



Introduction of the IC3 and Other Compliance Tools

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Energy Code Specialist





Agenda

- IC3 What is it?
- IC3 History
- Getting Started
- ERI Simulation Path
- Other Compliance Tools





IC3 – What is it?

- The International Code Compliant Calculator is a performance-based residential energy code compliance tool
- Publicly accessible energy code compliance software
- Based on the Texas Building Energy Performance Standards
- RESNET certified
 - Verification Procedures No. 07-003
- Satisfies the EPA guidelines
 - Demonstrates air quality improvements/emission reductions with adequate certainty



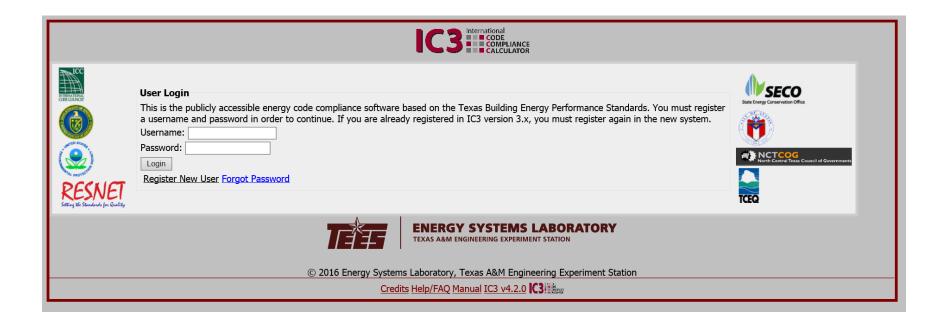


IC3 – History

- Created in response to the 77th Texas Legislature's Senate Bill 5 (2001)
- Assigned the ESL responsibilities
 - Calculation of emissions reduction
 - Energy efficiency
 - Renewable energy programs
 - Providing state-wide technical assistance
- Web-based energy efficiency and emissions reduction calculators
 - Texas Climate Vision (Austin, TX)
 - Legacy calculators
 - eCalc
 - AIM

