

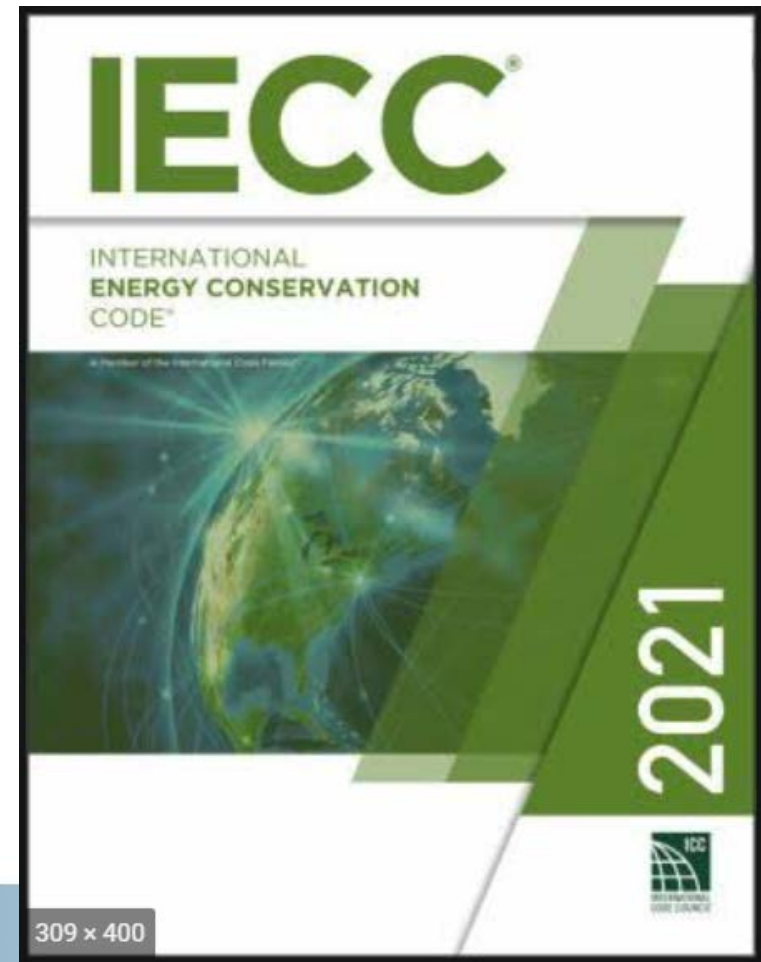
# Significant Changes 2021 IECC Residential

**Randy Plumlee**

IECC|HERS|LEED GR|BPI

**SPEER**

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# Who is SPEER?

- REEO – Regional Energy Efficiency Organization
- Member-based, non-profit 501(c)3 organization
- 50+ members from wide cross section of E.E. industries



# Little bit About Me....

- Started out as a TREC Apprentice Inspector
- Worked part-time as a Low-Voltage contractor
- A.A.S. in Residential Building Performance
- 10+ years as an Energy Rater and Field Supervisor for one of DFW's largest 3<sup>rd</sup> party energy verifiers
- That team has inspected over 75,000 homes
- Certified with | BPI | IECC Res | HERS Rater | LEED GR
- Certified QA with RESNET and LEED

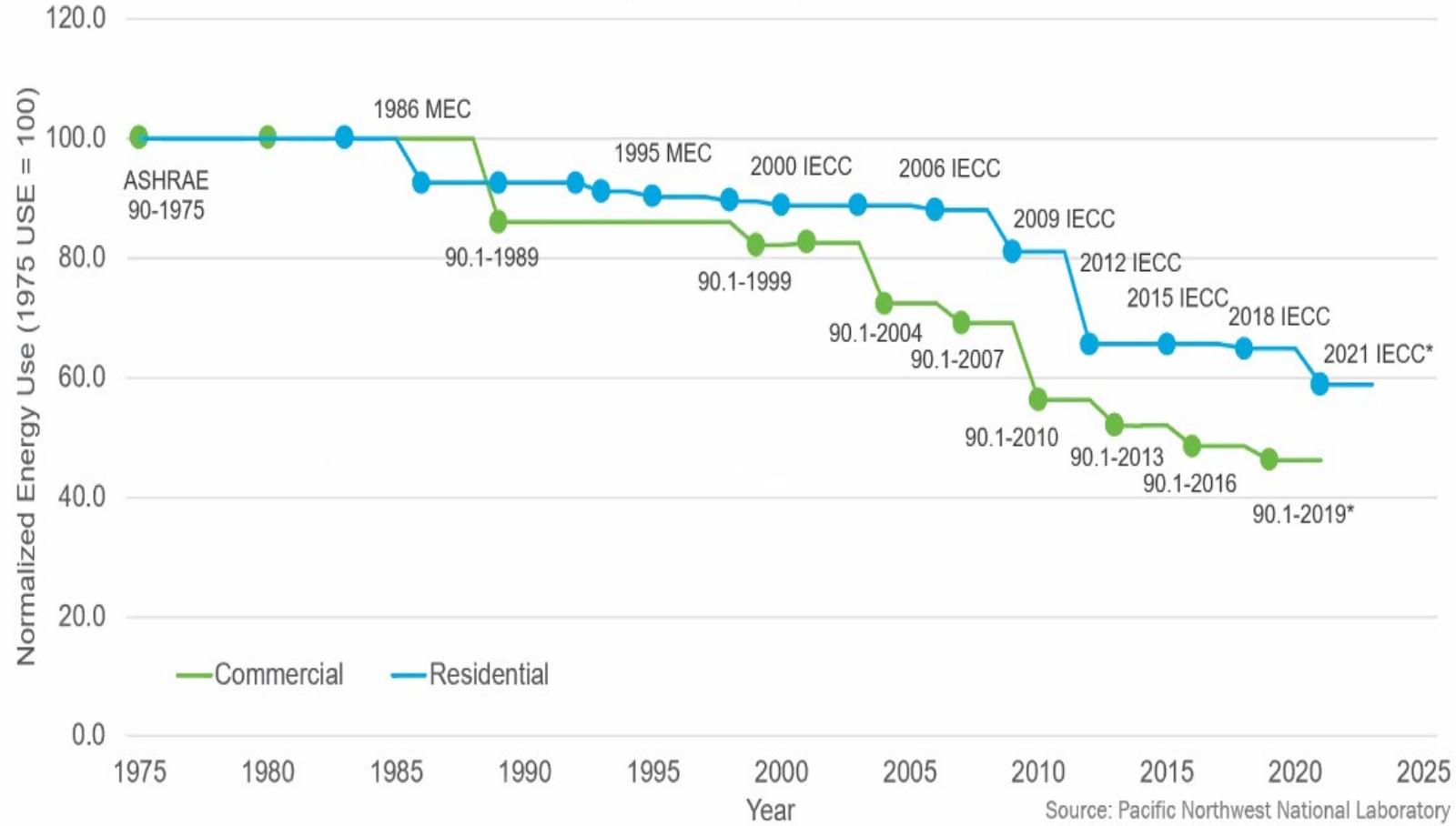
# Today's Agenda

- Energy Code in State Law
- Residential Energy Code Overview
  - Layout
  - Compliance paths
  - Other “IECC 101” items
- Changes in the 2021 IECC (Res)
- Some Insulation Stuff
- Q&A

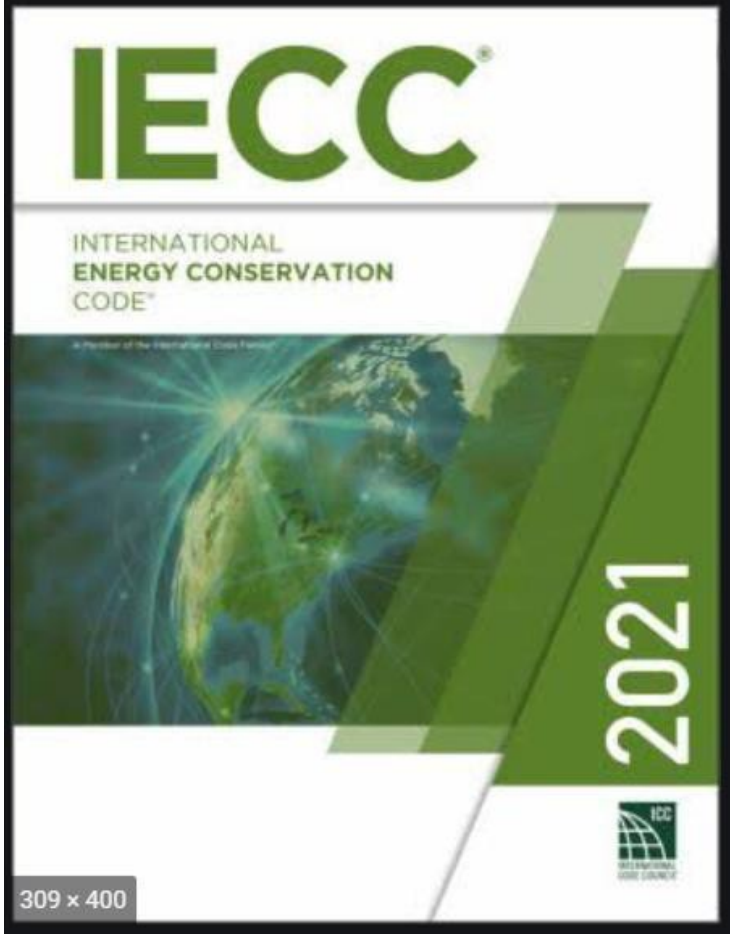


# Historical Improvement: IECC and Standard 90.1

Improvement in Residential & Commercial Energy Code  
(Year 1975-2021)



Source: Pacific Northwest National Laboratory



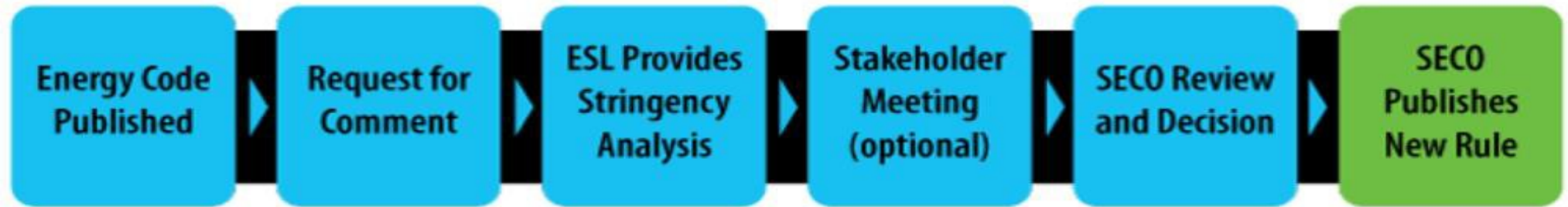
# ICC Updates

## Code Council releases new framework to address energy efficiency needs across the entire building industry



The International Code Council released a new framework — Leading the Way to Energy Efficiency: A Path Forward on Energy and Sustainability to Confront a Changing Climate — to assist in meeting energy efficiency goals. The framework includes using the Code Council’s ANSI-approved standards process to update the International Energy Conservation Code.

