Healthy Homes of Louisiana, llc

www.LaEnergyCode.com

Bobby Parks

2021 Evolving Energy Codes V2

2021 Energy Codes Simplified

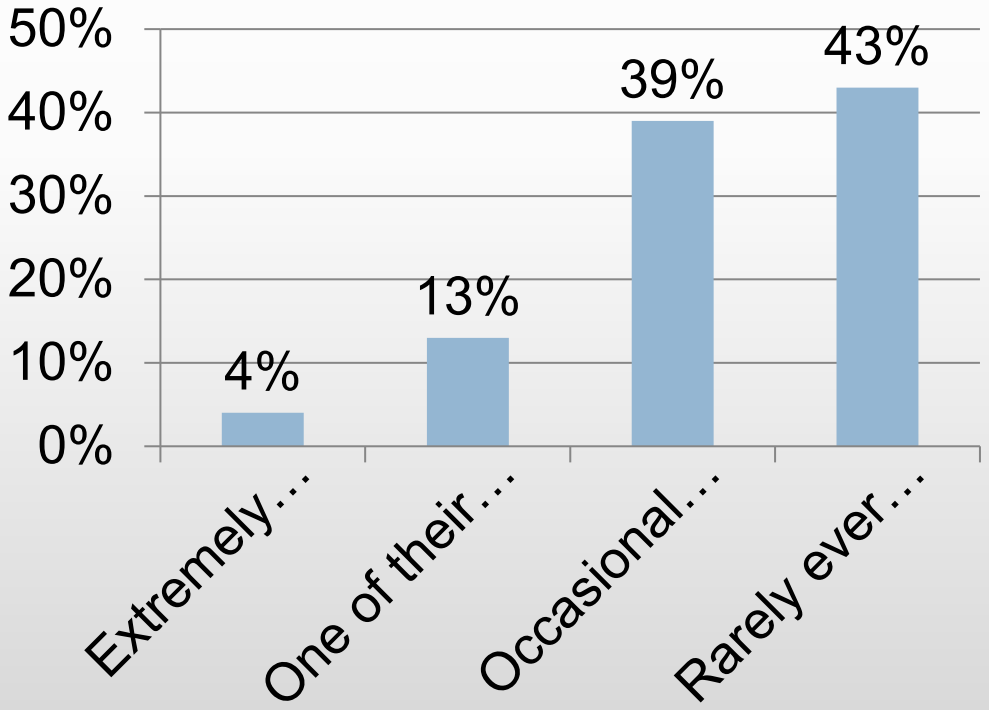
State of Louisiana
DEPARTMENT OF NATURAL RESOURCES

LHBA
Building Science and Codes
April 24th, 2024

Energy and Comfort

How would you best describe the average consumer's level of concern for **energy** and **comfort** when building a new home?…

