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MISSOURI DEPARTMENT OF NATURAL RESOURCES

Residential Requirements of the 2009 International Energy Conservation Code

Webinar:

Awareness, New Construction,
Additions/Remodels, and Implementation



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Introductions

Stephen Johnson

Project email:

energycodeworkshop@shawgrp.com



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Overview

Project funded by the Missouri Department of Natural Resources (MDNR) with American Recovery and Reinvestment Act of 2009 (ARRA) funding.

3 Locations and Webinars:

- St. Louis (December 1st – 2nd)
- Springfield (December 5th – 6th)
- Kansas City (January 24th – 25th)

Objective of the Workshop: Work with municipalities and counties across the state to identify opportunities to adopt or enhance compliance with the 2009 International Energy Conservation Code (IECC) at a local level.



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Overview - Agenda

Topic	Approx. Time
Introduction	15 minutes
Awareness of the 2009 IECC	20 minutes
2009 IECC highlights	40 minutes
Tools to enhance compliance	30 minutes
Summary/Next Steps	15 minutes
Total	2 hours

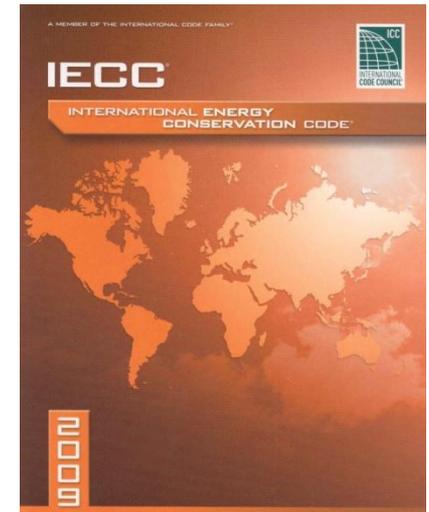


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Overview

- The International Code Council® (ICC) develops codes
- The IECC looks at energy consumption and cost savings in buildings
- Three year cycle for updates
- Several codes by the ICC
 - 2012 International Building Code®
 - 2012 International Fire Code®
 - 2012 International Mechanical Code®
 - 2012 International Property Maintenance Code®



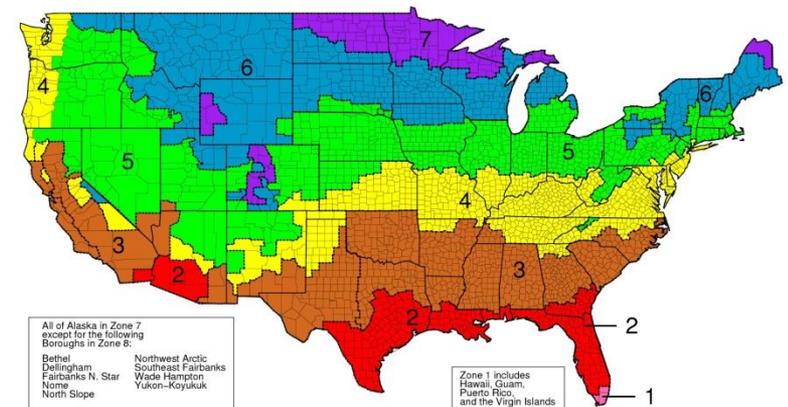
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Overview

2009 IECC

- Chapter 1 - Administration
- Chapter 2 - Definitions
- Chapter 3 - General Requirements
- Chapter 4 - Residential Energy Efficiency
- Chapter 5 - Commercial Energy Efficiency
- Chapter 6 - Referenced Standards



[301]

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Overview

101.3 Intent. This code shall regulate the design and construction of buildings for the **effective use of energy**. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.