# Texas Adoption Process



- IECC was published in January 2021
- ESL will take until August to provide stringency analysis
- SECO will hold a stakeholder meeting and consider comments

So... at the very earliest we will be looking at July 2022 for the 2021 IECC to be mandated by the State BUT...



# Homebuyer Cash Flow – Climate Zone 2

	Incremental Cost of moving from 2009 IECC to 2015 IECC = \$1,980	Annual	Monthly
A	Energy Savings (year one)	\$ 220.00	\$ 18.33
B	Mortgage Increase	\$ 114.60	\$ 9.55
C	Net cost of mortgage interest deductions, mortgage insurance, and property taxes (year one)	\$ 5.00	\$ 0.42
D	Net cash flow (Savings) = [B-(C+D)]	\$ 100.40	\$ 8.36

*\*Cost-Effectiveness Analysis of the 2009 and 2012 IECC Residential Provisions – Technical Support Document, April, 2013 and National Cost-Effectiveness of the Residential Provisions of the 2015 IECC, June 2015.*



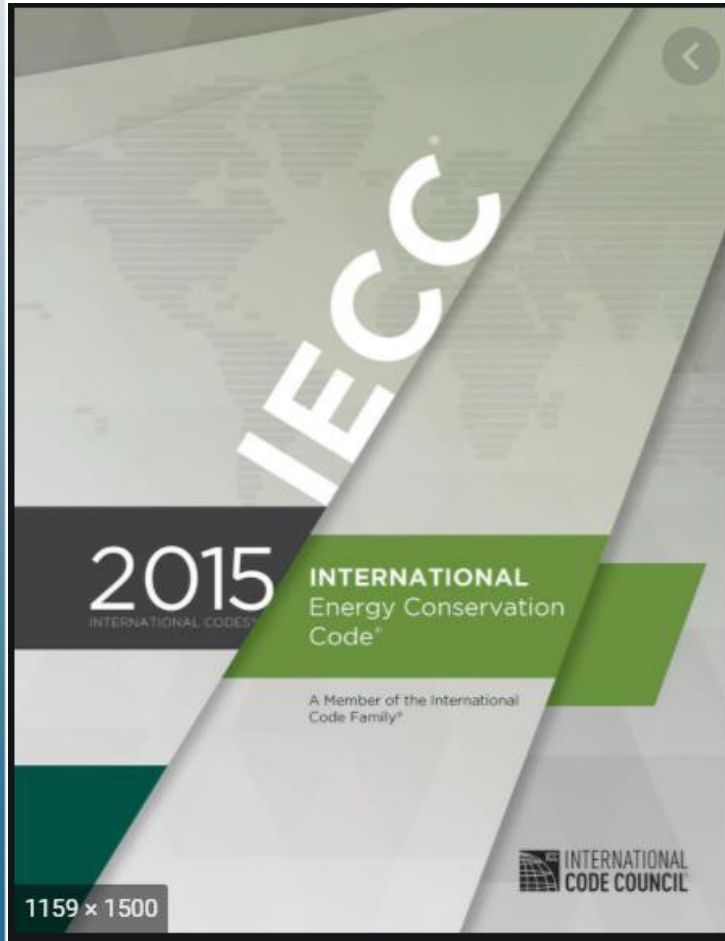


# El trabajo que hacen es muy IMPORTANTE!

Un recibo de la luz que es mas barato puede hacer la diferencia en una pareja de ancianos poder comprar medicamentos y también una madre comprar comida para sus hijos.



# Current State Law



2015 session of TX Legislature passed HB 1736 adopting IRC energy provisions for residential effective Sept. 1, 2016



# Layout of the IECC

Chapter 1 – Scope and Administration

Chapter 2 – Definitions

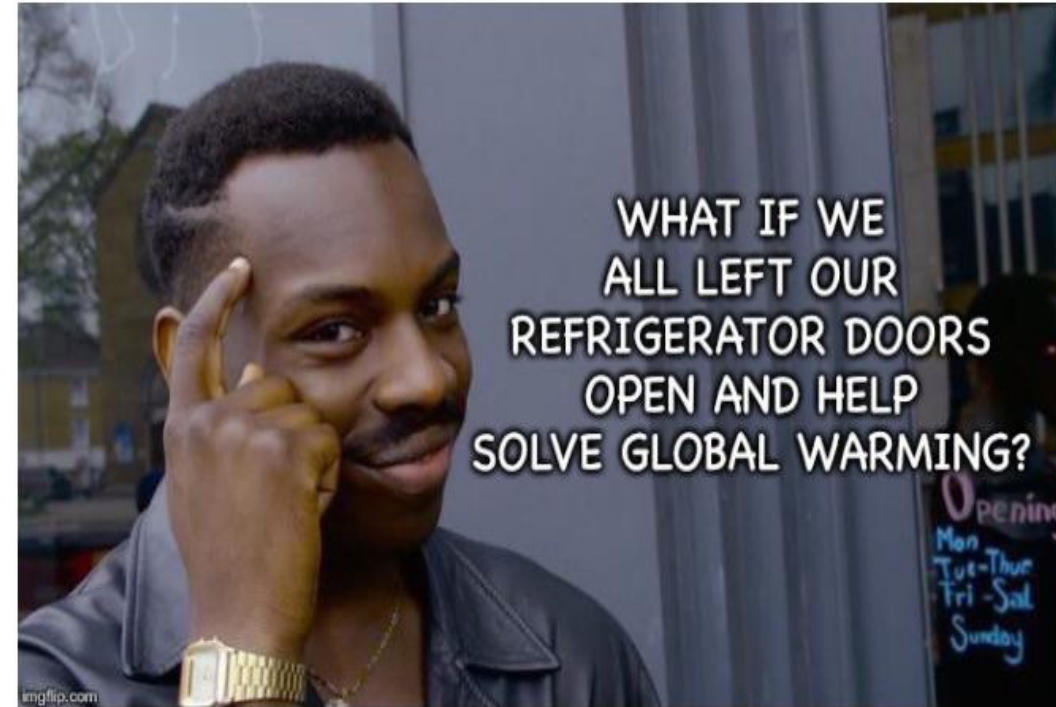
Chapter 3 – General Requirements

Chapter 4 – Residential Energy Efficiency

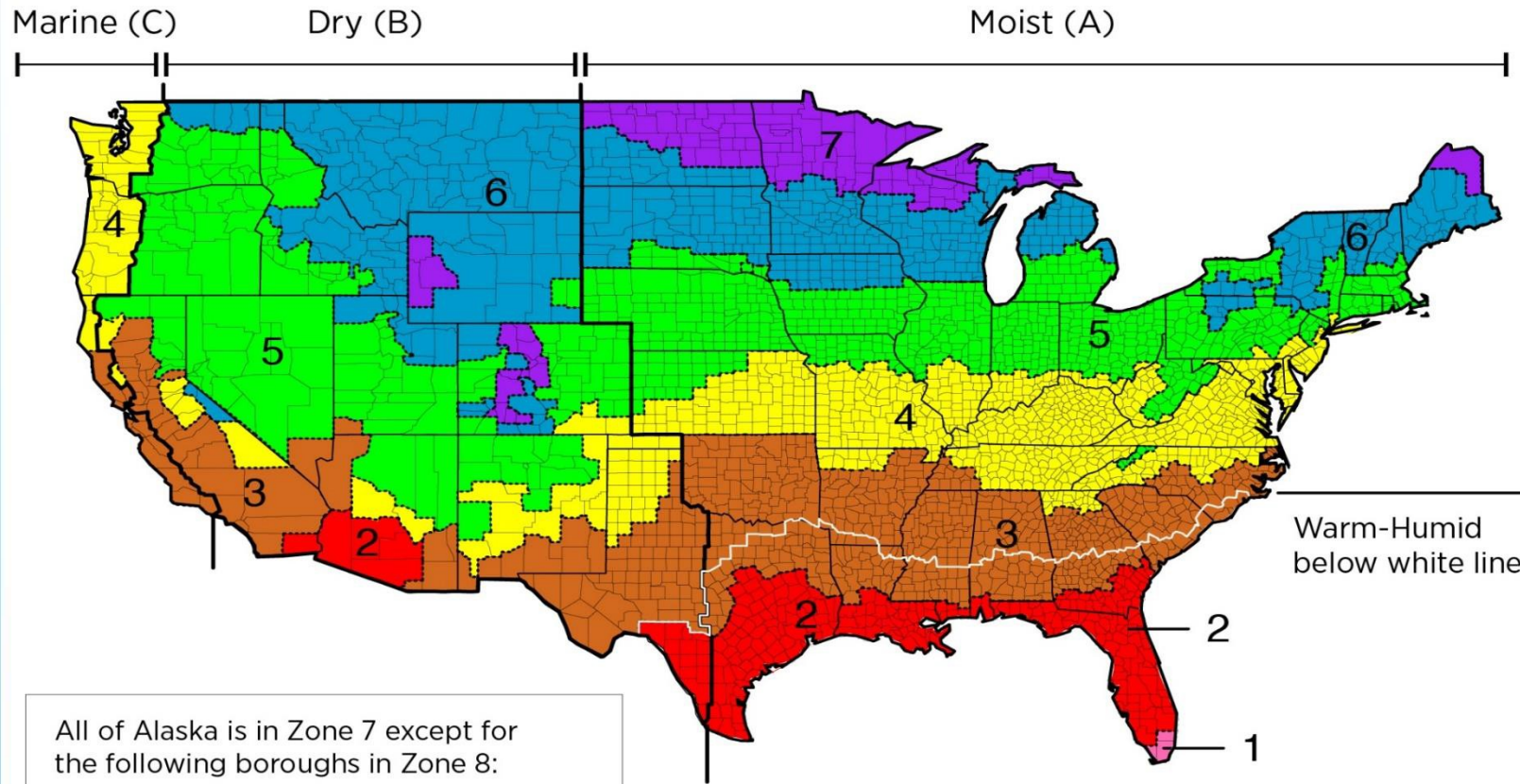
Chapter 5 – Existing Buildings

Chapter 6 – Referenced Standards

Appendices



# Climate Zone... What Exactly is a Climate Zone?



- Found in Chapter 3
- Listed by county

All of Alaska is in Zone 7 except for the following boroughs in Zone 8:  
Bethel, Northwest Arctic, Dellingham, Southeast Fairbanks, Fairbanks N. Star, Wade Hampton, Nome, Yukon-Koyukuk, North Slope

Zone 1 includes Hawaii, Guam, Puerto Rico, and the Virgin Islands

# Chapter 1 – Scope and Administration

## R103.2 Information on Construction Documents

- Insulation materials and R-values
- Window U-factor and SHGC
- Area weighted U and SHGC calculations
- Mechanical system design criteria
- Mechanical and hot water-heating system types, sizes and efficiencies
- Equipment and system controls
- Duct sealing, duct and pipe insulation and location
- Air sealing details