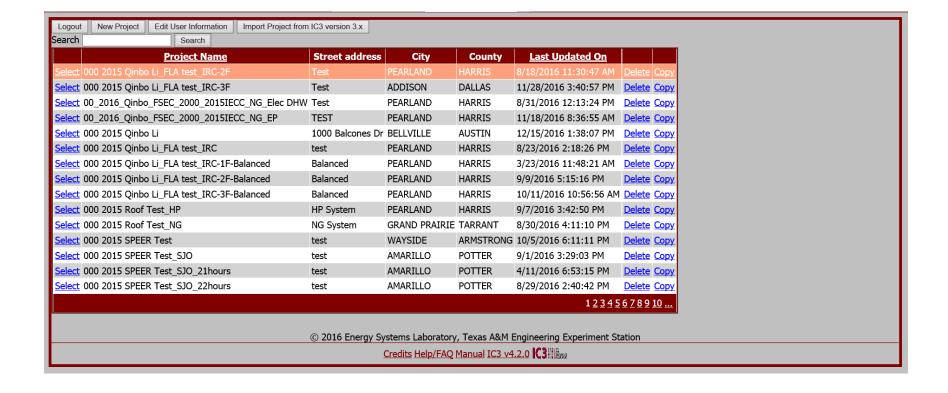


User Login





Project List





ERI SIMULATION PATH



ENERGY SYSTEMS LABORATORY TEXAS A&M ENGINEERING EXPERIMENT STATION

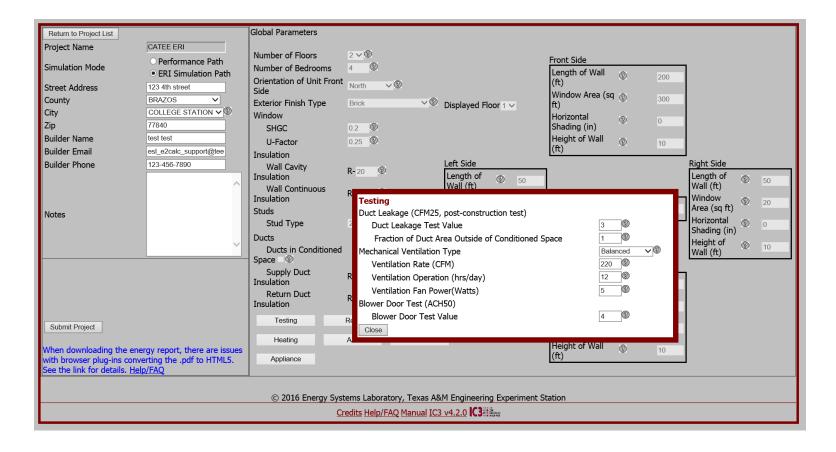


Return to Project List		Global Parameters				
Project Name	CATEE ERI					
	O Performance Path	Number of Floors	2 🗸 🕲		Front Side	
Simulation Mode	ERI Simulation Path	Number of Bedrooms	4		Longth of Wall	200
Street Address	123 4th street	Orientation of Unit Front Side	North 🗸 🕲		(ft)	200
County	BRAZOS V	Exterior Finish Type	Brick 🗸 🖫	Displayed Floral	Window Area (sq 💿	300
City	COLLEGE STATION V®	Window	DICK	Displayed Floor 1 ∨	ft) Horizontal	
Zip	77840	SHGC	0.2		Shading (in)	0
Builder Name	test test	U-Factor	0.25 ③		Height of Wall	10
Builder Email	esl_e2calc_support@tee	Insulation	0.20		(ft)	10
Builder Phone	123-456-7890	Wall Cavity	D	Left Side		Right Side
		Insulation	R-20	Length of © 50		Length of ® 50
	^	Wall Continuous	R-5 ®	Wall (ft)		Wall (ft)
		Insulation		Window © 20 Area (sq ft)	Conditioned Floor 2800	Window ② 20
Notes		Studs		Horizontal	Area (sq ft)	Horizontal
		Stud Type	2 x 4 🗸 🕲	Shading (in)		Shading (in)
		Ducts		Height of ® 10		Height of ® 10
		Ducts in Conditioned Space ©		Wall (ft)		Wall (ft)
		Supply Duct	D		Back Side	
		Insulation	R-8		Length of Wall	200
		Return Duct	R-8 ②		(ft)	
		Insulation			Window Area (sq ft)	50
Submit Project		Testing	Roof Foundation		Horizontal ®	
Submit Project		Heating	A/C Water Heate		Shading (in)	0
When downloading the ener	rgy report, there are issues	rieating	VValer Fleate	1	Height of Wall	10
with browser plug-ins conve	erting the .pdf to HTML5.	Appliance			(ft)	
See the link for details. Help)/FAQ					
				&M Engineering Experiment St	ation	
		<u>C</u>	redits Help/FAQ Manual IC	3 v4.2.0 (C3 10%)		