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Overview

- IECC attempts to regulate energy use:
 - Thermal envelope (walls, windows, etc.)
 - Duct and house air sealing (less drafty)
 - Lighting (high-efficacy lamps)
- IECC does NOT regulate:
 - Mechanical system efficiencies (furnace, hot water heater, etc.)
 - Water consumption
 - Appliances (televisions, computers, refrigerator, etc.)
 - Those are federally mandated items



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Topic 1

Awareness of the 2009 IECC



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Topic 1 Objectives

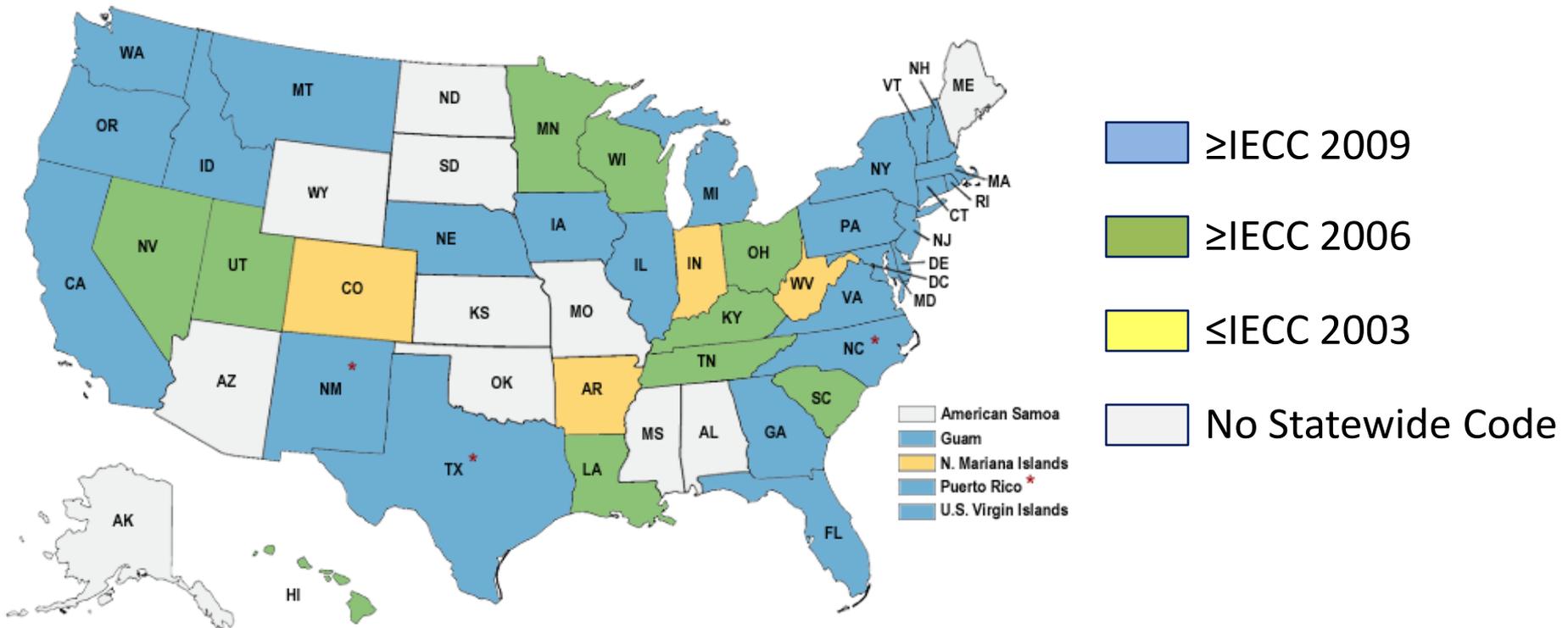
- Current Implementation
- Benefits of the 2009 IECC
- Challenges of enforcing the 2009 IECC
- Cost impact of compliance
- Promote awareness of the 2009 IECC



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Overview - Residential State Energy Code Status (*)



(*) as of November 1, 2011, DOE – Building Energy Codes Program

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Overview - Missouri Residential Energy Efficiency

State Level:

- No mandatory efficiency code

Local Level:

- St. Louis City and County – 2009 IECC
- Clay County – 2006 IRC
- Springfield – 2006 IRC with 2012 IRC hopeful in January



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Topic 1 Objectives

- Current Implementation
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Benefits of the 2009 IECC

Important points about energy codes

- Marketplace does not guarantee energy-efficiency
 - Upfront cost vs. long-term, operating costs
- Comfort
- Energy consumption and emissions
- New construction is a unique opportunity