1. Extremely important
2. One of their top 3 concerns
3. Occasional conversation
4. Rarely ever discussed

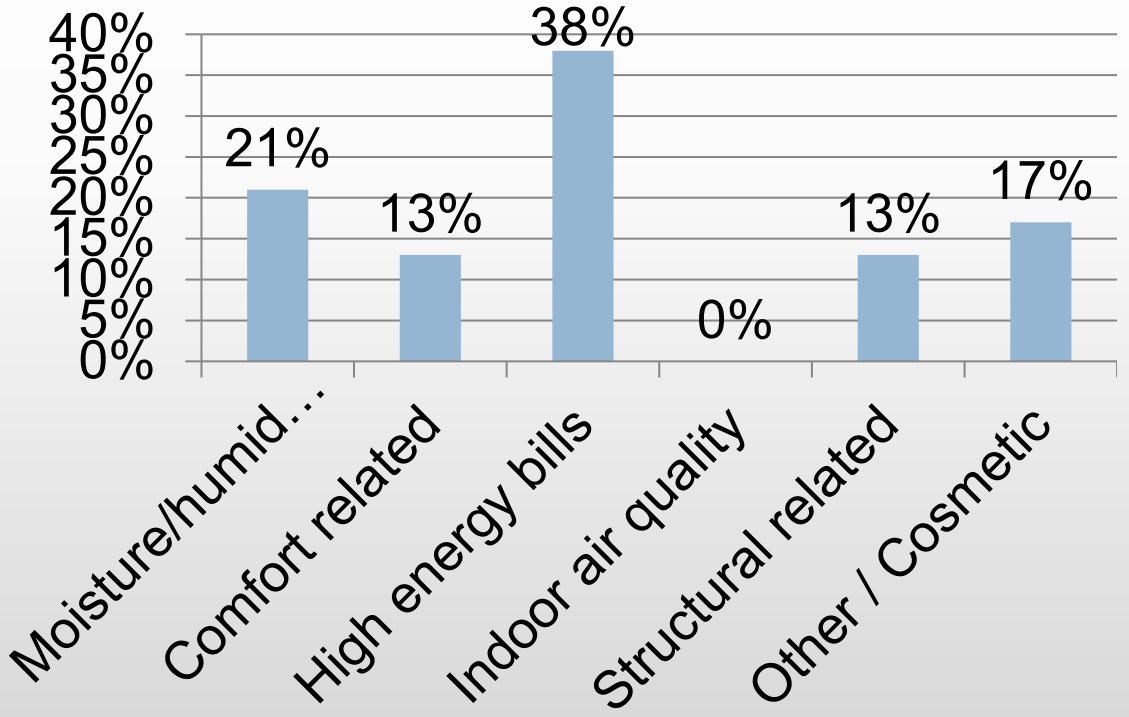


Types of Problems

When you do get a problem/complaint call from a client/customer, …..

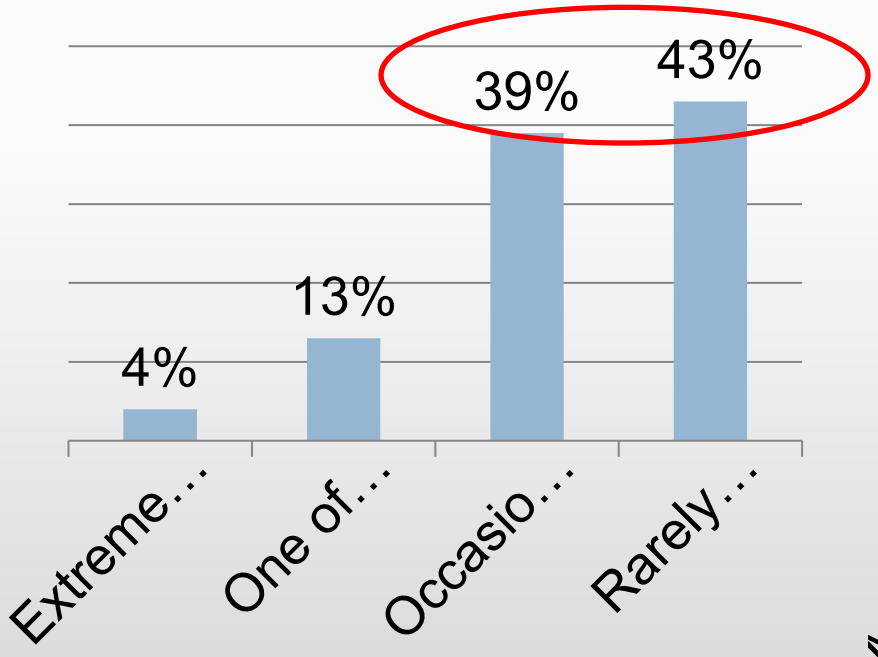
what's your most challenging issues related to?

1. Moisture/humidity related
2. Comfort related
3. High energy bills
4. Indoor air quality
5. Structural related
6. Other / Cosmetic