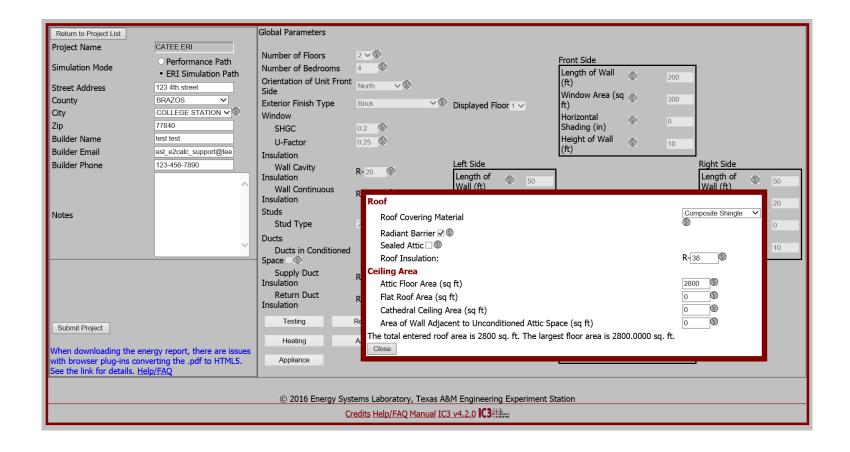


Testing



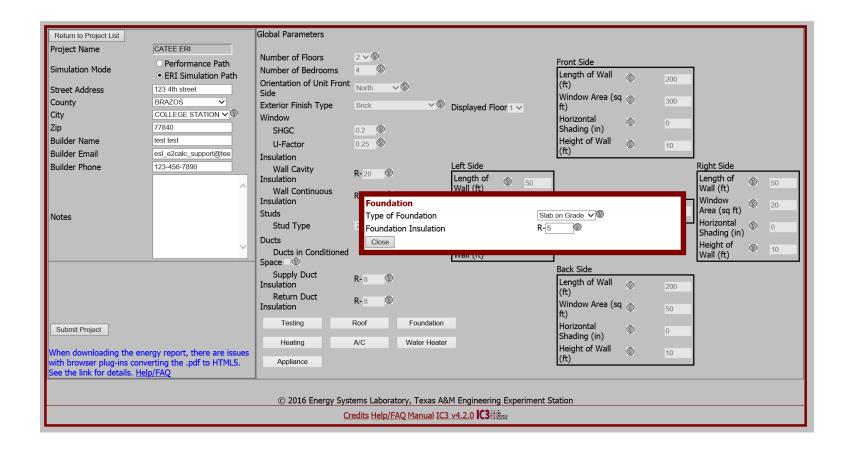


Roof





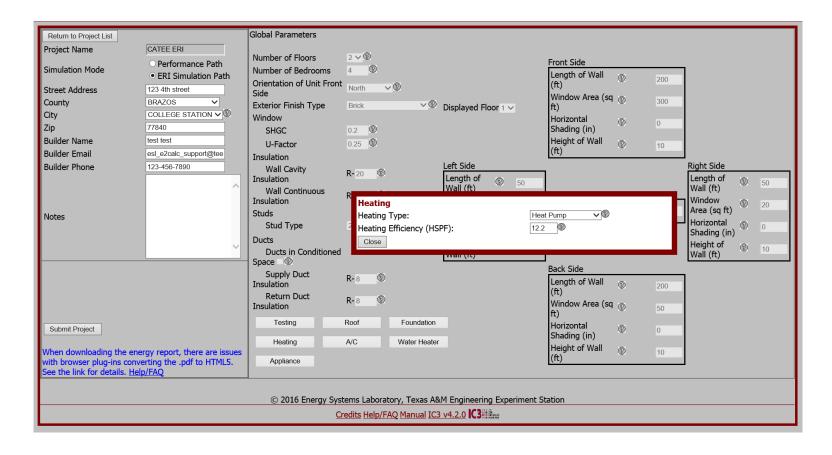
Foundation







Heating

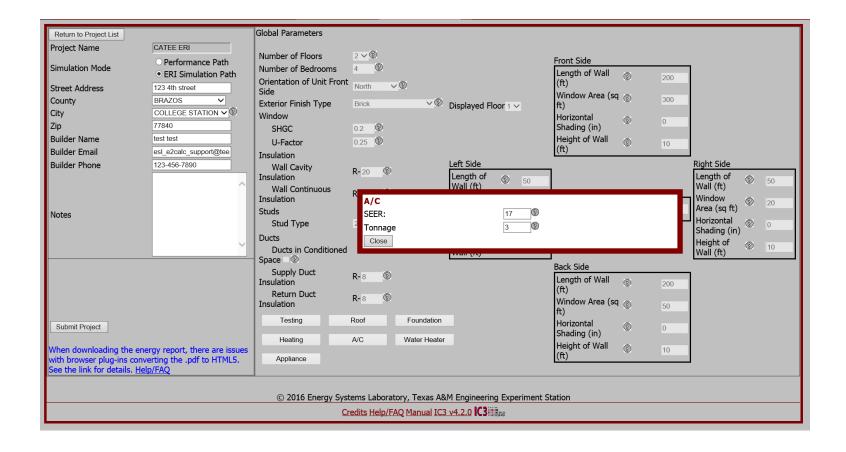


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TEXAS A&M ENGINEERING EXPERIMENT STATION