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Benefits of the 2009 IECC - Municipality

- Optimal utilization of fossil fuels and non-renewable resources for communities¹
 - Reduces strain on energy and utility resources
- Create economic opportunities for business and industry by promoting new, energy-efficient technologies
- Shifts construction costs away from materials and towards labor²
 - Job creation/enhance skills of workforce
- ISO rating and insurance rates

[1] International Code Council,

http://media.iccsafe.org/geo/docs/IECC_EnergyCodeSupportProgram-Overview.pdf

[2] Institute for Market Transformation, IMT Research on Jobs for Energy Codes

<http://www.imt.org/files/FileUpload/files/PDF/JobsFromEnergyCodesOnePager.pdf>



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Benefits of the 2009 IECC - Homeowner

- Homeowners
- Utility savings
 - Average \$2,150/yr on home energy bills¹
 - Average savings ~ \$300/yr¹
- Improved thermal comfort
- Reduces the risk of long-term financial burden that can result from short-term design and construction decisions
 - Testing requirement, installation of “hidden” materials (e.g., insulation)

[1] Alliance to Save Energy, U.S. Household Energy Expenditures, 2010



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Benefits of the 2009 IECC - Contractor

- Customer satisfaction and recommendations
 - Increases comfort
 - Fewer call-backs
- Competitive advantage in the marketplace
 - Advertising can be used to explain energy-efficiency advantages
 - Can leverage available incentives and increase revenue
- Common basis for education and practice



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Topic 1 Objectives

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Potential for Challenges of the 2009 IECC

Affected Professions¹:

- Architects
- Carpenters
- Brick masons, stonemasons, block masons
- Cement masons and concrete finishers
- Roofers
- Electricians
- Engineers
- Insulation Workers
- Energy modelers

[1] Institute for Market Transformation, IMT Research on Jobs for Energy Codes
<http://www.imt.org/files/FileUpload/files/PDF/JobsFromEnergyCodesOnePager.pdf>



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Potential for Challenges of the 2009 IECC

- Limited municipal staff/availability to attend trainings
- Ability to accurately enforce the code
- Public perception of energy codes
- Added costs to homeowners



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Potential for Challenges of the 2009 IECC

Builder/Contractor:
It's always been done
this way...deal with it.

Builder/Contractor:
Come on, that's not
necessary.

Builder/Contractor:
They won't pay for
that price!

Homeowner:
I'd rather have the
granite countertops...

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Topic 1 Objectives

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Costs of the 2009 IECC

Analysis of Costs and Benefits of 2009 IECC

- Determine difference in construction costs and energy savings resulting from implementing IECC 2009 compared with the current practice
- The Building Codes Assistance Project (BCAP) estimates 18-26% in energy savings or annual savings between \$337-559 (compared with current practices), money that could be spent on upgrading their house or fed into the local communities



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Costs of the 2009 IECC

- Costs, savings and payback¹

	IECC 2009 vs. Current Practice
Incremental Construction Costs	\$1,608
Annual Energy Cost Savings	\$459
Simple Payback (years)	3.5

¹The Building Codes Assistance Project: Incremental Construction Cost Analysis for New Homes – Building to the 2009 IECC

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Costs of the 2009 IECC

- Mortgage Details

	IECC 2009 vs. Current Practice
Increase of a 20% Down Payment	\$322
Increase of Monthly Payment (30 year mortgage, 7% interest rate)	\$8.56
Average Monthly Energy Savings	\$38.25
Mortgage Becomes Cash Positive	11 months

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Topic 1 Objectives

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Promoting Awareness of 2009 IECC

- Where is our municipality relative to our neighbors?
- Utilizing your municipality's website
- Distributing handouts/information to applicants as early as possible



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Promoting Awareness of 2009 IECC