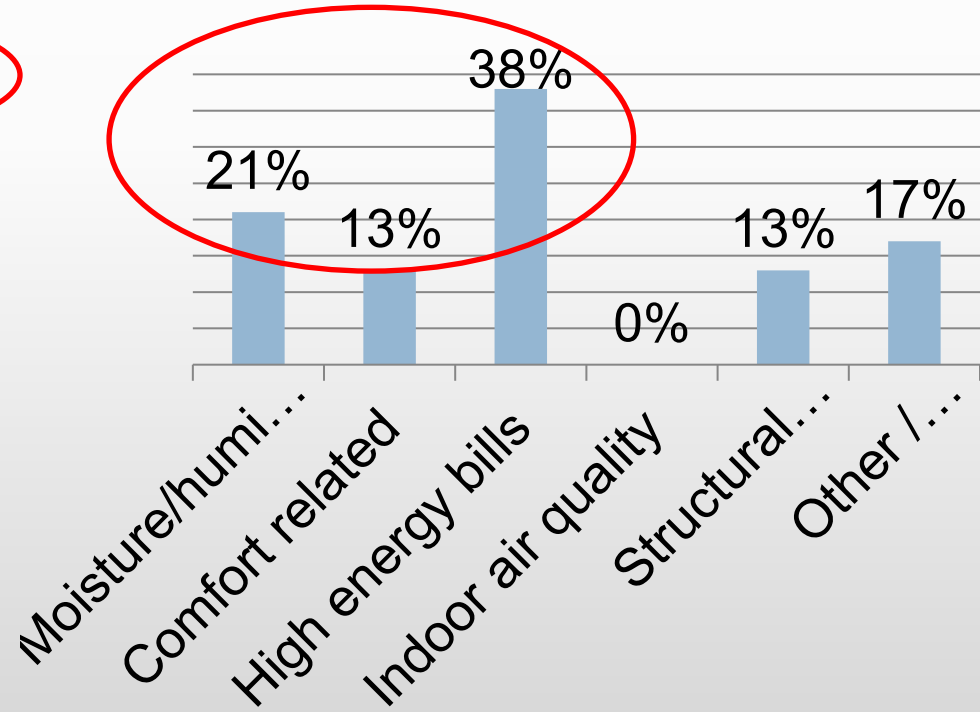


Which means…..

82% of the issues rarely or occasionally addressed before the build



Usually account for 72% a homeowners most significant issues after the build



How do we comply
with the
2021 Energy Code?

And

Where do we start ?

Chapter 1
Scope and Administration

2021- R101.5.1 Compliance materials. The code official shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

Chapter 1
Scope and Administration

Section R102.1.1 Above code programs

The code official serving as the authority having jurisdiction for building codes, shall be permitted to deem a national or state energy-efficiency program to exceed the energy efficiency required by this code. Buildings approved in writing by such an energy-efficiency program shall be considered to be in compliance with this code. The requirements identified in Table N1105.2, as applicable, shall be met and the building thermal envelope is greater than or equal to levels of efficiency and solar heat gain coefficients (SHGC) in Tables 402.1.1 and 402.1.3 of the **2009 International Energy Conservation Code**. *(this is considered a backstop)*

TABLE 402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE	MASS WALL *R*-VALUE[i]	FLOOR *R*-VALUE	BASEMENT[c] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c] WALL *R*-VALUE
1	1.2	0.75	0.30	30	13	3/4	13	0	0	0
2	0.65[j]	0.75	0.30	30	13	4/6	13	0	0	0
3	0.50[j]	0.65	0.30	30	13	5/8	19	5/13[f]	0	5/13
4 except Marine	0.35	0.60	NR	38	13	5/10	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35	0.60	NR	38	20 or 13+5[h]	13/17	30[g]	10/13	10, 2 ft	10/13
6	0.35	0.60	NR	49	20 or 13+5[h]	15/19	30[g]	15/19	10, 4 ft	10/13
7 and 8	0.35	0.60	NR	49	21	19/21	38[g]	15/19	10, 4 ft	10/13

