

ENERGY SYSTEMS LABORATORY

TEXAS A&M ENGINEERING EXPERIMENT STATION

2015 IECC Residential and the IC3



2015 International Energy Conservation Code* and ANSI/ASHRAE/IES Standard 90.1-2013: Energy Standard for Buildings Except Low-Rise Residential Buildings





July 17. 2018



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Learning Objectives

- 1. Understand the Energy Systems Laboratory legislative mandates as it relates to the IECC.
- 2. Evolution of the IC3 from inception to present day.
- 3. Review of the current version IC3 4.3.2



NOx REDUCTIONS USING eGRID

NOx emissions reductions calculation from electricity savings





NOx Reductions From EE/RE Using eGRID

NOx emissions reductions calculation from electricity savings





Desktop Processor (DDP)





Current Version 4.3.2: IECC 2015

	-User Login	
	Coser Login This is the publicly accessible energy code compliance software based on the Texas Building Energy Performance Standards. IMPORTANT changes have been made to our duct model. These changes have altered some of the required inputs. Details can be found here Username: Password: Login Register New User Forgot Password	cil of Governments
ESINE Ele Standards for Quality	TCEQ ENERGY SYSTEMS LABORATORY TEXAS A&M ENGINEERING EXPERIMENT STATION	



Login Screen



Return to Project List		Global Parameters						
Project Name Simulation Mode	CATEE O Performance Path © ERI Simulation Path	Number of Floors 2 - 10 Number of Bedrooms 4 🐨		Front Side Length of Wall (ft)	®			^
Energy Code	2015 IECC ~	Orientation of Unit Front Side North V	Displayed Floor 1 ~	Window Area (sq ft) Horizontal Shading	© 50			
Street Address	123 4th street	Exterior Finish Type Brick VIII		(in)	0			
County	DENTON V	Window		Height of Wall (ft)	10			
Zie	20252-1111	SHGC 0.2	Left Side			Right Side		
Builder Name	test test	U-Factor 0.25	Length of Wall (ft) 60			Length of Wall (ft)	® 6	50
Builder Email	esl_e2calc_support@tee:	Wall Cavity Insulation B-21	Window Area D 40	Conditioned Floor		Window Area	® 3	10
Builder Phone	123-456-7890	Wall Continuous Insulation R-3	(sq ft) Horizontal Shading (in) Height of Wall	Area (sq ft)	2000	(sq ft) Horizontal Shading (in) Height of Wall	® [0	
N.		Stud Type 2 x 4 ~ D	(ft) 10			(ft)	1	0
Submit Project When downloading the energy browser plug-ins converting the for details. Help:FAQ	y report, there are issues with he .pdf to HTML5. See the link	Ducts Duct Systems Tested Testing Roof Foundation Heating A/C Water Heater Appliance		Back Side Length of Wall (ft) Window Area (sq ft) Horizontal Shading (in) Height of Wall (ft)	200 60 0 0 10 0			v
		© 2017 Energy Systems Laboratory, Texa	as A&M Engineering Experiment State	on				
		Credits Help/FAQ Man	aal IC3 v4.3.2					



Main Page



Return to Project List	
Project Name	000 2015 Qinbo Li
Energy Code	2015 IECC 🗸 🕲
Street Address	1000 Balcones Dr
County	AUSTIN 🗸 🕲
City	BELLVILLE
Zip	77777
Builder Name	test test
Builder Email	patrickparker@tees.tamus
Builder Phone	123-456-7890
Notes:	This is a test.



Energy Code/Site Address/Project Details





Please enter the distance measured from the wall to the outer edge of the projection.

			Front Side						
			Length of Wall (ft)	8		50			
Floor 1 M			Window Area (sq ft)	$\textcircled{\baselinetwidth}$		21			
			Horizontal Shading (in)	8		0.8			
			Height of Wall (ft)	8		8			
Left Side			_				Right Side		
Length of Wall (ft)	8	50					Length of Wall (ft)	8	50
Window Area (sq ft)	8	0	Conditioned Floor	8	2500		Window Area (sq ft)	8	0
Horizontal Shading (in)	0	0	Aica (sq ii)				Horizontal Shading (in)	8	0
Height of Wall (ft)	0	8					Height of Wall (ft)	8	8
			Back Side						
			Length of Wall (ft)	8		50			
			Window Area (sq ft)	8		11			
			Horizontal Shading (in)	8		0.8			
			Height of Wall (ft)	8		8			

Floors/Foundation







Please select the orientation of the house from the drop-down menu. The front of the house is the direction the front door faces. The right side of the house is to the right of the house when facing it.