### R103.2.1 Building Thermal Envelope Depiction

# Required Inspections – Energy Related

**Footing and foundation inspection – N/A**

**Framing and rough-in inspection**

**Plumbing rough-in inspection**

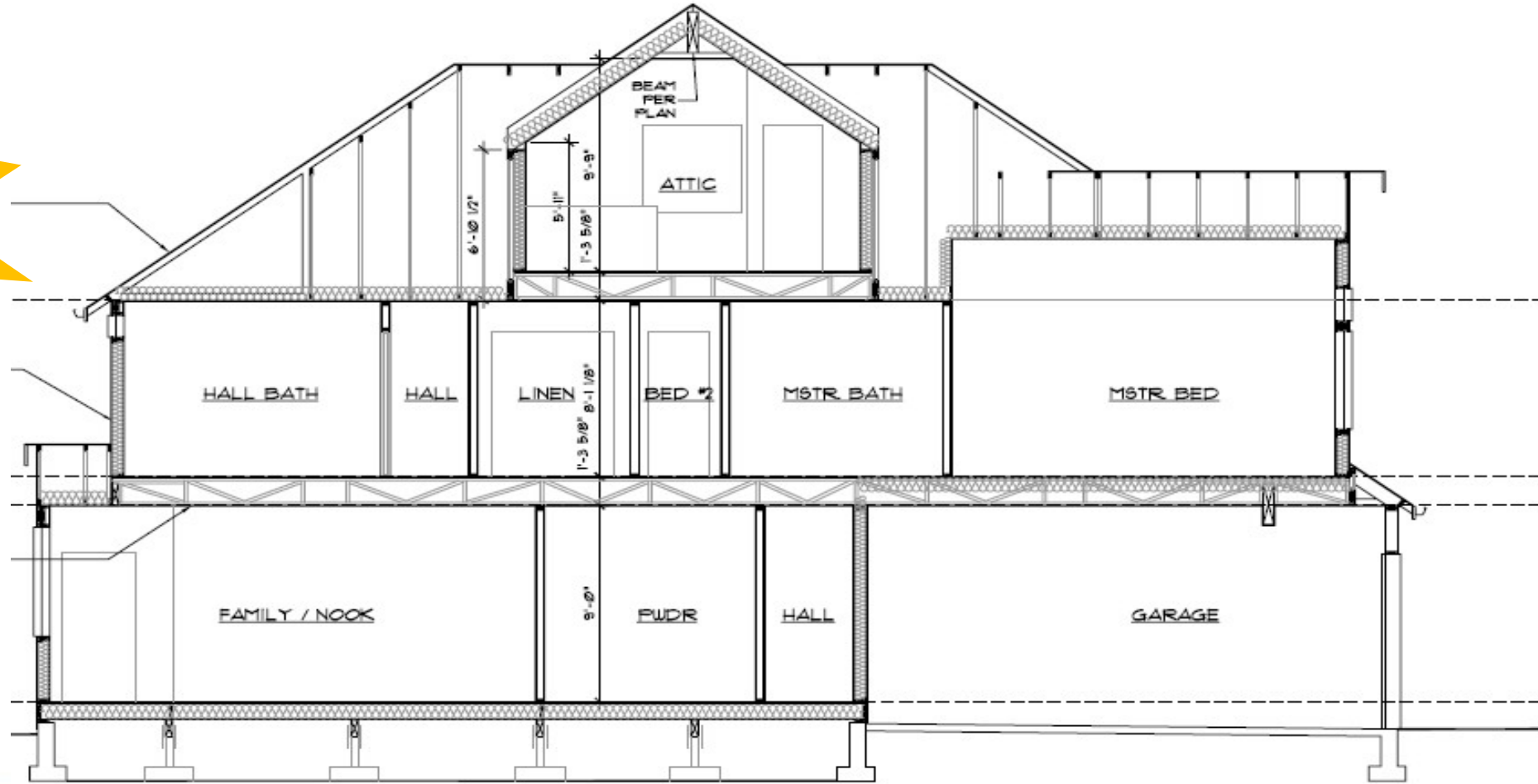
**Mechanical rough-in inspection**

Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding *R*-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation, and minimum fan efficiency.

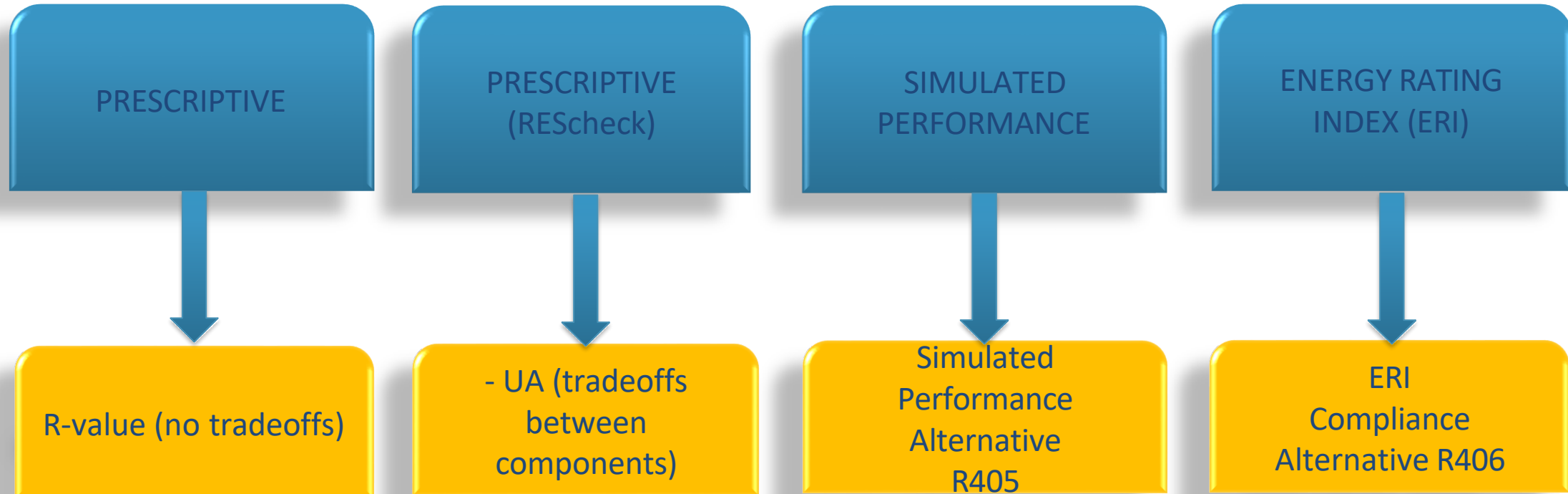
**Final inspection**

# Building Thermal Envelope

All vertical walls have six sides



# IECC Compliance - Four Options





# 2015 Envelope and Fenestration Table

Climate Zone	U-Factor	SHGC	Ceiling R-value	Wood Wall	Mass Wall	Floor R-value	Base-ment	Slab	Crawl
1	NR	.25	30	13	3/4	13	0	NR	NR
2	.40	.25	38	13	4/6	13	0	NR	NR
3	.35	.25	38	20 or 13+5	8/13	19	5/13	NR	5/13
4	.35	.40	49	20 or 13+5	8/13	19	10/13	10, 2ft	10/13

# You Need Software!

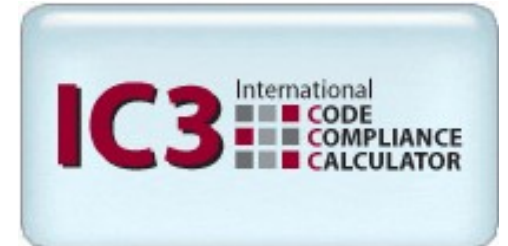
Prescriptive – Total UA



Performance R405



**REM/Rate**<sup>TM</sup>



Energy Rating Index R406

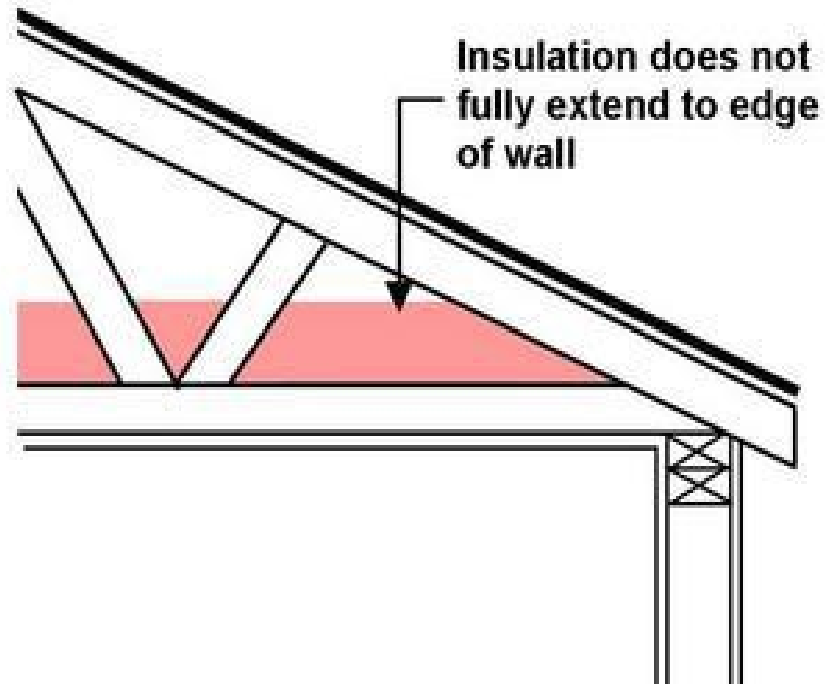
# All Mandatory Measures must be completed regardless of compliance path!

## 2015 Residential Mandatory Requirements

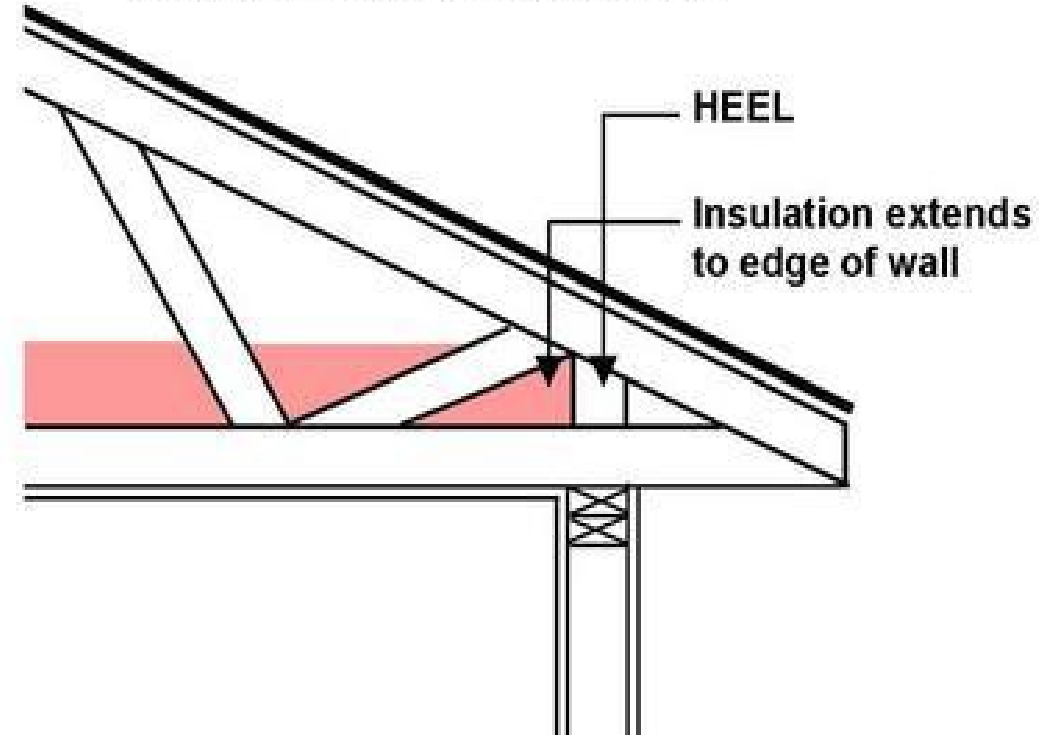
- R401.3 Certificate
- R402.4 Air leakage – Basically installation table and testing
- R402.5 Max U-factor and SHGC
- R403.1 Controls
- R403.3.2 Sealing & R403.3.3 Duct testing
- R403.3.5 Building cavities
- R403.4 Mechanical system piping insulation
- R403.5.1 Heated water circ and temp maintenance systems
- R403.6 Mechanical ventilation
- R403.7 Equipment sizing and efficiency rating
- R403.8 Systems serving multiple units & R403.9 Snow melt
- R403.10 Pool and spa energy consumption. 403.11 Spas
- R404.1 Lighting equipment