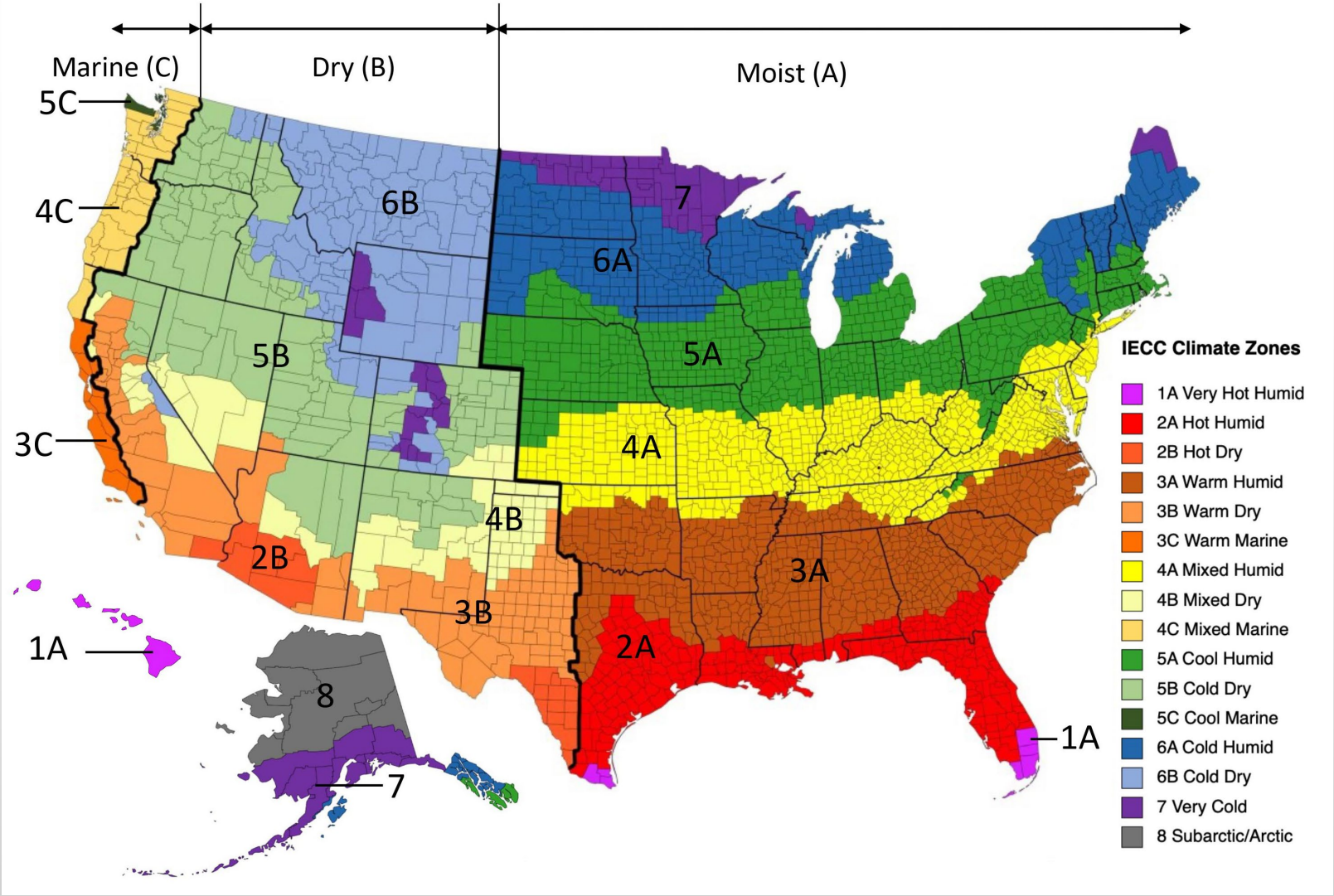
Chapter 2
Definitions

SECTION R202 GENERAL DEFINITIONS

APPROVED. Acceptable to the *code official*

Chapter 3
General Requirements

16 different climate zones and…..
Louisiana is separated by 2



Louisiana Amended

Section R301.1 Climate Zones Climate zones from Figure N1101.7 or Table N1101.7 shall be used for determining the applicable requirements in Sections N1101 through N1113. Locations not indicated in Table N1101.7 shall be assigned a climate zone in accordance with Section N1101.7.2. **However, for energy purposes only, all of Louisiana shall be a climate zone 2A.** East and West Carroll parishes shall be assigned a warm humid climate zone.

Chapter 3
General Requirements

R302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

R403.7 Equipment sizing and efficiency rating. Heating and cooling *equipment* shall be sized in accordance with ACCA Manual S based on *building* loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies. ….

Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

R401.2.2 Total Building Performance Option. The Total Building Performance Option requires compliance with Section R405.

R401.2.3 Energy Rating Index Option. The Energy Rating Index (ERI) Option requires compliance with Section R406.

R401.2.4 Tropical Climate Region Option. The Tropical Climate Region Option requires compliance with Section R407.

And then there is……

R401.2.5 Additional energy efficiency. This section establishes **additional requirements** applicable to all compliance approaches to achieve additional energy efficiency.

Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

TABLE R402.1.3
INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b, i]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE[g]	MASS WALL *R*-VALUE[h]	FLOOR *R*-VALUE	BASEMENT[c,g] WALL *R*-VALUE	SLAB[d] *R*-VALUE & DEPTH	CRAWL SPACE[c,g] WALL *R*-VALUE
0	NR	0.75	0.25	30	13 or 0&10ci	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0&10ci	3/4	13	0	0	0
2	0.40	0.65	0.25	49	13 or 0&10ci	4/6	13	0	0	0
3	.30	0.55	0.25	49	20 or 13&5ci[h] or 0&15ci[h]	8/13	19	5ci or 13f	10ci, 2 ft	5ci or 13f

Louisiana Amendments

Climate Zone	Fenestration *U*-Factor[b, I]	Skylight[b] *U*-Factor	Glazed Fenestration SHGC[b, e]	Ceiling *R*-Value	Wood Frame Wall *R*-Value[g]	Mass Wall *R*-Value[h]	Floor *R*-Value	Base-Ment[c,G] Wall *R*-Value	Slab[d] *R*-Value & Depth	Crawl Space[c,G] Wall *R*-Value
0	NR	0.75	0.25	30	13 or 0 & 10ci	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0 & 10ci	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13 or 0 & 10ci	4/6	13	0	0	0

Louisiana Amendment

Climate Zone	Fenestration *U*-Factor[b, I]	Skylight[b] *U*-Factor	Glazed Fenestration SHGC[b, e]	Ceiling *R*-Value
0	NR	0.75	0.25	30
1	NR	0.75	0.25	30
2	0.40	0.65	0.25	38

2024 IECC Roll Back….

N1102.2.1 (R402.2.1) Ceilings with attics.