Resource Inventory

- Compilation of resources
- Living document

Residential/ Commercial	Residential/Commercial 2009 IECC	Guide	2009 IECC with commentary	Basic Energy Code definitions from the 2009 IECC with short commentary. Purchase available at this link.	http://www.iccsafe.org/Store/Pages/Product.aspx?id=3810S09
Residential/ Commercial	REScheck and COMcheck	Presentation	Building Energy Codes Online Training	This website provides links to a variety of courses, including information about REScheck, the requirements of the 2009 IECC, etc.	http://www.energycodes.gov/moodle/
Residential/ Commercial	REScheck and COMcheck	Presentation	2009 IECC, REScheck and COMcheck	IECC, REScheck and COMcheck presentation developed by U.S. DOE.	http://www.energycodes.gov/training/pdfs/2009_iecc_rescheck_comcheck.pdf
Residential	Additions and Renovations and the 2009 IECC	Transcript	Residential Requirements of the 2009 IECC	Transcript for a presentation given by the U.S. DOE on the residential requirements of the 2009 IECC (pg. 7 is relevant to additions and renovations).	http://www.energycodes.gov/training/pdfs/2009_iecc_residential_transcript.pdf
Residential	REScheck	Compliance Report	REScheck Compliance Report	Sample REScheck compliance report with sample energy efficiency certificate on pg 5.	http://kwhdesign.net/site/Permit & Construction Documents_files/REScheck.pdf
Residential	Compliance	Frequently-Asked Questions	Frequently-Asked Questions - Module 3 provided by ICC	Frequently-asked questions around the residential energy code; includes answers to questions about the 2009 IECC and roofs, wood-burning fireplaces, windows, thermal envelopes, etc.	http://media.iccsafe.org/geo/docs/FAQ_Module-3.pdf
Residential/ Commercial	General Code Information	Fact Sheet	Policy Maker Fact Sheet, Building Energy Code Compliance; October 2010	One-page tool that provides answers to questions such as: (1) What are energy codes? (2) What are the benefits of building energy codes? (3) What can policy makers do to enhance code compliance and enforcement?	www.imt.org/files/PolicyMakerFactsheet-EnergyCodeCompliance.pdf
Residential/ Commercial	Mechanical	Article	Bigger is not always better with HVAC systems	Article describes why sizing appropriately is of importance, links to article regarding how to size equipment correctly, and to diagrams outlining the mechanical systems covered by the IECC	http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/article/136
Residential/ Commercial	Mechanical	Articles, web tools, photos, presentations	Building Codes Energy Resource Center	Numerous sources for information regarding HVAC systems and the IECC. Use "browse topic" drop down menu at upper right to choose "mechanical."	http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter

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Promoting Awareness of 2009 IECC

Resources:

- Presentations
- Pamphlets
- Factsheets
- Articles
- Guides
- Websites
- Reports
- Frequently-asked questions

Sources:

- U.S. Department of Energy
- International Code Council
- Other states and municipalities

Topics:

- Code requirements
- REScheck and COMcheck
- Additions/renovations
- Duct pressure testing



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Promoting Awareness of 2009 IECC

Example of Resources

- [Top 10 Reasons for Building Energy Codes](#), U.S. Dept. of Energy
- [Duct Leakage Frequently-Asked Questions](#), U.S. Dept. of Energy
- [Bigger is not always better with HVAC systems](#), U.S. Dept. of Energy



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Promoting Awareness of 2009 IECC

Maintaining the Resource Inventory

- Where will the Resource Inventory “live?”
- Who will update the Resource Inventory?
- Who will have access to the Resource Inventory?



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Promoting Awareness of 2009 IECC

Contractor awareness

- Inform contractors with the energy code
 - Create cheat sheet, require short training, or take notes about failed inspections
- Identify and address knowledge gaps upfront to enhance compliance with the 2009 IECC
- Possible to require registration
- Create opportunities to promote awareness



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Promoting Awareness of 2009 IECC

Summary of Mechanical Requirements

- Size and select appropriate heating and cooling systems – submit documents to city prior to installation
- Seal all duct connections
- Do not use cavities for supply ducts
- Install furnace and ducts in conditioned space
- If ducts cannot be fully located in conditioned space
 - Insulate supply ducts to R-8 and all others to R-6
 - Test for duct tightness and meet requirements