# Ceiling Insulation

CONVENTIONAL TRUSS DESIGN

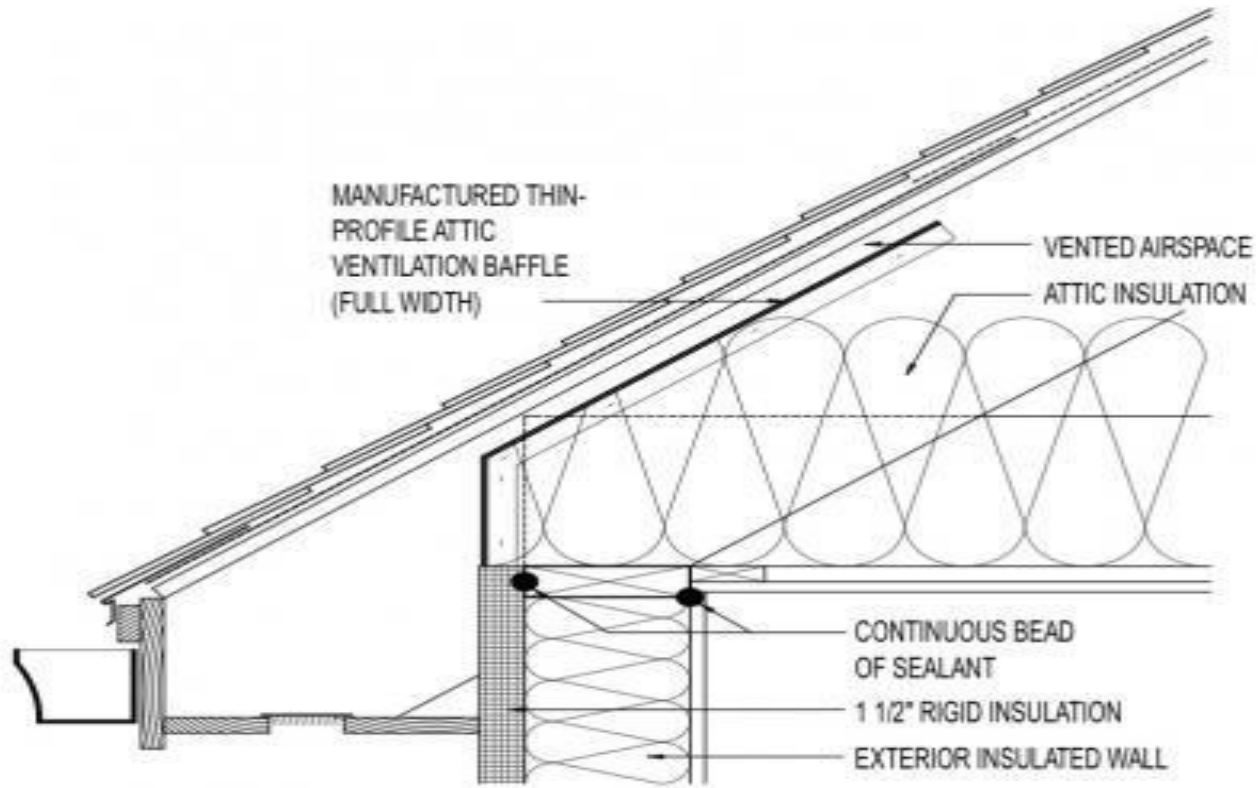


ENERGY HEEL TRUSS DESIGN



\*Reduction NOT allowed in REScheck (Total-UA)

# Ceiling Insulation



\*NEW in the 2021 - baffles shall be installed continuously to prevent ventilation air in the eave soffit from bypassing the baffle.

# Attic Access



**2015 R402.2.4 Access hatches and doors.** Access doors from conditioned spaces to unconditioned spaces such as attics and crawl spaces shall be weather-stripped and insulated to a level equivalent to the insulation on the surrounding surfaces.