Where Section N1102.1.3 requires R-38 insulation in the ceiling or *attic* , installing R-30 over 100 percent of the ceiling or *attic* area requiring insulation shall satisfy the requirement for R-38 insulation wherever the full height of uncompressed R-30 insulation extends over the wall top plate at the eaves. Where Section N1102.1.3 requires R-49 insulation in the ceiling or *attic*, installing R-38 insulation over 100 percent of the ceiling or *attic* area requiring insulation shall satisfy the requirement for R-49 insulation wherever the full height of uncompressed R-38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the insulation and *fenestration* criteria in Section N1102.1.2 and the component performance alternative in Section N1102.1.5.

Chapter 4
Residential Energy Efficiency

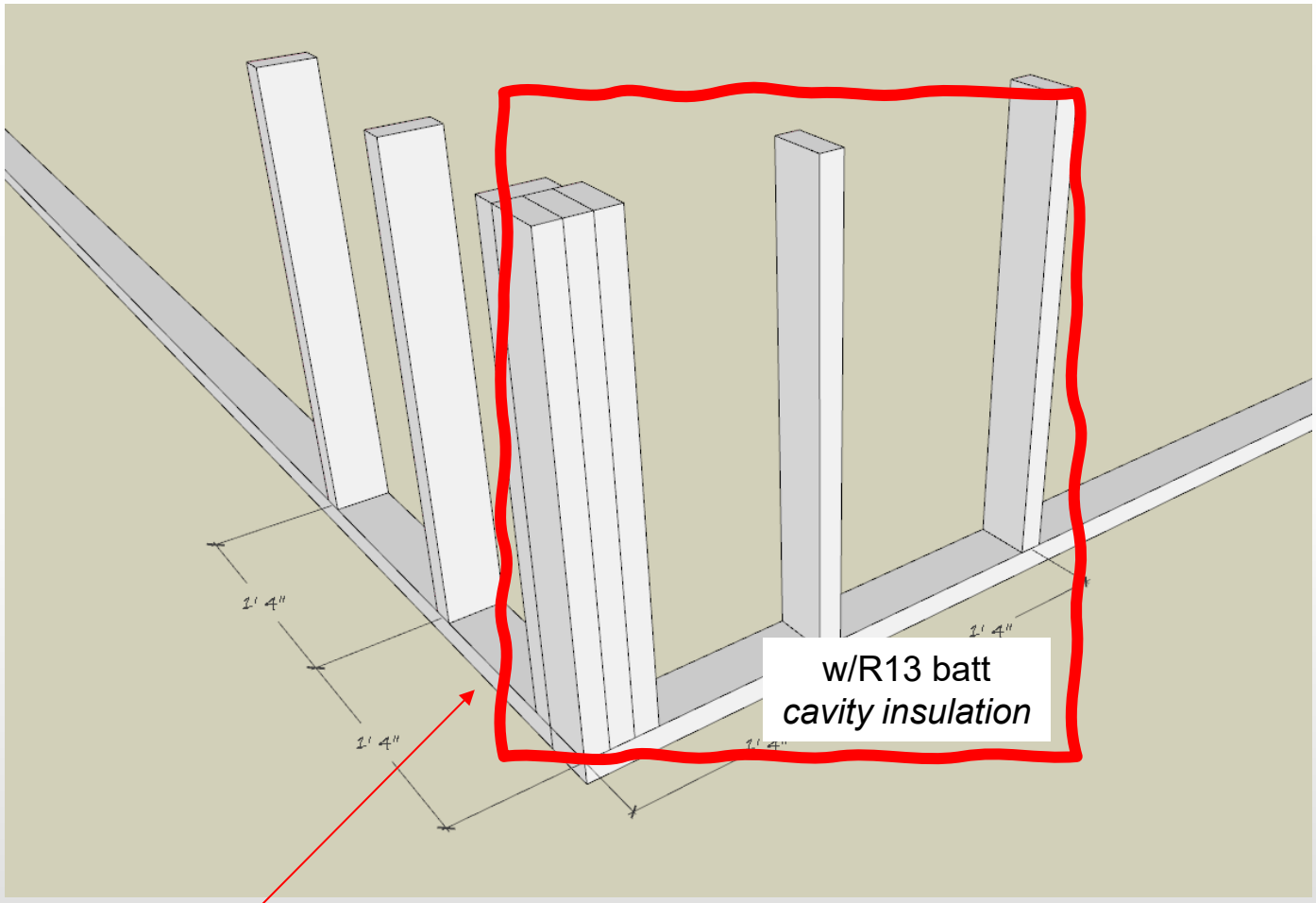
R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

