the verifier or code official to readily verify the correct reference home is generated in accordance to the requirements of TABLE R405.5.2(1) for use in the FL Code 2014 performance calculation. As a result the software does

not appear to satisfy the requirements of section R5.1 Minimum Reporting Requirements. Additionally, a verifier does not have the capability to view the reference home and perform a 2014 FL Code calculation to verify the e-ratio of 1.00 or the Total Proposed Modified Loads should equal the Total Baseline Loads as required by the TAM.

- Attempted to enter a reference efficiency level house and got a Summary screen e-Ratio of 0.979 but not sure I have all entries at reference levels (for one thing, difficult to get exact U-values) or again that all entries I make are being used (e.g. changing roof solar absorptance on the Florida 2014 Credit Options screen does not change the e-Ratio); would be worth looking into further.

### **Tutorial Notes**

[These observations are from the three tutorials linked from TAC meeting agenda.]

- Tutorial 1 says Right-Energy is not for use for multi-family projects
- Three tutorials do not cover non-default duct leakage entry.
- Tutorial summary e-Ratio of 0.907 does not match print Form 405 loads shown in tutorial:  
 $44.31/45.18 = 0.981$