# Insulation Grading – Impact of Gaps



- R-13 wall
  - No gaps = R-13
  - 2% gaps = R-11
  - 4% gaps = R-9



- R-30 attic
  - No gaps = R-30
  - 2% gaps = R-18
  - 4% gaps = R-13



- R-15 wall
  - No gaps = R-15
  - 2% gaps = R-12
  - 4% gaps = R-10



- R-19 floor
  - No gaps = R-19
  - 2% gaps = R-13
  - 4% gaps = R-10



# Attic Knee Walls





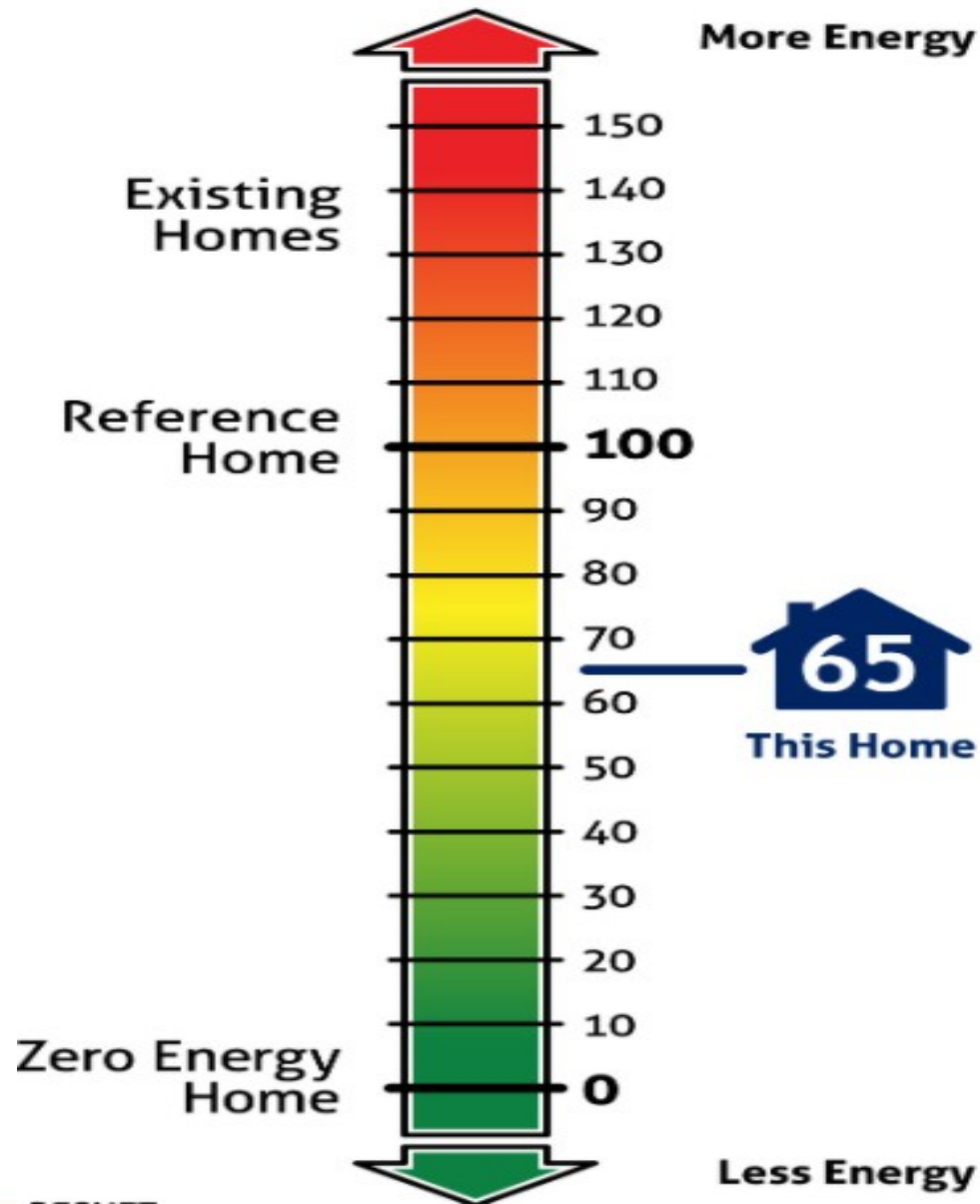
# Framing Corners and Tees

# Penetrations: All plumbing, wiring and mechanical penetrations sealed



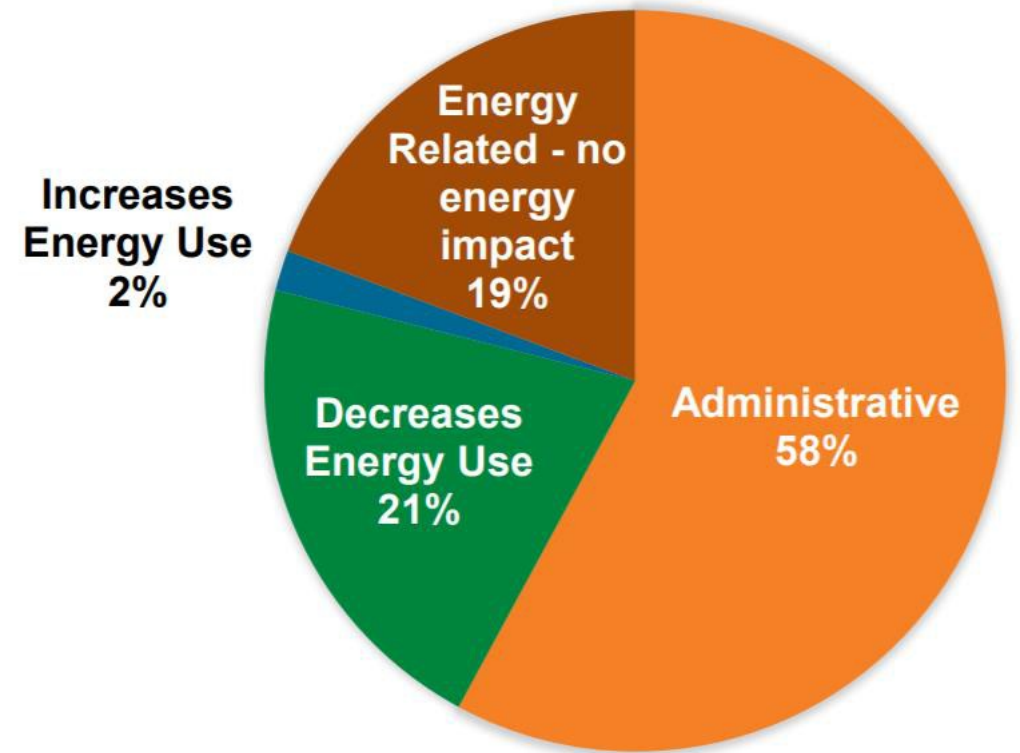
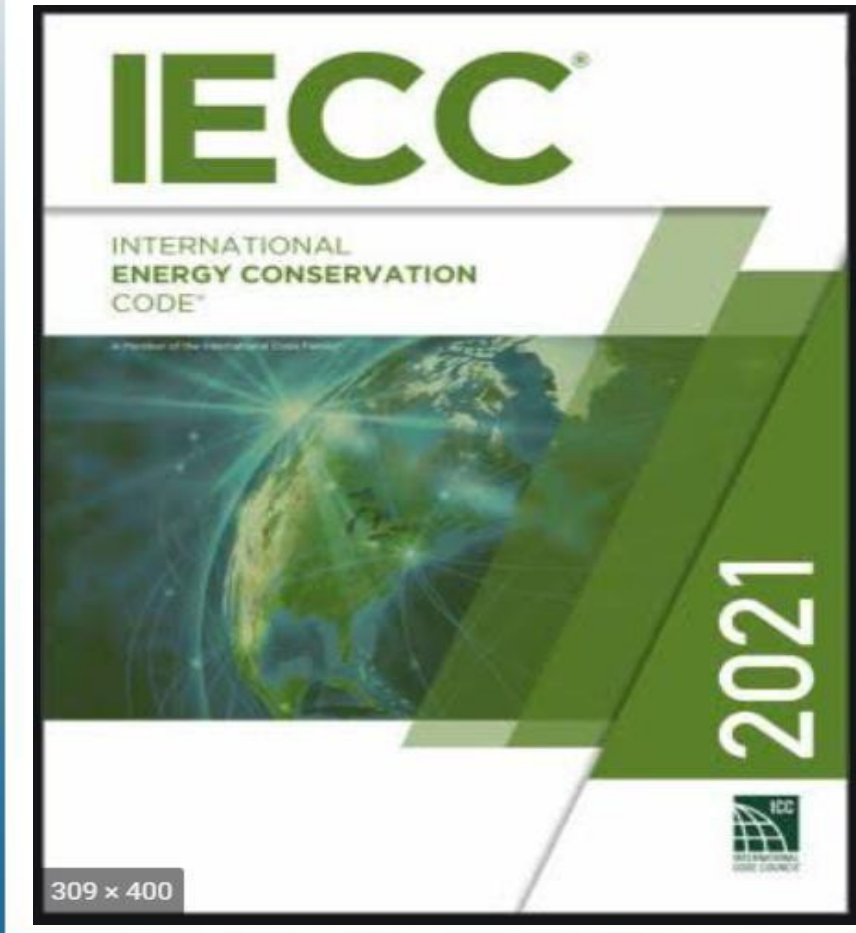
The penetrations on this unit appear to be sealed BUT there are 2 code violations evident here. Can you spot them?

- ERI is a scale. 100 = 2006 IECC
- 0 = A Building that uses net zero energy
- Compares energy use of Rated Design to Reference Design
- Requires Code Official to verify software compliance



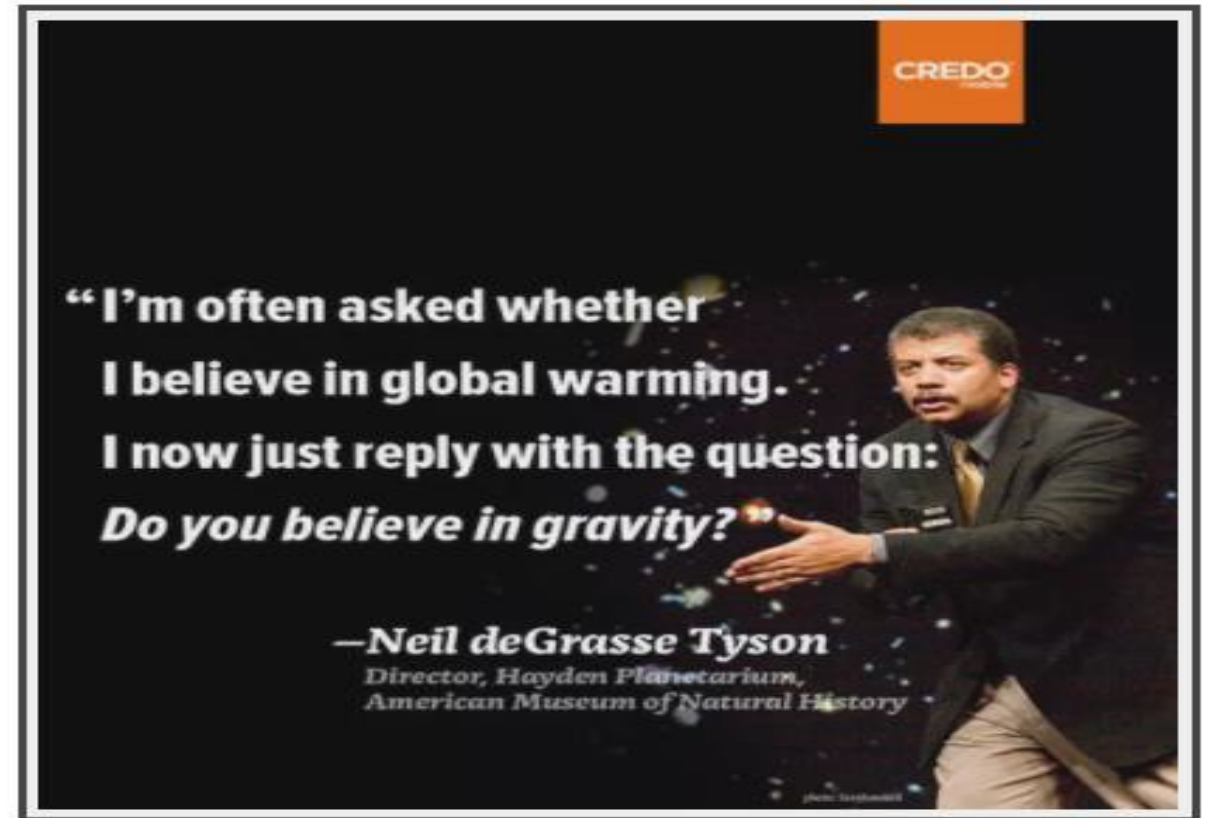
R406 ERI  
aka a  
HERS  
score

# 2021 IECC Discussion - 114 Changes



# Changing CZ's – It's Getting Warmer

- Cameron from 2A to 1A
- Dallas from 3A to 2A
- Ellis from 3A to 2A
- **Hidalgo from 2A to 1A**
- Johnson from 3A to 2A
- Navarro from 3A to 2A
- Tarrant from 3A to 2A
- **Willacy from 2A to 1A**



# Lots of Changes to the Baselines

Climate Zone	U-Factor	SHGC	Ceiling R-value	Wood Wall	Mass Wall	Floor R-value	Base-ment	Slab R & Depth
1	NR*	.25	<b>30</b>	13 or 0+10	3/4	13	0	0
2	.40	.25	<b>49</b>	13 or 0+10	4/6	13	0	0
3	<b>.30</b>	.25	<b>49</b>	20 or 13+5 or 0+15	8/13	19	5/13	<b>10ci, 2ft</b>
4	<b>.30</b>	.40	<b>60</b>	<b>20+5 or 13+10 or 0+15</b>	8/13	19	10/13	<b>10ci, 4ft</b>

# Significant Changes – Definitions

**DIMMER.** A control device that is capable of continuously varying the light output and energy use of light sources.

**DWELLING UNIT ENCLOSURE AREA.** The sum of the area of ceiling, floors, and walls separating a *dwelling unit's conditioned space* from the exterior or from adjacent conditioned or unconditioned spaces. Wall height shall be measured from the finished floor of the *dwelling unit* to the underside of the floor above

**OCCUPANT SENSOR CONTROL.** An automatic control device that detects the presence or absence of people within an area and causes lighting, equipment or appliances to be regulated accordingly.

**RENEWABLE ENERGY CERTIFICATE (REC).** An instrument that represents the environmental attributes of one megawatt hour of renewable energy; also known as an energy attribute certificate (EAC).

**RENEWABLE ENERGY RESOURCES.** Energy derived from solar radiation, wind, waves, tides, landfill gas, biogas, biomass or extracted from hot fluid or steam heated within the earth.

# Changes – Definitions



**THERMAL DISTRIBUTION EFFICIENCY (TDE).** The resistance to changes in air heat as air is conveyed through a distance of air duct. TDE is a heat loss calculation evaluating the difference in the heat of the air between the air duct inlet and outlet caused by differences in temperatures between the air in the duct and the duct material. TDE is expressed as a percent difference between the inlet and outlet heat in the duct.



# Changes – Certificate

1. Energy compliance path & Code Edition
2. Insulation materials and their *R*-values
3. Fenestration *U*-factors and *solar heat gain coefficients* (SHGC)
4. Area-weighted *U*-factor and SHGC calculations.
5. Mechanical system design criteria
6. Mechanical and service water-heating systems and equipment types, sizes and efficiencies
7. Equipment and system controls
8. Duct sealing, duct and pipe insulation and location
9. Air sealing details

Energy Efficiency Certificate					
Insulation Rating		R-Value		R-Value	
Ceiling /Roof	<i>Attic</i>	<i>R- 38</i>	<i>Vaulted</i>	<i>R- 30</i>	
Walls	Frame	<i>R- 20</i>	Mass	<i>R- N/A</i>	
	Basement	<i>R- 10</i>	Crawl space	<i>R- 10</i>	
Floors	Over unconditioned space	<i>R- 19</i>	Slab edge	<i>R- 10</i>	
Ducts	Attic	<i>R- 8</i>	Other	<i>R- N/A</i>	
Air Leakage Test Results					
Blower door	<b>3.0</b>	ACH/50 Pa.	Duct testing	<b>4.0</b> Cfm/100 ft <sup>2</sup>	
Fenestration Rating		NFRC U-Factor		NFRC SHGC	
Window		<i>U- 0.32</i>		<i>0.60</i>	
Opaque door		<i>U- 0.32</i>		<i>N/A</i>	
Skylight		<i>U- 0.55</i>		<i>0.60</i>	
Equipment Performance		Type	Efficiency		
Heating system		<i>Gas forced-air</i>	<i>90%</i>	AFUE	
Cooling system		<i>Central AC</i>	<i>15</i>	SEER	
Water heater		<i>Gas (Storage-type)</i>	<i>0.57</i>	EF	
Indicate if the following have been installed (an efficiency shall not be listed)					
<input type="checkbox"/>	electric furnace	<input type="checkbox"/>	gas-fire unvented room heater	<input type="checkbox"/>	baseboard electric heater
Designer/builder					
Code edition	<b>2012 IRC</b>	Date	<b>01/2/2013</b>		

# Changes – Maintenance/Labels

## R303.3 Maintenance information.

Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily **visible** label. The label shall include the title or publication number for the operation and maintenance manual for that model and type of product.