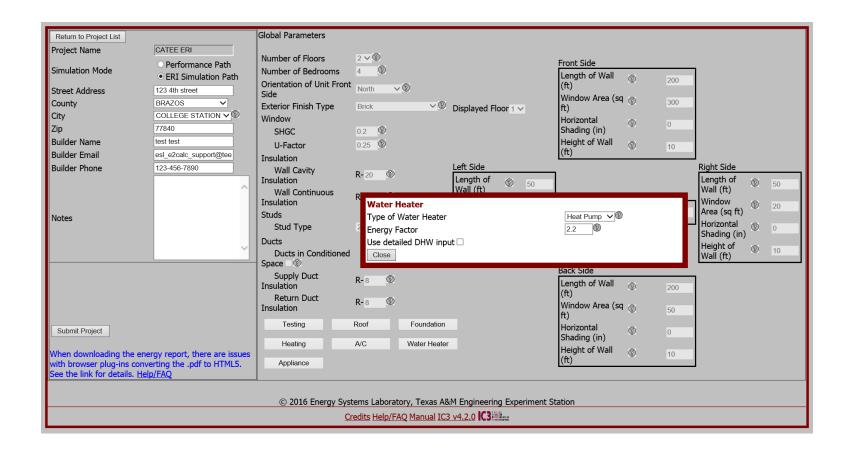


A/C



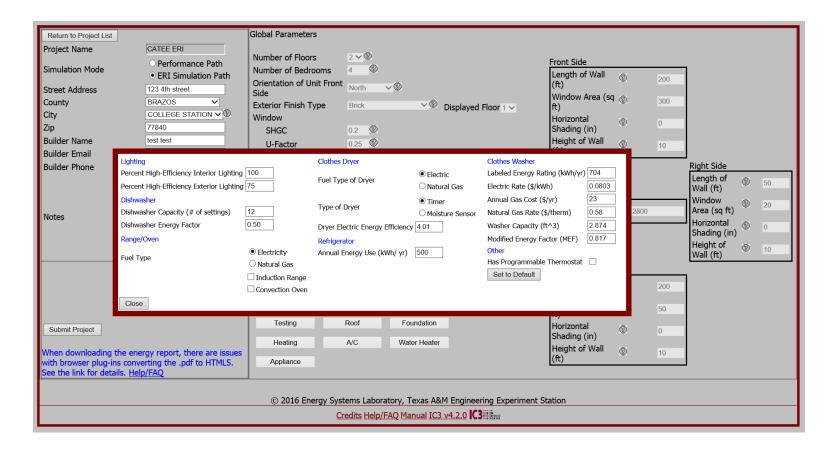


Water Heater



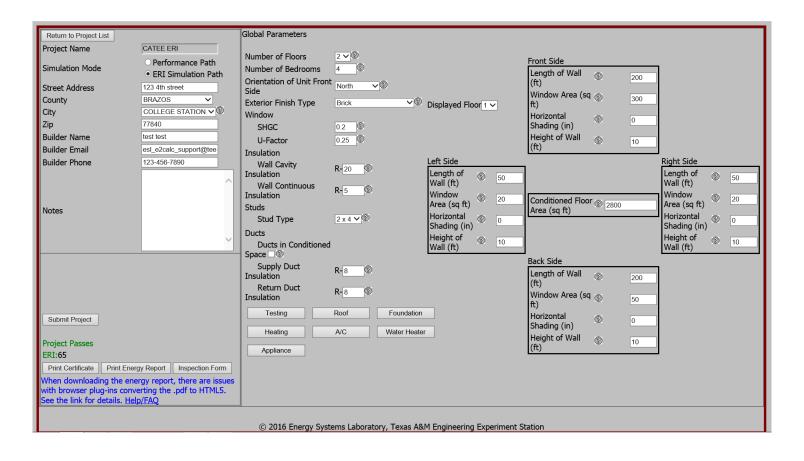


Appliance





Project Results





Certificate

Residential Energy Efficiency Certificate



Window U-Value	U- 0.25	Duct Tightness (in CFM25)	3
Window SHGC	0.2	Cooling Efficiency	SEER 17
Wall Cavity Insulation	R-20	Heating Efficiency	12.2 HSPF
Roof/Ceiling Insulation	R - 38	Water Heater Efficiency	Heat Pump EF 2.2
Floor/Foundation Insulation	R-5	Builder Email	esl_e2calc_support@tees.tamus.ed
Supply Duct Insulation	R-8	Builder Phone	123-456-7890
Return Duct Insulation	R-8	Date Issued	12/15/2016
Blower Door (in ACH50)	4	Certificate Number	1,018,168
COMPLIANCE	Di-td	Davina Brafassianal	
Builder	or negistered	Design Professional	

This certificate was generated by IC3 in compliance with ERI



TEXAS A&M ENGINEERING EXPERIMENT STATION



Energy Report



Single Family House Energy Report

Project Name: CATEE ERI **Builder Name:** test test **Builder Phone:** 123-456-7890 **Builder Email:** esl_e2calc_support@tees. Address: 123 4th street City: **COLLEGE STATION**

County: **BRAZOS** Zip: 77840

Certificate #: 1018168 Date Issued: 12/15/2016

Notes:

Project Details

Emissions Reduction

NOx: 15 lbs. SOx: 53 lbs. CO2: lbs. 28,658



65 ERI

This single family residential project was found to be in compliance with the performance measures described in the 2015 IECC as calculated by the Energy Systems Laboratory, a division of the Texas A&M Engineering Experiment Station using IC3 version 4.2.0



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The values produced are generated by the DOE-2 building energy analysis program. These values do not constitute a guarantee of actual energy usage by ESL or TEES.