Global Parameters

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- Number of Floors
- Number of Bedrooms
- Orientation of Unit Front Side
- Exterior Finish Type
- Window
 - SHGC
 - U-Value
- Insulation
 - Wall Cavity Insulation
 - Wall Continuous Insulation
- Studs
 - Stud Type
- Ducts
 - Ducts in Conditioned Space @
- 8

Global Parameters







2 x 4 🖌 🕲



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Testing
Mechanical Ventilation Type
Ventilation Rate (CFM)
Ventilation Operation (hrs/day)
Ventilation Fan Power(Watts)
Blower Door Test (ACH50)
Blower Door Test
Blower Door Test Value
Close



Please mark your answer according to the location of the mechanical equipment and its duct-work.







Roof ~ Wood Shingles Roof Covering Material Q Radiant Barrier 🗆 🕲 Sealed Attic @ 🕲 Roof Insulation: ? R-25 **Ceiling Area** Attic Floor Area (sq ft) 2500 2 2 Flat Roof Area (sq ft) 0 8 Cathedral Ceiling Area (sq ft) 0 Area of Wall Adjacent to Unconditioned Attic Space (sq ft) ? 0 The total entered roof area in 2500 sq ft. The total floor area is 2500 sq ft



Please enter the average ceiling height for this floor.



Close





Foundation	
Type of Foundation	Slab on Grade 🗸 🔞
Foundation Insulation	R-0.23
Close	

Water Heater	
Type of Water Heater	Heat Pump 🗸 🛞
Energy Factor	2.1
Use detailed DHW input	
Close	



Foundation/Water Heater





Heating	
Heating Type:	Heat Pump 🗸 😨
Heating Efficiency (HSPF):	9.8
Close	



AC/Heating





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Performance Certificate







Building Na	me & Address:						Inditio	ned Floor Area:
Building Co	ntact: Name:		Phone:		_ E	mall;		
Compliance	Approach (check all that apply):	Prescriptive	Trade-Off	P	erfor	nance		
Compliance	Software Used:		Green Bu	Idingi	Above	-Cod	e Prog	ran:
IECC			Verified		Com	pilles		Comments/Assumptions
Section #	Foundation Inspection	Code Value	Value	Y	N	NO	N/A	
402.1.1 [FO1] ¹	Slab edge insulation R-value.	Unheated: R-0 Heated: R-5	R Unheated Heated					
303.2, 402.2.8 (FO2) ¹	Slab edge insulation installed per manufacturer's instructions.	ĺ						
402.1.1 (FO3) ¹	Slab edge insulation depth/length.	Heated: 2 ft.	<u></u> *					
402.1.1 [FO4] ¹	Basement wall exterior insulation R-value ² .	Continuous: R-5	R					
303.2 (FO5) ¹	Basement wall exterior insulation installed per manufacturer's instructions.							
402.2.7 [FO8] ¹	Basement wall exterior insulation depth.	10 ft. or to basement floor	*					
402.2.9 (FO7) ¹	Crawl space wall insulation R-value.	Continuous: R-5 Cavity: R-13	R					
303.2 (FO8) ¹	Crawl space wall insulation installed per manufacturer's instructions.							
402.2.9 [FO0] 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.							
403.8 (F011) ²	Snow melt controls.	ĺ						

Additional Comments/Assumptions: _

Residential Data Collection Checklist 2009 International Energy Conservation Code Climate Zone 3

Building ID:	Date: I	Name of Evalu	uator(s):					
Building Cor	ntact: Name:	F	Phone:			Emai	: <u> </u>	
Building Nar	ne & Address:							
Subdivision:			Lot #:			_ (Condit	ioned Floor Area:ft ²
State:	County:		Jurisdiction	c				
Compliance	Approach (check all that apply):	Prescriptive	Trade-Off		Perfo	rmano	æ	
Compliance	Software Used:		Green Bu	uilding	/Abov	/e-Co	de Pro	ogram:
Building Typ	e: 1- and 2-Family, Detached:	Single Fa	amily 🗆 N	/lodula	ar		Town	house
	Multifamily:	Apartmer	nt 🗆 C	ondo	miniu	m		
Project Type	e: 🗌 New Building 🔤 🛙	Existing Buildir	ng Addition			xistin	g Buil	ding Renovation
IECC		Code	Verified		Com	plies		Comments/Assumptions ¹
Section #	Pre-Inspection/Plan Review	Value	Value	Y	Ν	N/O	N/A	
103.2 [PR1] ¹	Construction drawings and documentation available. Documentation sufficiently demonstrates energy code compliance.							
403.6 [PR2] ²	HVAC loads calculations: Heating system size(s): Cooling system size(s):		kBtu: kBtu:					