# Insulation Certificate

Insulation installers shall provide a certification that indicates the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown-in or sprayed fiberglass and cellulose insulation, the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be indicated on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and the *R*-value of the installed thickness shall be indicated on the certification.

# Fantastic Resources for Installers

<http://insulationinstitute.org/wp-content/uploads/2016/04/NAIMA-Tech-Tips-and-Critical-Details-Spanish.pdf>

<https://insulationinstitute.org/tools-resources/grade-1-insulation-certification-training/>

<https://insulationinstitute.org/tools-resources/resource-library/installation-application/>



# Additional Efficiency Required – 5 Options

## **R401.2.5 Additional energy efficiency.**

1. For buildings complying with Section R401.2.1, (**prescriptive**) one of the additional efficiency package options shall be installed according to Section R408.2.
2. For buildings complying under with Section R401.2.2 , (**performance**) the building shall meet one of the following:
  1. One of the additional efficiency package Options in Section R408.2 shall be installed without including such measures in the proposed design under Section R405; or
  2. The proposed design of the building under Section R405.3 shall have an annual energy cost that is less than or equal to 95 percent of the annual energy cost of the standard reference design.
3. For buildings complying with the Energy Rating Index alternative (**ERI**) Section R401.2.3, the Energy Rating Index value shall be at least 5 percent less than the Energy Rating Index target specified in Table R406.5.

The option selected for compliance shall be identified in the certificate required by Section R401.3.

## #1 Option - R408.2.1 Enhanced envelope performance option.

The total *building thermal envelope* UA, the sum of *U*-factor times assembly area, shall be less than or equal to 95 percent of the total UA resulting from multiplying the *U*-factors in Table R402.1.2 by the same assembly area as in the proposed building. The UA calculation shall be performed in accordance with Section R402.1.5. The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table R402.1.2.



## **Option #2 - R408.2.2 More efficient HVAC equipment performance option.**

Heating and cooling *equipment* shall meet one of the following efficiencies:

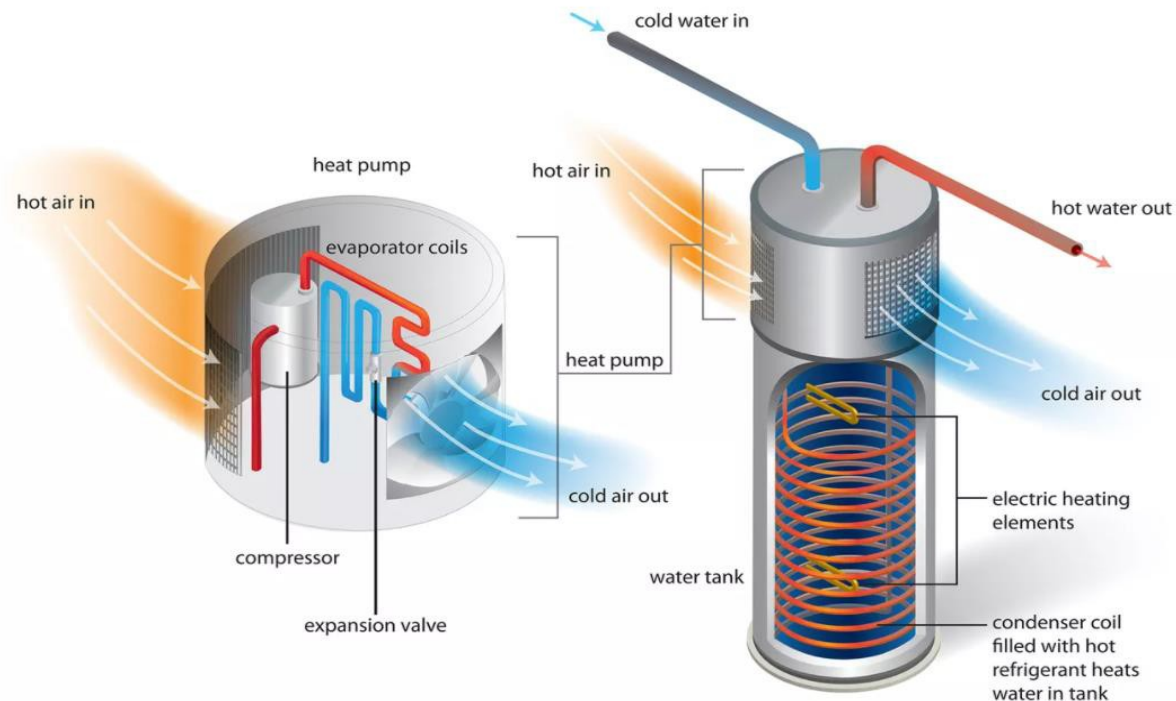
1. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner.
2. Greater than or equal to 10 HSPF/16 SEER air source heat pump.
3. Greater than or equal to 3.5 COP ground source heat pump.

For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.

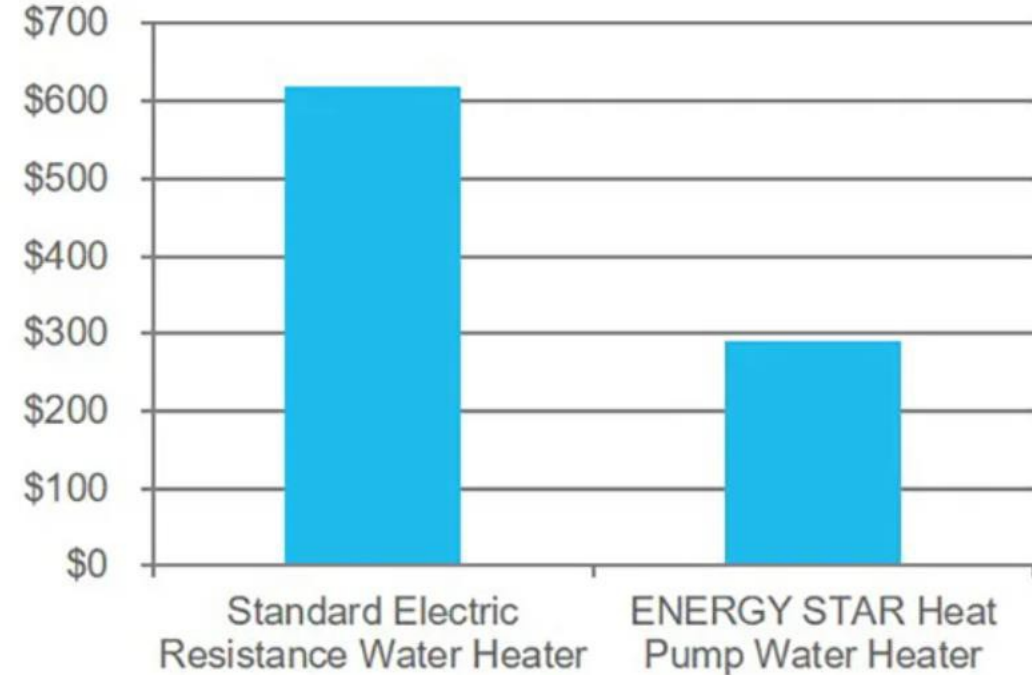
## Option # 3 - R408.2.3 Reduced energy use in service water-heating option.

...One of the following efficiencies:

- 1) Greater than or equal to 82 EF fossil fuel service water-heating system.
- 2) Greater than or equal to 2.0 EF electric service water-heating system.
- 3) Greater than or equal to 0.4 solar fraction solar water-heating system.



Annual Energy Costs for an Electric Storage Water Heater (4-person Family)





# A Texas Attic in August...

## Option 4 - R408.2.4 More efficient duct thermal distribution system option.

...one of the following efficiencies:

1. 100 percent of ducts and air handlers located entirely within the *building thermal envelope*.
2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system located completely inside the *building thermal envelope*.
3. 100 percent of duct thermal distribution system located in *conditioned space* as defined by Section R403.3.2.

## Option #5 R408.2.5 Improved air sealing and efficient ventilation system option.

The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt (0.03 m<sup>3</sup>/min/watt) and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).



# Attic Access (from conditioned space)

Marwin – Made in Texas!



**R402.2.4.1 Attic access hatches and doors.** Access hatches and doors from conditioned to unconditioned spaces such as attics and crawl spaces shall be insulated to the same *R-value* required by [Table R402.1.3](#) for the wall or ceiling in which they are installed...

NEW Exceptions... R-10...

Still needs to be weatherstripped and have an insulation dam

# About Time the Code Addresses This

**R402.2.4.1...** Where loose-fill insulation is installed, a wood-framed or equivalent baffle or retainer, or dam shall be installed to prevent the loose-fill insulation from spilling into the living spaces, from higher to lower sections of the attic and from attics covering conditioned spaces to unconditioned spaces. The baffle or retainer shall provide a permanent means of maintaining the installed *R*-value of the loose-fill insulation.



# Table Changes – Added “Air Sealing”

Rim joists	<p>Rim joists shall include an exterior air barrier.<sup>b</sup></p> <p>The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.</p>	<p>Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.<sup>b</sup></p>
Shafts, penetrations	<p>Duct and flue shafts and other similar penetrations to exterior or unconditioned space shall be sealed to allow for expansion, contraction and mechanical vibration.</p> <p>Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.</p>	<p>Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required R-value.</p>

# Table Changes – Continued

Narrow cavities	Narrow cavities of 1 inch or less that are not able to be insulated shall be air sealed.	Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.
Plumbing, wiring or other obstructions	All holes created by wiring, plumbing or other obstructions in the air barrier assembly shall be air sealed.	Insulation shall be installed to fill the available space and surround wiring, plumbing, or other obstructions, unless the required <i>R</i> -value can be met by installing insulation and air barrier systems completely to the exterior side of the obstructions.

# Other Residential Changes of Note



- 5 ACH allowance\* or 0.28 cfm/ft<sup>2</sup> (0.30 cfm/ft<sup>2</sup> exception)
- NEMA OS 4 electrical boxes (air sealed)\*\*
- Mechanical ventilation testing required
- 100% High Efficacy lighting
- Lighting controls for residential
- Heated Garage requirements

# Windows

 National Fenestration Rating Council® <b>CERTIFIED</b>	PWG CPD#: GLW-M-125-00001-00001	
	Vinyl Frame Double Glazing      No Grids Low-E                      Argon Fill	
<b>Casement</b>		
<b>ENERGY PERFORMANCE RATINGS</b>		
U-Factor <b>0.26</b> <b>1.48</b> (U.S./I-P)      (Metric/SI)		Solar Heat Gain Coefficient <b>0.25</b>
<b>ADDITIONAL PERFORMANCE RATINGS</b>		
Visible Transmittance <b>0.47</b>		Air Infiltration <b>&lt;0.3</b> <b>&lt;1.5</b> (U.S./I-P)      (Metric/SI)
<small>Manufacturer certifies that these ratings conform to applicable NFRC procedures for determining whole product performance. NFRC ratings are determined for a fixed set of environmental conditions and a specific product size. NFRC does not recommend any product and does not warrant the suitability of any product for any specific use. Consult manufacturer's literature for other product performance information. www.nfrc.org</small>		

## R402.4.3 Fenestration air leakage.

Windows, *skylights* and sliding glass doors shall have an **air infiltration** rate of not greater than 0.3 cfm per square foot (1.5 L/s/m<sup>2</sup>), and for swinging doors, not greater than 0.5 cfm per square foot (2.6 L/s/m<sup>2</sup>), when tested in accordance with 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.