Authorized Signature:

IC3 | CODE | COD

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CATEE ERI Page 1 of 3





Energy Report – Page 2

Project Information

General

Number of Bedrooms: 4

Wall Cavity Insulation: R- 20

Wall Continuous Insulation: R- 5

Orientation: North

Windows

SHGC: 0.2

U-Factor: 0.25

Roof

Cladding Type: Composite Shingle
Radiant Barrier: Yes
Sealed Attic: No
Roof Insulation: R - 38
Attic Area: 2800 sq. ft.
Cathedral Ceiling Area: 0 sq. ft.

Foundation

Foundation Type: Slab on Grade

Foundation Insulation: R- 5

Wall Area Next to Attic: 0 sq. ft.

Flat Roof Area: 0 sq. ft.

SEER: 17 Tonnage: 3 Structural Floor 1

Exterior Finish: Brick Floor Area: 2800 sq. ft.

Stud Type: 2 x 4 Floor Wall Height: 10 ft.

Stud Spacing: 16 in. Front Side Length: 200 ft

Mechanical

Heating

Water Heater

Fraction Outside: 1

Supply Duct Insulation: R - 8

Return Duct Insulation: R-8

Duct Tightness Test: 3 @CFM25

Heating Type: Heat Pump Heating Efficiency: 12.2 HSPF

Water Heater Type: Heat Pump Energy Factor: 2.2

Ducts in Conditioned Space: No

ical Front Side Window Area: 300 sq. ft.

Blower Door Test: 4 @ACH50 Back Side Length: 200 ft

Ventilation Type: Balanced Back Side Window Area: 50 sq. ft.

Ventilation Rate: 220 CFM Back Side Window Vetex: 30 sq. ft.

Ventilation Operation: 12 hrs. Floor 2

Fan Power: 5 Watts Floor 4 year: 2000 sq. ft.

Floor Wall Height: 10 ft.
Front Side Length: 200 ft
Front Side Window Area: 300 sq. ft.
Front Side Shading: 0 in
Back Side Length: 200 ft
Back Side Window Area: 100 sq. ft.
Back Side Shading: 0 in

Right Side Shading: 0 in
Left Side Length: 50 ft
Left Side Window Area: 20 sq. ft.
Left Side Shading: 0 in
Area over Unconditioned: 0 sq. ft.
Right Side Length: 50 ft
Right Side Window Area: 30 sq. ft.

Right Side Shading: 0 in

Left Side Length: 50 ft

Left Side Window Area: 30 sq. ft.

Left Side Shading: 0 in

Right Side Length: 50 ft

Right Side Window Area: 20 sq. ft.

A/C

Burner Capacity: N/A





Energy Report – Page 3

Appliances

Lighting: % indoor High-Efficiency: 75 % Lighting: % outdoor High-Efficiency: 75 %