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Topic 1 Summary

- There are several benefits that result from energy codes, to all stakeholders
- The challenges of implementing the 2009 IECC can easily be overcome
- The payback to homeowners is less than five years
- There are several options available which municipalities can use to promote awareness of the 2009 IECC



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Topic 2

Highlights of the Residential portion of the 2009 IECC



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Topic 2 Objectives

- Overview
- Compliance
 - Mandatory Provisions
- Compliance Paths
 - Prescriptive [402.1]
 - U-Factor [402.1.3]
 - UA Alternative [402.1.4]
 - Simulated Performance Alternative [405]



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Overview

RESIDENTIAL BUILDING. For this code, includes R-3 buildings, as well as R-2 and R-4 buildings three stories or less in height above grade.

- Single family house
- Duplex/townhouse
- Triplex (or larger units if 3 stories or less in height above grade)
- Apartment Buildings (if 3 stories or less in height above grade)
- Assisted Living Communities (if 3 stories or less in height above grade)



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Overview

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of “Residential buildings.”



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Overview

- An 10 unit, 2 story apartment complex?
- References the IBC (IRC is for one- and two-family dwellings or townhouses)
- Still the residential portion of the IECC per the ICC definitions



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Overview

Relationship between IRC (International Residential Code) and IECC

- IECC addresses only energy (commercial and residential)
- IRC addresses all topics (structural, plumbing, etc.)
- IRC allows compliance with IECC as an alternative to Chapter 11 [N1101.2]
 - Energy requirements in IRC and IECC almost identical
 - Minor differences as they relate to Missouri
 - IRC does not have a simulated performance alternative path



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Overview

Applicability

- Code applies to “residential buildings”
- New construction, additions, alterations, renovations or repairs [101.4.3]
- Additions can comply alone or in combination with existing building

Exempted Buildings

- Existing buildings
- Buildings designated as historic
- Buildings (or portions of) that are neither heated or cooled (e.g. garage)

Exempted Alterations

- Eight exemptions



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Overview

8 Exceptions

1. Storm windows installed over (E) window.
2. Glass only replacements in an (E) window.
3. (E) cavities are filled with insulation.
4. (E) cavity is not exposed.
5. Roofing for roofs were neither the sheathing nor the insulation is exposed.
6. Replacement of (E) doors that

separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door.

7. Alterations that replace less than 50% of the luminaires in a space.
8. Alterations that replace only the bulb and ballast w/in the (E) luminaires in a space.

The IECC “is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.”

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Overview

Mandatory Provisions

- Air-seal house and install “tight” fixtures in the building envelope
- Ducts must be sealed and building cavities may not be supply ducts
- If ducts are not in conditioned space they must be verified to be “tight”
- Heating and cooling equipment shall be sized to ACCA Manual J and S
- There are others but the above are the main items

ACCA - Air Conditioning Contractors of America
Manual J – Residential Load Calculation
Manual S – Residential Equipment Selection



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Overview

Two options to meet the air sealing requirement [402.4.2]

- Testing option [402.4.2.1]
- Visual Inspection option [402.4.2.2], using Table 402.4.2 *Air Barrier and Insulation Inspection Component Criteria*

BEST PRACTICE: Testing is now required in the 2012 IECC. Third party testing might be easier than inspectors trusting builders and/or verifying each item on the checklist.



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Overview

**TABLE 402.4.2
AIR BARRIER AND INSULATION INSPECTION COMPONENT CRITERIA**

COMPONENT	CRITERIA
Air barrier and thermal barrier	Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier. Breaks or joints in the air barrier are filled or repaired. Air-permeable insulation is not used as a sealing material. Air-permeable insulation is inside of an air barrier.
Ceiling/attic	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed. Attic access (except unvented attic), knee wall door, or drop down stair is sealed.
Walls	Corners and headers are insulated. Junction of foundation and sill plate is sealed.
Windows and doors	Space between window/door jambs and framing is sealed.
Rim joists	Rim joists are insulated and include an air barrier.
Floors (including above-garage and cantilevered floors)	Insulation is installed to maintain permanent contact with underside of subfloor decking. Air barrier is installed at any exposed edge of insulation.
Crawl space walls	Insulation is permanently attached to walls. Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.