# There are 2 Sides to This Story



Electrical and communication outlet boxes installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces. Electrical and communication outlet boxes shall be tested in accordance with [NEMA OS 4](#), *Requirements for Air-Sealed Boxes for Electrical and Communication Applications*, and shall have an air leakage rate of not greater than 2.0 cubic feet per minute (0.944 L/s) at a pressure differential of 1.57 psf (75 Pa). Electrical and communication outlet boxes shall be marked “NEMA OS 4” or “OS 4” in accordance with [NEMA OS 4](#). Electrical and communication outlet boxes shall be installed per the manufacturer's instructions and with any supplied components required to achieve compliance with [NEMA OS 4](#).



## R8 Only, Ducts in A/C, + Buried Ducts



Supply and return ducts located outside *conditioned space* shall be insulated to an *R*-value of not less than R-8 for ducts 3 inches (76 mm) in diameter and larger and not less than R-6 for ducts smaller than 3 inches (76 mm) in diameter. Ducts buried beneath a building shall be insulated as required per this section or have an equivalent thermal distribution efficiency. Underground ducts utilizing the thermal distribution efficiency method shall be listed and *labeled* to indicate the *R*-value equivalency.

# R403.5.1 Heated water circulation and temperature maintenance systems

If you have a recirculation system...

- Pumps required, no gravity or thermosyphon
- Pumps must be demand controlled, not continuous (timer ok 2012 and 2009)
- Demand controls (2015+) – switch or occupancy sensor



It must be controlled!

**Table M1507.3.3(1) - 2015 IRC**

Dwelling unit Floor Area (sq <sup>ft</sup> )	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	>7
	AIRFLOW IN CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,501	105	120	135	150	165

Table M1507.3.3(1): Continuous Whole-House Mechanical Ventilation System Airflow Rate Requirements  
For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 cubic foot per minute = 0.0004719 m<sup>3</sup>/s.

### Intermittent Run-Time Multiplication Factors

Run- Time Percentage In Each 4-Hour Segment	25%	33%	50%	66%	75%	100%
Factor <sup>a</sup>	4	3	2	1.5	1.3	1.0

Table M1507.3.3(2): Intermittent Whole-House Mechanical Ventilation Rate Factors<sup>a, b</sup>

<sup>a</sup> For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.

<sup>b</sup> Extrapolation beyond the table is prohibited.

# Continuous Ventilation Airflow Requirements

# 2021 IECC... TESTING!

**R403.6.3 Testing.** Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6. Testing shall be performed according to the ventilation *equipment* manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts. Where required by the code official, testing shall be conducted by 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.

**Exception:** Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.

FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV	Any	1.2 cfm/watt
In-line supply or exhaust fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
Other exhaust fan	≥ 90	3.5 cfm/watt
Air-handler that is integrated to tested and <i>listed</i> HVAC equipment	Any	1.2 cfm/watt

# Lighting - 70 LPW, 100%, Sensor/Dimmer

**750 Lumens - LED A19 - 9 Watt - 60W Equal - 5000 Kelvin**

Daylight White - Medium Base - 120 Volt - PLT-11490



4.0 (1)

[Write a review](#)

[Ask a question](#)

**This light is 84LPW, Code requires 70+**



Producing a bright **daylight white** light, this PLT LED A19 gives spaces better visibility while saving up to 85 percent in energy usage when compared to a standard 60-Watt incandescent. This PLT A19 lamp conveniently fits most general lighting fixtures in residential and commercial spaces.

- Frosted lens is made of plastic for shatter resistance
- **UL** listed for use in damp locations
- Lights at a full 240-degree beam

[View Specs & Details](#)

**\$0.93** ea.

Quantity



1



[Add to Cart](#)

SKU: PLT-11490

Dimmable starts at \$1.04

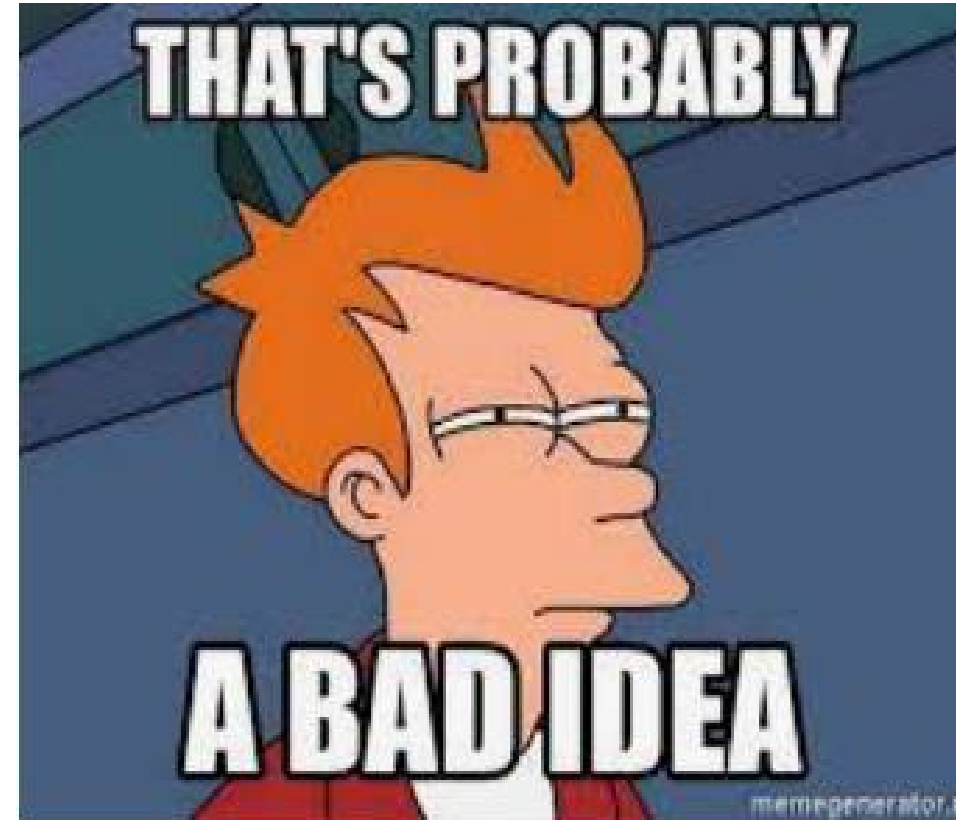
# Mixed Emotions Here

## **R404.2 Interior lighting controls.**

Permanently installed lighting fixtures shall be controlled with either a dimmer, an occupant sensor control Or other control that is installed or built into the fixture.

**Exception:** Lighting controls shall not be required for the following:

1. Bathrooms.
2. Hallways.
3. Exterior lighting fixtures.
4. Lighting designed for safety or security.



**\*This →  
was actually  
proposed...**

(One of the reasons I  
think moving to a  
standard is a good idea)

\* I have to assume bedrooms were not on the list of spaces

*R404.2 (IRC N1104.2) Lighting Controls (Mandatory). At least one permanently installed luminaire in each of the following spaces shall be controlled with an occupant sensor control with manual on capability and which automatically turns off lights within 20 minutes after all occupants have left the space.*





# 100% On Board Here

## **R404.3 Exterior lighting controls.**

Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall comply with the following:

1. Lighting shall be controlled by a manual on and off switch which permits automatic shut-off actions.

**Exception:** Lighting serving multiple *dwelling units*.

2. Lighting shall be automatically shut off when daylight is present and satisfies the lighting needs.

3. Controls that override automatic shut-off actions shall not be allowed unless the override automatically returns automatic control to its normal operation within 24 hours.

# Don't forget about the 45L Tax Credit...

“...builders who go ahead and move to the 2021 code now are likely to qualify for the \$2,000 Section 45 New Home builder tax credit and get an Energy Star label on the home” Curt Rich - NAIMA

## Currently Proposed Legislation:

- Homes labeled by the EPA ENERGY STAR Homes Program. The credit for meeting ENERGY STAR would be \$2,500.

- Homes labeled by the DOE Zero Energy Ready Homes Program. The credit for meeting Zero Energy Ready Homes Program would be \$5,000.

... and on to  
the HVAC  
portion

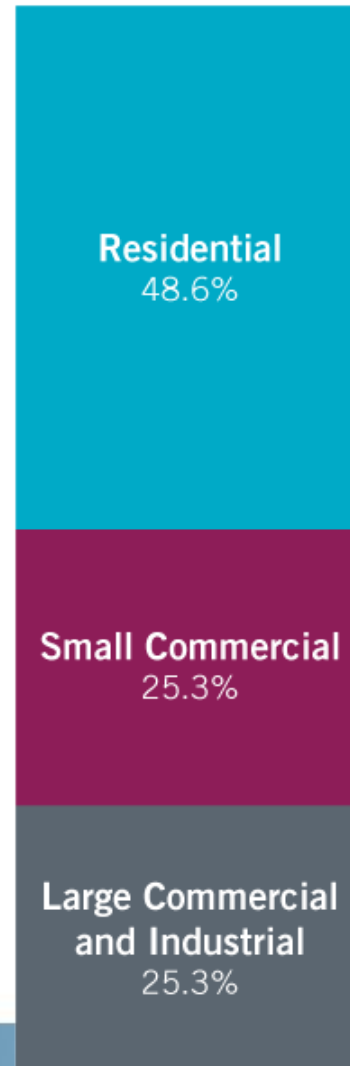
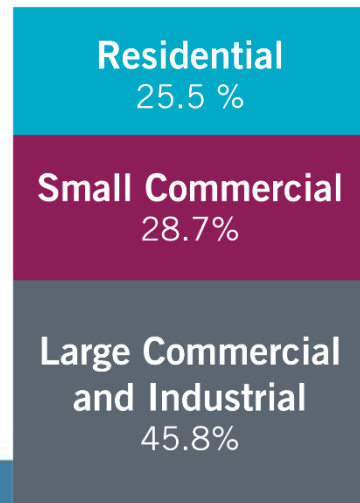
Not a bad idea →



**Determined to keep heating bills to a minimum, Ken had the contractor install a placebo thermostat in the new house.**

# Summer Weather Impacts on Load by Customer Type

Thursday, March 24, 2016  
5:00 p.m.  
ERCOT Load: 33,597 MW  
Temperature in Dallas: 62°