Additional Comments/Assumptions: _

³ Besement insulation is not required in warm-humid locations. 6/9/2011

¹ Use Comments/Assumptions to document code requirements that pass due to exceptions, and specify the exception. Also use Comments/Assumptions to document multiple values observed for a given code requirement, such as multiple equipment efficiencies. 6/9/2011

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Date:	Name of Evaluator(s):								
Building Name	& Address:					Co	ndition	ed Floor Area:	ft ²
Building Contac		E	mall;						
Compliance Ap Compliance So	proach (check all that apply): Pr	escriptive	Trade-Off Green Bulk	D Pe	erform bove	ance Code	Progra	am:	
IECC Section #	Framing / Rough-in inspection	Code Value	Verified Value	Y	Com	plies N/O	N/A	Comments/Assumption	sumptions
402.1.1, 402.3.4 (FR1) ¹	Door U-factor. ³	U-0.5	U						
402.1.1, 402.3.1, 402.3.3 (FR2) ¹	Glazing U-factor (area-weighted average). ⁴	U-0.5 Impact Rated: U-0.65	U						
402.1.1, 402.3.2, 402.3.3, 402.5 (FR3) ¹	Glazing SHGC value, including sunrooms (area-weighted average). ⁴	8HGC: 0.3 (0.5 max) ⁵	SHGC:						
303.1.3 (FR4)	Glazing labeled for U-factor and SHGC (or default values used).	ĺ							
402.1.1, 402.3.3 (FR5) ¹	Skylight U-factor. ⁴	U-0.65	U						
402.1.1, 402.3.3, 402.5 (FR6) ¹	Skylight SHGC value, including sunrooms. ⁴	8HGC: 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-0.5 Impact Rated: U-0.65	U						
402.1.1, 402.3.5 (FR9) ¹	Sunroom skylight U-factor.	U-0.65	U						
402.1.1 (FR10) ¹	Mass wall exterior insulation R- value.	R-5 ⁰	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]	Duct sealing compiles 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.	ĺ							

402.4.5 (FR:16) ²	IC-rated recessed lighting fixtures meet infiltration criteria.					
403.3 FR17] ⁰	HVAC piping insulation.	R-3	R			
403.4 FR:18) ²	Circulating hot-water piping insulation.	R-2	R			
403.5 FR:10] ⁰	Dampers installed on all outdoor intake and exhaust openings.	1				
402.4.4 FR20) ⁸	Glazed fenestration air leakage.	0.3 cfm/ft ²	ctm/ ft ²			
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.	ĺ				

Additional Comments/Assumptions:

² One side-hinged door up to 24.8² can be exempted from the prescriptive door U-factor requirements.
⁴ Up to 15 % of glazed ferestration, including skylights, may be exempted from U-factor and SHOC requirements under the prescriptive approach.
⁵ SHOC mandatory maximum using table-offs.
⁶ Wrome than % the insulation is on the interior, mass well interior insulation requirement applies (R-8).

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late:	Name of Evaluator(s):								
Suliding Nam	e & Address:					Co	ndition	ed Floor Area:	f
Building Con	tact: Name:	Ph	one:		_ E	mall:			
Compliance /	Approach (check all that apply):	escriptive	Trade-Off	D Pt	rform	ance			
Compliance	Software Used:		Green Bull	ding//	bove	Code	Progra	am:	
IECC		Code	Verified	Complies				Comments/Assumption	one
Section #	Insulation Inspection	Value	Value	Y	N	NIO	N/A		
402.1.1, 402.2.5, 402.2.6 (IN1) ¹	Floor insulation R-value.	R-19 Steet ⁷ See footnote	Wood Steel		Ц				
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 [N3] ¹	Wall Insulation R-value.	Wood: R-13 Mass: ⁸ R-8 Steel: ⁹ See footnote	R- Mass Steel						
303.2 [IN4]	Wall insulation installed per manufacturer's instructions.								
402.1.1 (IN5) ¹	Basement wall Interior insulation R- value.	Continuous: R-5 Cavity: R-13	R						
303.2 (IN8) ¹	Basement wall interior insulation installed per manufacturer's instructions.								
402.2.7 [IN7] ¹	Basement wall interior insulation depth.	10 ft or to basement foor	î						
402.2.11 (IN8) ¹	Sunroom wall insulation R-value.	R-13	R						
402.2.11 [IN0]	Sunroom wall insulation installed per manufacturer's instructions.								
402.2.11 [IN10] ¹	Sunroom celling insulation R-value.	R-19	R						
303.2 (IN11) ¹	Sunroom ceiling insulation installed per manufacturer's instructions.	ĺ							
402.4.2, 402.4.2.1 (IN12) ¹	Air sealing compiles 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 Windowidoor openings Utility penetrations Attic access openings								