Dishwasher Capacity: 12 settings

Dishwasher Energy Factor: 0.46

Range Fuel Type: Electric

Induction Range: No

Convection Oven: No

Clothes Dryer Fuel Type: Electric

Clothes Dryer Type: Timer

Clothes Dryer Energy Efficiency: 3.01

Refrigerator: Annual Energy Use: 709 kWh/yr

Clothes Washer Energy Rating:704 kWh/yr

Clothes Washer Electric Rate: 0.08\$/kWh

Clothes Washer Annual Gas Cost: 23 \$/yr

Clothes Washer Natural Gas Rate: 0.58\$/therm

Clothes Washer Capacity: 2.874ft^3 Clothes Washer MEF: 0.817

Programmable Thermostat: No



												ilding information only required if o							Bu
	Posido	stiel Det	a Collec	tion CI	no oklici							Name of Evaluator(s							
		International	Energy Cor	nservation		t						ame & Address:							ned Floor Area:
		CI	imate Zone 2	ž							Building Co	ontact: Name:		Phone:		_ [Email		
Building ID:_	Date: I	Name of Eval	uator(s):						_		Compliano	e Approach (check all that apply):	Prescriptive	☐ Trade-Off	□F	Perfor	mano	9	
Building Con	ntact: Name:		Phone:		Email:				_		Compliano	e Software Used:		Green Bu	ilding	/Abov	e-Cod	e Prog	ram:
Building Nan	me & Address:								_		IECC		T	Verified	Т	Con	nolies		Comments
Subdivision:			Lot #:		Cond	litioned Flor	or Area:	ft ²	t ²		Section #	Foundation Inspection	Code Value		Y			N/A	
State:	County:		Jurisdictio	on:					_		402.1.1 [FO1] ¹	Slab edge insulation R-value.	Unheated: R-0	R					
Compliance	Approach (check all that apply):	Prescriptive	☐ Trade-O	ff Perf	ormance								Heated: R-5	Heated					
	Software Used:			-					-		303.2, 402.2.8 [FO2] ¹	Slab edge insulation installed per manufacturer's instructions.			-				
Building Typ	e: 1- and 2-Family, Detached: Multifamily:	☐ Single F		Modular Condominio	☐ Tow	nhouse					402.1.1	Slab edge insulation depth/length.	Heated: 2 ft.	ft.					
Project Type		xisting Build	ing Addition		Existing Bu	uilding Reno	ovation				402.1.1 [FO4]	Basement wall exterior insulation R-value ² .	R-0	R					
IECC Section #	Pre-Inspection/Plan Review Construction drawings and	Code Value	Verified Value	YN	N/O N/A	A	nments/Assumption	ions ¹			303.2 [FO5] ¹	Basement wall exterior insulation installed per manufacturer's instructions.							
[PR1] ¹	documentation available. Documentation sufficiently										402.2.7 [FO6] ¹	Basement wall exterior insulation depth.	n N/A	ft.					
403.6	demonstrates energy code compliance. HVAC loads calculations:								-		402.2.9 [FO7] ¹	Crawl space wall insulation R-value.	R-0	R					
[PR2] ²	Heating system size(s): Cooling system size(s):		kBtu: kBtu:	_ - -							303.2 [FO8] ¹	Crawl space wall insulation installed per manufacturer's instructions.			-				
Additional Co	omments/Assumptions:								-		402.2.9 [FO9] ¹	Crawl space continuous vapor retarder installed with joints overlapped by 6 inches and sealed, and extending at least 6' up the stem wall.							
											303.2.1 [FO10] ²	Exposed foundation insulation protection.			I =		_	_	
											403.8 [FO11] ²	Snow melt controls.							
											Additional	Comments/Assumptions:							
	enbl/Assumptions to document code requisions supplies a supplier to the contract of the contra																		
6/9/2011	TO GOODING THUMPS THE TOTAL THE TOTA	ou ou a y			s manple	quepriruit t	THE STATE OF THE S	Page 1	1		² Basement	insulation is not required in warm-humi	d locations.						





General buildin	g information only required if differen	it than above						Building ID:
Date:	Name of Evaluator(s):							
Building Name	& Address:					Co	ndition	ned Floor Area: ft ²
Building Contac	t: Name:	Pho	ne:		E	mail:_		
Compliance Ap	proach (check all that apply): Pr	escriptive	Trade-Off	□ Pe	erform	ance		
Compliance So	ftware Used:		Green Build	ding/A	bove	-Code	Progr	ram:
IECC		Code	Verified		Com	plies		Comments/Assumptions
Section #	Framing / Rough-In Inspection	Value	Value	Y	N	N/O	N/A	
402.1.1, 402.3.4	Door U-factor. 3	U-0.65	U					