Thursday, Aug. 11, 2016  
5:00 p.m.  
ERCOT Load: 71,093 MW  
Temperature in Dallas: 106°

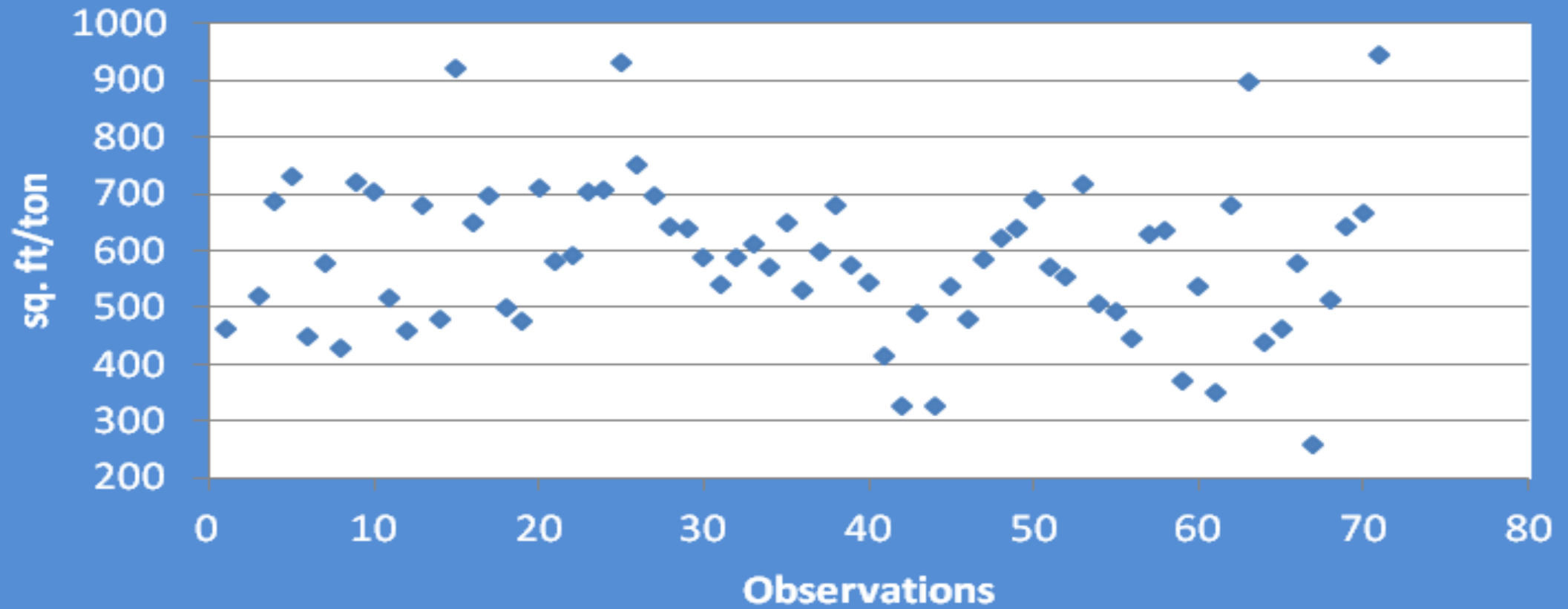


*>37,000 MW of weather-sensitive load -- 53% of peak*

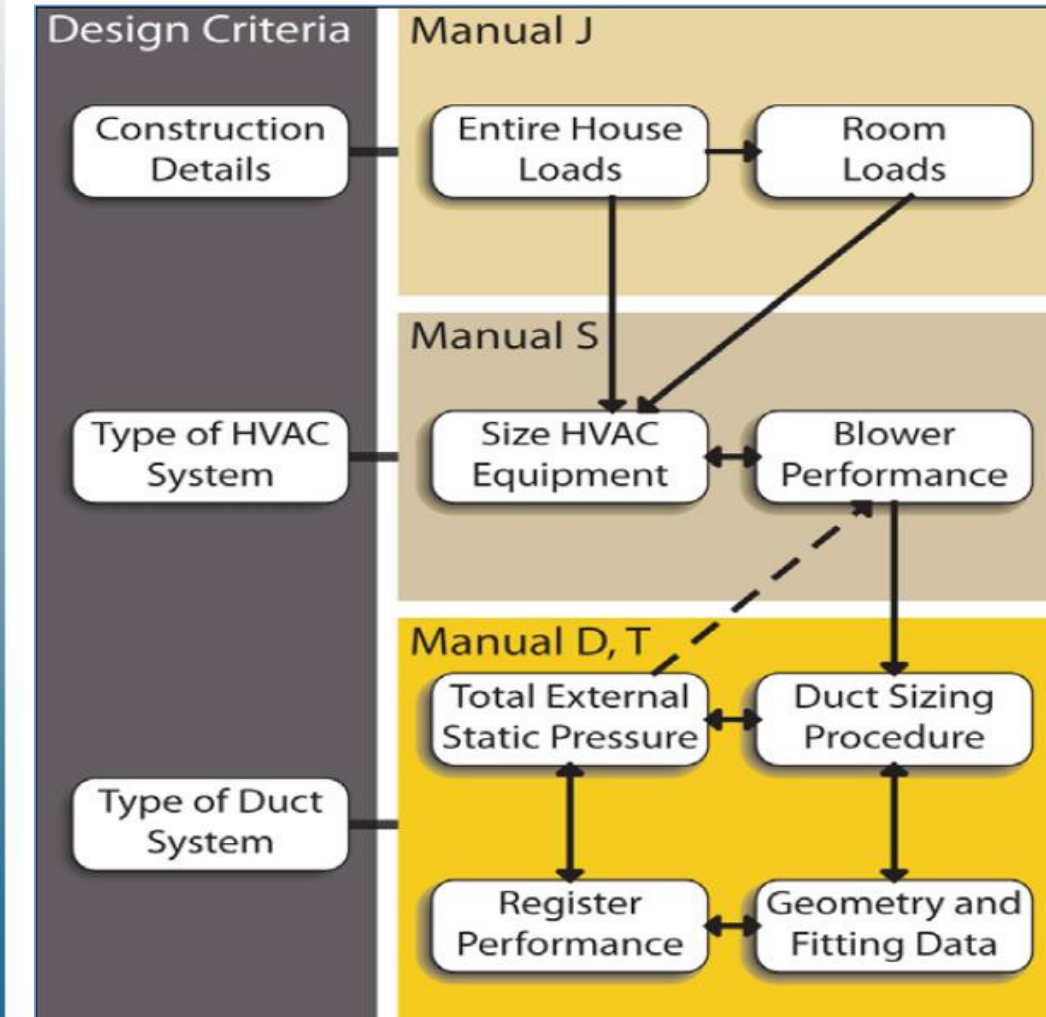
- Customer class breakdown is for competitive choice areas; percentages are extrapolated for municipals and co-ops to achieve region-wide estimate
- Large C&I are IDR Meter Required (>700kW)
- Hourly integrated demand values

# Cooling capacity Sq.ft./ton

70 Observations



# ACCA Manuals J, S, D and T



Required- IECC/IRC  
Manual J & Manual S or other  
approved method

2015 R403.7

2009 & '12 403.6

Required – IRC 1601.1  
Design the ductwork according to  
Manual D or other approved  
method

# Manuals J, S, T & D

- Right sizing and equipment selection – REQUIRED!
- Systems run more efficiently
- Longer cycles dehumidify better, comfort and durability better too
- Smaller units use less power
- Lower up front costs
- Systems must be right sized to apply for utility incentives
- Tamaño adecuado y seleccion de equipo– Requerido!
- Funciona mas eficiente el sistema
- Ciclos mas largos, Deshumece mejor , mas duradero y comodo
- Equipos mas pequeños consumen menos luz
- Menos gastos al principio
- Sistema tiene que ser del tamaño adecuado para calificar para reembolsos

# Return Air Strategies? What are your Rules of Thumb?

- If you're using just one return you've very likely undersized the return air





# Ventilation

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

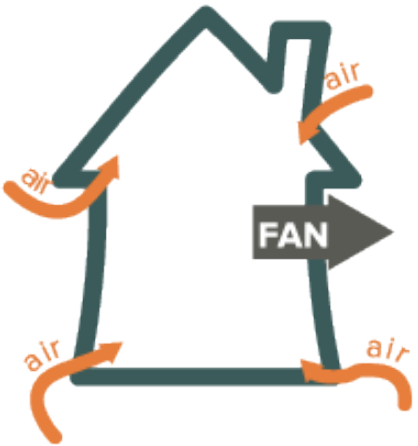
**R403.6.1 Whole-house mechanical ventilation system fan efficacy.** Mechanical ventilation system fans shall meet the efficacy requirements of Table R403.6.1.

**Exception:** Where mechanical ventilation fans are integral to tested and listed HVAC equipment, they shall be powered by an **electronically commutated motor.**

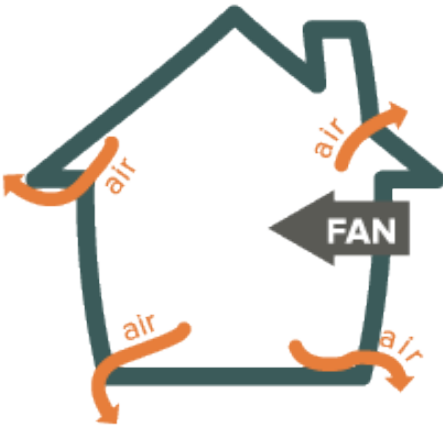
Whole house ventilation system details on construction documents

# 2015 IECC/IRC requires a whole house ventilation system, What does that mean?

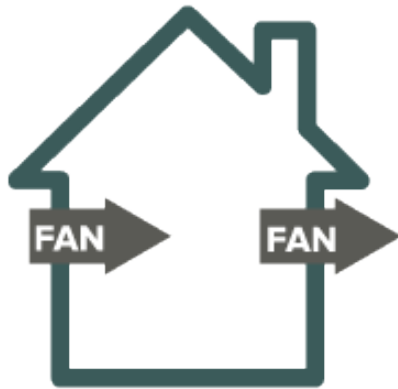
Exhaust



Supply



Balanced



# Continuous Ventilation Airflow Requirements

Table M1507.3.3(1)  
2015 IRC

Dwelling unit Floor Area (sq <sup>ft</sup> )	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	AIRFLOW IN CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,501	105	120	135	150	165

Table M1507.3.3(1): Continuous Whole-House Mechanical Ventilation System Airflow Rate Requirements  
For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 cubic foot per minute = 0.0004719 m<sup>3</sup>/s.

## Intermittent Run-Time Multiplication Factors

Table M1507.3.3(2)  
2015 IRC

Run- Time Percentage In Each 4-Hour Segment	25%	33%	50%	66%	75%	100%
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<sup>b</sup>Extrapolation beyond the table is prohibited.

# Additional Resources

- [Insulation Installation in Spanish](#)
- [Energy Code Training](#)
- [Wood Wall Calculator](#)
- [Commissioning Checklists](#) (super handy at permit)
- [Construction Instruction](#)
- [Building America Solution Center](#)
- [SPEER YouTube Channel](#)

# Any Question?

## Thank you!

Randy Plumlee

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214.803.2330