⁷ Floor steel frame equivalent: R-19+R-8 in 2x8 or R-19+R-12 in 2x8 or 2x10 ⁹ If more than % the insulation is on the exterior, mass well exterior insulation requirement applies (R-5). ⁹Wall also littme equivalent R-13+R-5, R-17-R-4, R-21+R-3, R-0-R-10

6/9/2011

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Additional Comments/Assumptions:



Steel truss equivalent: R-38; R-30+R-3; R-28+R-5.
 Steel joist equivalent: R-38 in 2x4 or 2x6 or 2x6; R-49 in any framing. 6/0/2011

Building Gestact: Name: Discourse					Conditioned Ploor Area					
Compliance Approach (check all that apply): Prescriptive Trade-Off Performance Compliance Software Used: Green Building/Above-Code Program:										
IECC Section #	C Verifi on # Final Inspection Provisions Code Value Value		Verified Value	Complies Y N N/O N/A			N/A	Comments/Assumptions		
402.1.1 402.2.1 402.2.2 (Fi1) ¹	Celling Insulation R-value.	Wood R-30 Steel Truss ¹⁰ Steel Joist ¹¹	R Wood Steel							
303.1.1.1, 303.2 (Fi2) ¹	Celling insulation installed per manufacturer's instructions. Blown Insulation marked every 300 t ² .	ĺ								
402.2.3 (FI3) ¹	Attic access hatch and door insulation.	R-30	R	口						
403.2.2 (FI4) ¹	Duct tightness via post- construction test. If applicable, verification via rough-in test should be marked N/A.	To Outdoors: 8 cfm Across System: 12 cfm	cm							
403.6 (FIS) ¹	Heating and cooling equipment type and capacity as per plans.	ĺ								
404.1 (Fi6) ¹	Lighting - 50% of lamps are high efficacy.	ĺ		回						
401.3 (FI7) ²	Certificate posted.]								
402.4.3 (FI8) ⁰	Wood burning fireplace - gasketed doors and outdoor air for combustion.									
403.1.1 (FI0) ²	Programmable thermostats installed on forced air fumaces.	ĺ		回						
403.1.2 (FI10) ²	Heat pump thermostat installed on heat pumps.	ĺ		回						
403.4 (FI11) ²	Circulating service hot water systems have automatic or accessible manual controls.	ĺ		Þ						
403.9 (F112) ²	Pool heaters, covers, and automatic or accessible manual controls.	ĺ		F						





Current Version: IECC 2015

Residential Energy Efficiency Certificate

This certificate was generated by IC3 in compliance with ERI

Window U-Value	0- 0.25
Window SHGC	0.2
Wal Cavity Insulation	R - 21
Roof/Ceiling Insulation	R-35
Floor/Foundation Insulation	R-5
Supply Duct Insulation	R-0
Return Duct Insulation	R-0
Blower Door (in ACH50)	0
1C3:::::::	

Cooling Efficiency Heating Efficiency Water Heater Efficiency **Builder Ernail Builder Phone** Date Issued Certificate Number

Builder or Registered Design Professional

12.2 HSPF 123-456-7890 7/10/2018 1,088,061

TRES

Duct Tightness (in CFM25) 0 SEER 16 Heat Pump EF 22 esl_e2calc_support@teestamus.

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Certificate



Statewide Registry





Wall Cavity Insulation Distribution





Avg SEER

13.0 - 14.0

14.0 - 15.0

15.0 - 17.3

UValue Distribution





INTEGRATED NOX EMISSIONS REDUCTIONS (2008 Base year)

2016 Integrated OSD NOx Emissions Reduction Using new 2010 eGrid



- ESL Code Compliance (1.87 tons/day)
- PUC SB7 programs (2.39 tons/day)
- (0.67 tons/day) SECO Political Sub.*
- Green Power (Wind) (28.91 tons/day)
- Residential AC Retrofits (0.43 tons/day)
- Total (2016) (34.28 tons/day) \geq

- ESL Code Compliance (4.80 tons/day)
- PUC SB7 programs (3.40 tons/day)
- *SECO Political Sub. (0.69 tons/day)
- Green Power (Wind) (40.07 tons/day)
- Residential AC Retrofits (0.35 tons/day)
- (49.31 tons/day) **Total (2020)** \geq
- July 17, 2018



Statewide Savings From Code Compliance 2002 – 2016 (Est.)



44.71 tons NOx / year

Emissions Reduction in 2016

(Equivalent to about 34,000 cars)





Thank you for your participation