IECC		Code	Verified	Complies				Comments/Assumptions
Section #	Framing / Rough-In Inspection	Value	Value	Y	N	N/O	N/A	
402.1.1, 402.3.4 [FR1] ¹	Door U-factor. 3	U-0.65	U					
402.1.1, 402.3.1, 402.3.3 [FR2] ¹	Glazing U-factor (area-weighted average).	U-0.65 Impact Rated: U-0.75	U					
402.1.1, 402.3.2, 402.3.3, 402.5 [FR3] ¹	Glazing SHGC value, including sunrooms (area-weighted average). 4	SHGC: 0.3 (0.5 max) ⁵	SHGC:					
303.1.3 [FR4] ¹	Glazing labeled for U-factor and SHGC (or default values used).							
402.1.1, 402.3.3 [FR5] ¹	Skylight U-factor. 4	U-0.75	U					
402.1.1, 402.3.3, 402.5 [FR6] ¹	Skylight SHGC value, including sunrooms.4	SHGC: 0.3 (0.5 max) ⁵	SHGC:					
303.1.3 [FR7] ¹	Skylights labeled for U-factor and SHGC (or default values used).							
402.1.1, 402.3.5 [FR8] ¹	Sunroom glazing U-factor.	U-0.65 Impact Rated: U-0.75	U					
402.1.1, 402.3.5 [FR9] ¹	Sunroom skylight U-factor.	U-0.75	U					
402.1.1 [FR10] ¹	Mass wall exterior insulation R- value.	R-4 ⁶	R					
303.2 [FR11] ¹	Mass wall exterior insulation installed per manufacturer's instructions.							
403.2.1 [FR12] ¹	Duct insulation.	Attic Supply: R-8 Other: R-6	R R					
403.2.2 [FR13] ¹	Duct sealing complies with listed sealing methods.							
403.2.2 [FR14] ¹	Duct tightness via rough-in test. If applicable, verification via post- construction test should be marked N/A.	Across System: 6 cfm No Air Handler:: 4 cfm	cfm					
403.2.3 [FR15] ¹	Building cavities NOT used for supply ducts.							

One side-hinged	door up to 24 ft	can be exempted	from the prescriptive door	U-factor requirements.

^{*} Up to 15 if of glazed fenestration, including skights may be exempted from U-factor and SHGC requirements under the prescriptive approach.

* If more than ½ the insulation is on the interior, mass wall interior insulation requirement applies (R-8).

6/9/2011

402.4.5 [FR16] ²	IC-rated recessed lighting fixtures meet infiltration criteria.					
403.3 [FR17] ²	HVAC piping insulation.	R-3	R			
403.4 [FR18] ²	Circulating hot-water piping insulation.	R-2	R			
403.5 [FR19] ²	Dampers Installed on all outdoor Intake and exhaust openings.					
402.4.4 [FR20] ³	Glazed fenestration air leakage.	0.3 cfm/ft ²	cfm/ ft²			
402.4.4 [FR21] ³	Swinging door air leakage.	0.5 cfm/ft ²	cfm/ ft ²			
402.4.4 [FR22] ³	Fenestration and doors labeled for air leakage.					

6/9/2011



General build	ling information only required if differen	t than above						Building ID:
Date:	Name of Evaluator(s):							
Building Nam	e & Address:				_	Co	ndition	ned Floor Area: ft ²
Building Cont	act: Name:	Pho	one:		_ Er	nail:_		
Compliance A	Approach (check all that apply): Pr	escriptive [Trade-Off	□ Pe	erform	ance		
Compliance S	Software Used:		Green Buil	ding/A	bove-	Code	Prog	ram:
IECC		Code	Verified			plies		Comments/Assumptions
Section #	Insulation Inspection	Value	Value	Y	N	_	N/A	
402.1.1, 402.2.5, 402.2.6 [IN1] ¹	Floor insulation R-value.	Wood: R-13 Steet. ⁷ See footnote	R Wood Steel					
303.2 [IN2] [†]	Floor insulation installed per manufacturer's instructions, and in substantial contact with the subfloor.							
402.1.1 402.2.5 402.2.4 [IN3]	Wall insulation R-value.	Wood: R-13 Mass: ⁸ R-6 Steel: ⁹ See footnote	R Wood Mass Steel					
303.2 [IN4] ¹	Wall insulation installed per manufacturer's instructions.							
402.1.1 [IN5] ¹	Basement wall interior insulation R- value.	R-0	R					
303.2 [IN6] ¹	Basement wall interior insulation installed per manufacturer's Instructions.							
402.2.7 [IN7] [†]	Basement wall interior insulation depth.	N/A	ft					
402.2.11 [IN8]	Sunroom wall insulation R-value.	R-13	R					
303.2 [IN9] ¹	Sunroom wall insulation installed per manufacturer's Instructions.							
402.2.11 [IN10] ¹	Sunroom ceiling insulation R-value.	R-19	R					
303.2 [FI11] ¹	Sunroom ceiling insulation installed per manufacturer's instructions.							
402.4.2, 402.4.2.1 [IN12] ¹	Air sealing complies with sealing requirements via blower door test. If applicable, verification via visual inspection should be marked N/A.	ACH 50 ≤ 7	ACH 50 =					
303.1 [IN13] ²	All installed insulation labeled or installed R-value provided.							
402.4.1, 402.4.2 [IN14] ³	Air sealing of all openings and penetrations via visual inspection: Site-built fenestration Windowldoor openings Utility penetrations Attic access openings If applicable, verification via blower door should be marked NIA.							