Other option under **Prescriptive**

Table R402.1.2
Maximum Assembly *U*-Factor[a] and Fenestration Requirements

Climate Zone	Fenestration *U*-Factor[f]	Sky-Light *U*-Factor	Glazed Fenestration SHGC[d, e]	Ceiling *U*-Factor	Wood Frame Wall *U*-Factor	Mass Wall *U*-Factor[b]	Floor *U*-Factor	Basement Wall *U*-Factor	Crawl Space Wall *U*-Factor
0	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
1	0.50	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.25	0.030	0.084	0.165	0.064	0.360	0.477
3	0.30	0.55	0.25	0.030	0.060	0.098	0.047	0.091[c]	0.136

1 / 0.030 = R 33 1 / 0.084 = R 11.9

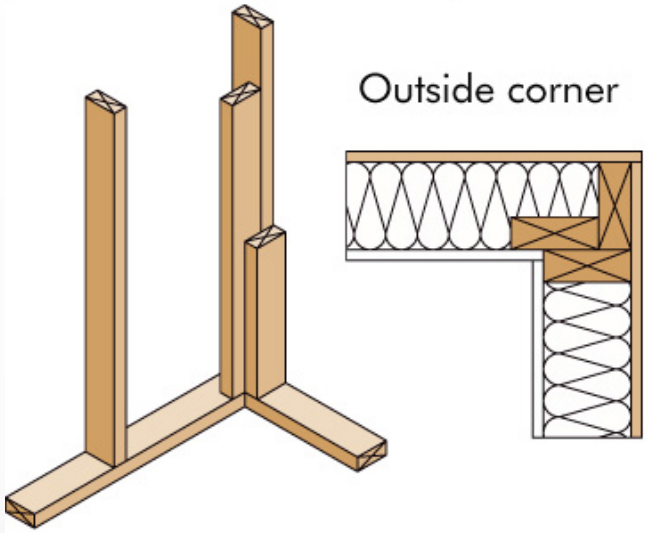


Uo 0.232 (R4.3) w/R13 batt – The "**thermal bridging**" diminishes the efficiency

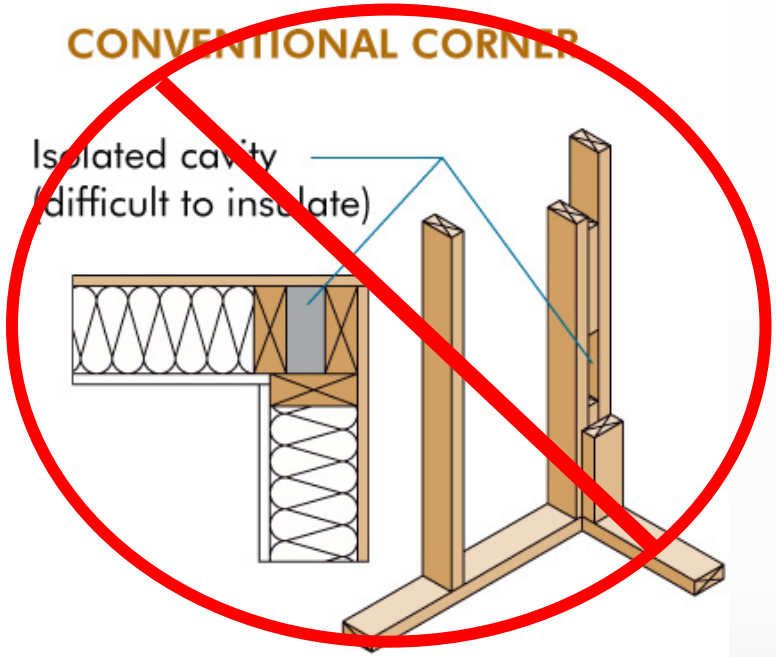
(doesn't meet the .084 or R11.9)

THREE-STUD CORNERS

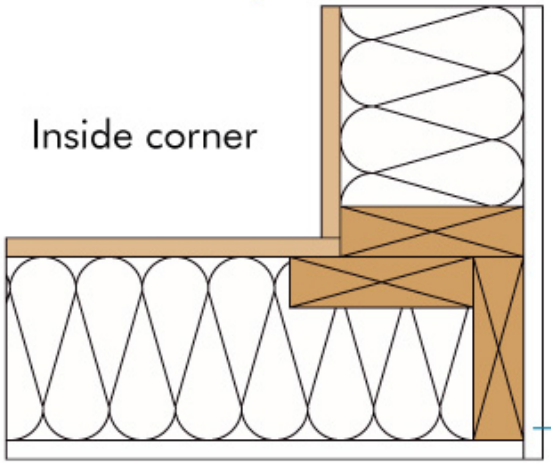
INSULATED THREE-STUD CORNER (CALIFORNIA CORNER)