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Compliance

Mandatory Provisions

AND

Compliance Path

(Four Options)



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Compliance

Mandatory Provisions

AND

- A. Prescriptive
- B.1 U-Factor
- B.2 UA Alternative
- C. Simulated Performance Alternative

Prescriptive Approaches



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Compliance Path – Prescriptive Approaches

There are a few additional requirements when doing a prescriptive approach (Prescriptive, U-Factor, and UA Alternative)

1. Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts (outside of the conditioned space) shall be insulated to a minimum of R-6.
2. A minimum of 50 percent of the lamps in permanently installed lighting fixtures shall be high-efficacy lamps.

Alternative: The Simulated Performance Alternative path:

- No requirement for high-efficacy lighting
- All ducts to be insulated to a minimum of R-6



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Compliance Path – Prescriptive Approaches

Lighting efficacy prescriptive requirement

- At least 50% of permanently installed lighting fixtures shall be high-
efficacy [404.1]
- What is high-efficacy?
 - Defined in Chapter 2 Definitions - Compact fluorescent lamps, T-8 or
smaller diameter linear fluorescent lamps, or lamps with a minimum
efficacy of:
 - » 60 lumens per watt for lamps over 40 watts,
 - » 50 lumens per watt for lamps over 15 watts to 40 watts, and
 - » 40 lumens per watt for lamps 15 watts or less



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Compliance Path – Prescriptive

Allowances in the prescriptive path:

- One door (24 ft²) can be exempt of the prescriptive requirements (e.g. decorative main entry wood panel door)
- 15 ft² can be exempt of the prescriptive requirements (e.g. block glass in shower instead of typical code compliant window)
- 500 ft² or 20% of the ceiling area, whichever is less, can be reduced to R-30 when ceiling assembly does not allow sufficient space for the required insulation (e.g. small sun room with a vaulted ceiling that the structural engineer wants sized with 2x10 rafters)

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Compliance

Mandatory Provisions

AND

- A. **Prescriptive**
- B.1 U-Factor
- B.2 UA Alternative
- C. Simulated Performance Alternative

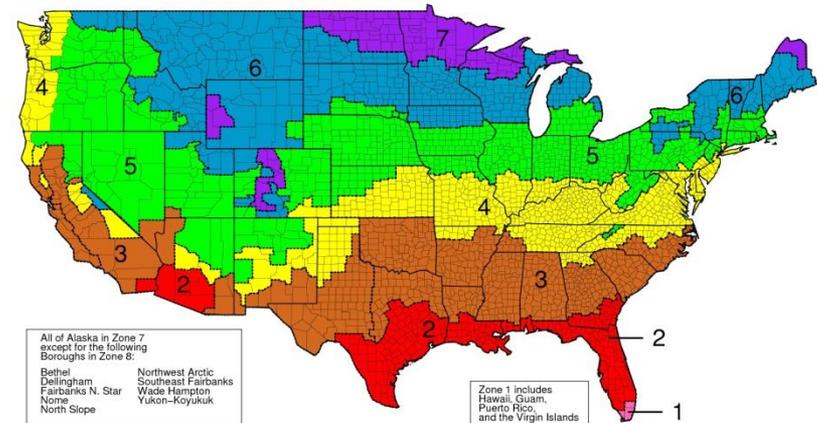
Prescriptive Approaches

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Compliance Path - Prescriptive

- R-values and U-factors dependent on climate zone
- *Insulation and Fenestration Requirements by Component* [Table 402.1.1]
- <http://energycode.pnl.gov/EnergyCodeReqs/>
- Could cite values directly from code
- No software needed
- No trade offs



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Compliance Path – Prescriptive