7 Floor steel frame equivalent:	P-10 in 2v6 or P-10+P-6 in 2v8 or 2v10	

402.4.1, 402.4.2 [IN15] ³	Air sealing of all envelope joints and seams via visual inspection: Dropped ceilings Knee walls Assemblies separating garage Tubs and showers Common walls between units Rim joist junctions If applicable, verification via blower door should be marked NIA.				
402.4.1, 402.4.2 [IN16] ³	Air sealing of all other sources of infiltration, including air barrier, via visual inspection. If applicable, verification via blower door should be marked N/A.				

6/9/2011



Name of Evaluator(s):dress:	Prescriptive Code Value Wood: R-30 R-30	Trade-Off Green Bu Verified Value R- Wood		Perfo g/Abov Con	Email	: :e		
ch (check all that apply): b Used: all Inspection Provisions insulation R-value. insulation Installed personal resolution insulations, Blown on marked every 300 ft ² . coses hatch and door on the Market of t	Code Value Wood: R-30 Steel Joist ¹¹ R-30	Trade-Off Green Bu Verified Value R- Wood Steel	ilding	Perfo g/Abov Con N	Email rmano ve-Co plies N/O	e de Pro	ogram:	
Lised: Inspection Provisions insulation R-value. Insulation installed per insulation installed per insulation installed per insulation installed per cober hatch and door on. In these six post- ciden test. If applicable,	Code Value Wood: R-30 Steel Truss ¹⁰ Steel Joist ¹¹ R-30	Verified Value R- Wood Steel	Y	Con	ve-Co	de Pro		
al Inspection Provisions insulation R-value. insulation installed per acturer's instructions. Blown on marked every 300 ft ² . coses hatch and door on. phtness via post-uction test. If applicable,	Code Value Wood: R-30 Steel Truss ¹⁰ Steel Joist ¹¹ R-30	Verified Value R	Y	N	nplies N/O	N/A		
insulation R-value. insulation installed per cclurer's instructions. Blown on marked every 300 ft ² . coess hatch and door ion. jhtness via post- ction test. If applicable,	Wood: R-30 Steel Truss ¹⁰ Steel Joist ¹¹	Value R		N .	N/O	_	Comments/Ass	sumptions
insulation R-value. insulation installed per cclurer's instructions. Blown on marked every 300 ft ² . coess hatch and door ion. jhtness via post- ction test. If applicable,	Wood: R-30 Steel Truss ¹⁰ Steel Joist ¹¹	RWood				_		
acturer's instructions. Blown ion marked every 300 ft ² . coses hatch and door ion. ghtness via post- uction test. If applicable,				-				
on. ghtness via post- uction test. If applicable,		_	l					
uction test. If applicable,		R						
tion via rough-in test should ked N/A.	To Outdoors: 8 cfm Across System: 12 cfm	cfm						
g and cooling equipment nd capacity as per plans.								
		İ						
ate posted.								
and outdoor air for								
s have automatic or								
atic or accessible manual								
	g - 50% of lamps are high // . burning freplace - gasketed and cutfoor air for silon. The silon and cutfoor air for silon. The silon are silon and cutfoor air for silon. The silon are silon and silon are silon are silon and silon are silon and silon are s	June 2015 Annual Conference of the Conference of	As also posted. burning fireplace - gasketed and outdoor air for stolen manual for stolen for st	June 2015 June 2	Jack posted.	Jack posted.	June 2015 Control of the Control o	July and posted.





Other Software Tools – ERI

- Accredited Rating Software
 - ANSI/RESNET/ICC 301-2014 Standard for the Calculation and Labeling of the Energy Performance of Low-Rise Residential Buildings using an Energy Rating Index
 - First published March 2014
 - Repudiated January 2015
- Software Providers
 - National Registry of Accredited Rating Software Programs www.resnet.us
 - EnergyGauge, REM/Rate, Right-Energy HERS, Ekotrope, HERS Module, ICF International Beacon Residential





Thank You

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