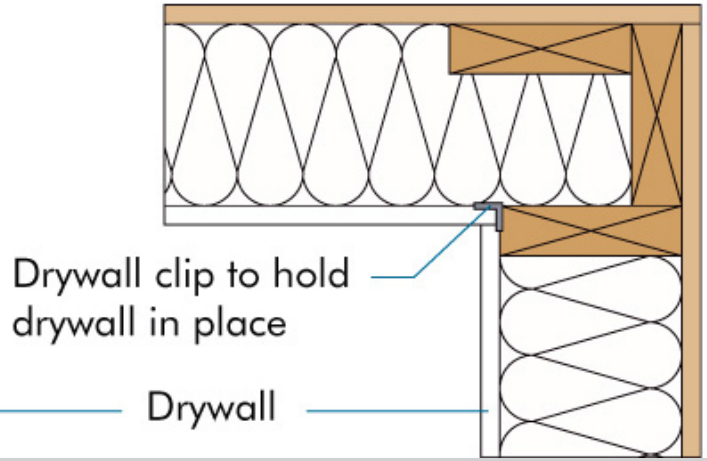
CONVENTIONAL CORNER



INSULATED THREE-STUD CORNER (INSIDE CORNER)



ALTERNATE INSULATED THREE-STUD CORNER (WITH DRYWALL CLIPS)



Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

R402.4 Air leakage. 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.
R402.4.1.3 Leakage rate. When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding ~~5.0~~ air changes per hour in Climate Zones 0, 1 and 2, and 3.0 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

Louisiana Amendments

Section R402.4.1.2 Testing. The building or dwelling unit shall be tested for air leakage. The maximum air leakage rate for any building or dwelling unit under any compliance path shall not exceed **7.0 air changes per hour**

* Effective July 1, 2024, blower door testing **shall be performed by individuals certified to perform blower door tests by a nationally recognized organization** that trains and provides certification exams for the proper procedures to perform such tests.

Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

R403.3.6 Duct leakage. The total leakage of the ducts, where measured in accordance with Section R403.3.5, shall be as follows:
Rough-in test: The total leakage shall be less than or equal to ~~4.0~~ cubic feet per minute per 100 square of *conditioned floor area.*
Postconstruction test: Total leakage shall be less than or equal to ~~4.0~~ cubic feet per minute per 100 square of *conditioned floor area*

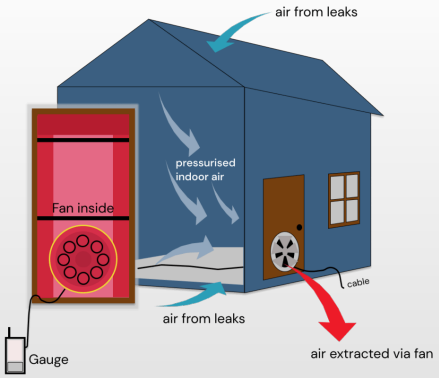
Louisiana Amendments

Section R403.3.5 Duct Testing
1.) **Rough-in test**: The total leakage shall be less than or equal to 6.0 cubic feet per minute (113.3 L/min) per 100 square feet of conditioned floor area
(2.) **Post construction test**: Total leakage shall be less than or equal to 8.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area or leakage to outside shall be less than or equal to 4 cfm per 100 sq feet of conditioned floor area.

Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option CONSIST OF….

Climate Zone	Fenestration *U*-Factor[b, l]	Skylight[b] *U*-Factor	Glazed Fenestration SHGC[b, e]	Ceiling *R*-Value	Wood Frame Wall *R*-Value[g]	Mass Wall *R*-Value[h]	Floor *R*-Value	Base-Ment[c,G] Wall *R*-Value	Slab[d] *R*-Value & Depth	Crawl Space[c,G] Wall *R*-Value
0	NR	0.75	0.25	30	13 or 0 & 10ci	3/4	13	0	0	0
1	NR	0.75	0.25	30	13 or 0 & 10ci	3/4	13	0	0	0
2	0.40	0.65	0.25	38	13 or 0 & 10ci	4/6	13	0	0	0



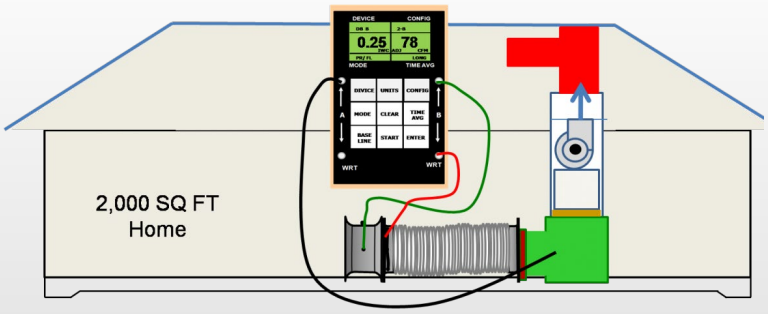


TABLE R402.4.1.1
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION[a]

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. 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 or 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, *R*-value, of not less than R-3 per inch. 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 framing and skylights, and the jambs of windows and doors, shall be sealed.	—
Rim joists	Rim joists shall include an exterior air barrier.[b] The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.	Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.[b]
Floors, including cantilevered floors and floors above garages	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. Alternatively, floor framing cavity insulation shall be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing and extending from the bottom to the top of all perimeter floor framing members.
Basement crawl space and slab foundations	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder/air barrier in accordance with Section R402.2.10. Penetrations through concrete foundation walls and slabs shall be air sealed. Class I vapor retarders shall not be used as an air barrier on below-grade walls and shall be installed in accordance with Section R702.7 of the *International Residential Code*.	Crawl space insulation, where provided instead of floor insulation, shall be installed in accordance with Section R402.2.10. Conditioned basement foundation wall insulation shall be installed in accordance with Section R402.2.8.1. Slab-on-grade floor insulation shall be installed in accordance with Section R402.2.10.
Shafts, penetrations	Duct and flue shafts to exterior or unconditioned space shall be sealed. Utility penetrations of the air barrier shall be caulked, gasketed or otherwise sealed and shall allow for expansion, contraction of materials and mechanical vibration.	Insulation shall be fitted tightly around utilities passing through shafts and penetrations in the building thermal envelope to maintain required *R*-value.
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.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	Insulated portions of the garage separation assembly shall be installed in accordance with Sections R303 and R402.2.7.

(continued)

~~Section 408 Additional Energy Efficiency Packages~~

R401.2.5 Additional energy efficiency. This section establishes **additional requirements** applicable to all compliance approaches to achieve additional energy efficiency.

BUT WAIT……

Remember the Uo ?……

R402.1.5 Total UA alternative. Where the total *building thermal envelope* UA, the sum of *U*-factor times assembly area, is less than or equal to 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 *building* shall be considered to be in compliance with Table R402.1.2. …

Manual J …

Chapter 4
Residential Energy Efficiency

R401.2.1 Prescriptive Compliance Option. The Prescriptive Compliance Option requires compliance with Sections R401 through R404.

R401.2.2 Total Building Performance Option. The Total Building Performance Option requires compliance with Section R405.

R401.2.3 Energy Rating Index Option. The Energy Rating Index (ERI) Option requires compliance with Section R406.

R401.2.4 Tropical Climate Region Option. The Tropical Climate Region Option requires compliance with Section R407.

And then there is……

R401.2.5 Additional energy efficiency. This section establishes **additional requirements** applicable to all compliance approaches to achieve additional energy efficiency.

Chapter 4
Residential Energy Efficiency

R401.2.2 Total Building Performance Option. The Total Building Performance Option requires compliance with Section R405.

R405.2 Performance-based compliance. Compliance based on total building performance requires that a *proposed design* meets all of the following:

> ***PROPOSED DESIGN.*** A description of the proposed *building* used to estimate annual energy use for determining compliance based on total building performance.

1. The requirements of the sections indicated within Table R405.2.

2. The building thermal envelope shall be greater than or equal to levels of efficiency and solar heat gain coefficients in Table R402.1.1 or R402.1.3 of the 2009 *International Energy Conservation Code*. (again, this is our **backstop**)

3. An annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official,*

> **STANDARD REFERENCE DESIGN.** A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total building performance.

1) If we can show that the annual energy "**cost"** ($) **or "usage**" (btu) is equal to or less than the 2021 Code, as a whole….

Then…

2) We can "trade-off" different requirements as long as when don't go below the 2009 IECC requirements (which is our backstop)

BUT HOW ????…

Chapter 4
Residential Energy Efficiency

R401.2.3 Energy Rating Index Option. The Energy Rating Index (ERI) Option requires compliance with Section R406.

TABLE R406.5
MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX
0-1	52
2	~~52~~ 58
3	51

Louisiana Amendment:

Section R406.5 HERS-based compliance. Compliance based on an HERS analysis requires that the rated proposed design and confirmed built dwelling be shown to have a HERS less than or equal to the value of 58.

Exceptions

(1.)**HERS calculation method shall be an equivalent to the ERI analysis in calculating compliance**

A critical difference with HERS scores is that they must be prepared by a HERS rater, certified by RESNET, and ERI score calculations do not require the preparer to have specific qualifications or certifications.