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



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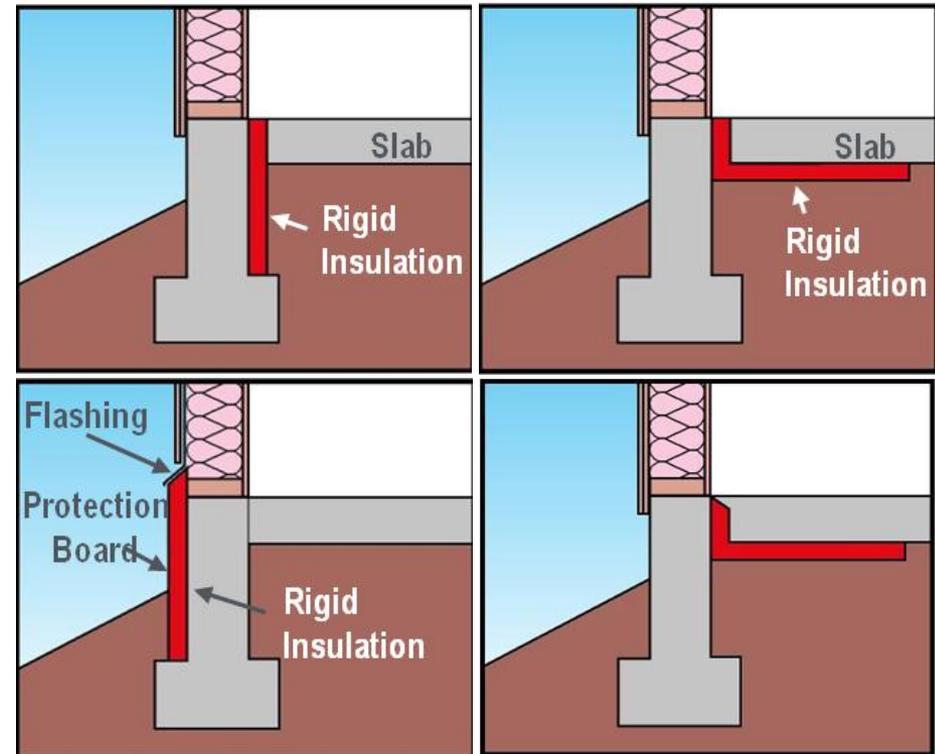
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Compliance Path – Prescriptive

Window performance data



Slab-on-grade examples



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Compliance Path – Prescriptive

- Mandatory notes
- Insulation schedule
- Building Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

Energy Details - Climate Zone 4	
2009 IECC Compliance - Prescriptive	
Basement Walls	2x4 with R-13 cav. (FB)
Above Grade Walls	2x6 with R-20 cav (BC)
Floor Over Garage	11.875" TJ with R-43 cav (BC)
Ceiling - Attic	R-50 (BC)
Windows	All U-Factors equal or below 0.30
Lighting	75% or more to be CFL

FB - Fiberglass Batt (R-3.7/inch)

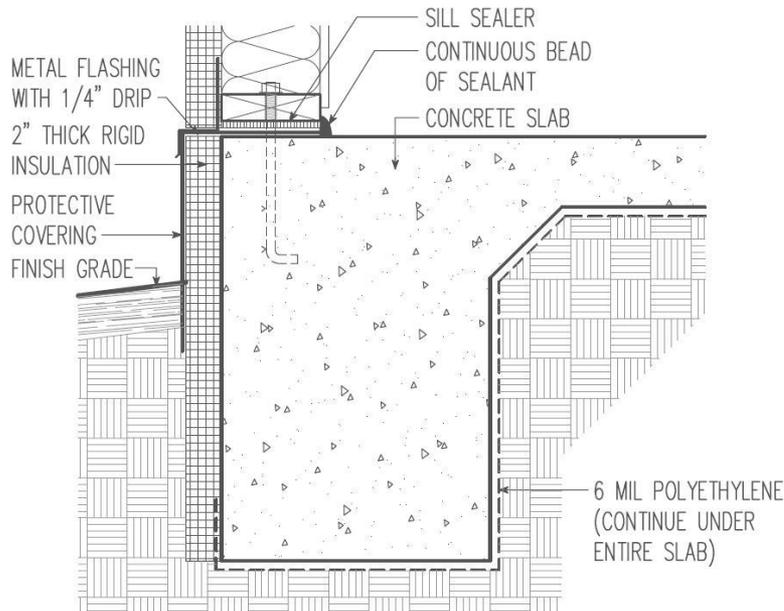
BC - Blown Cellulose (R-3.66/inch)

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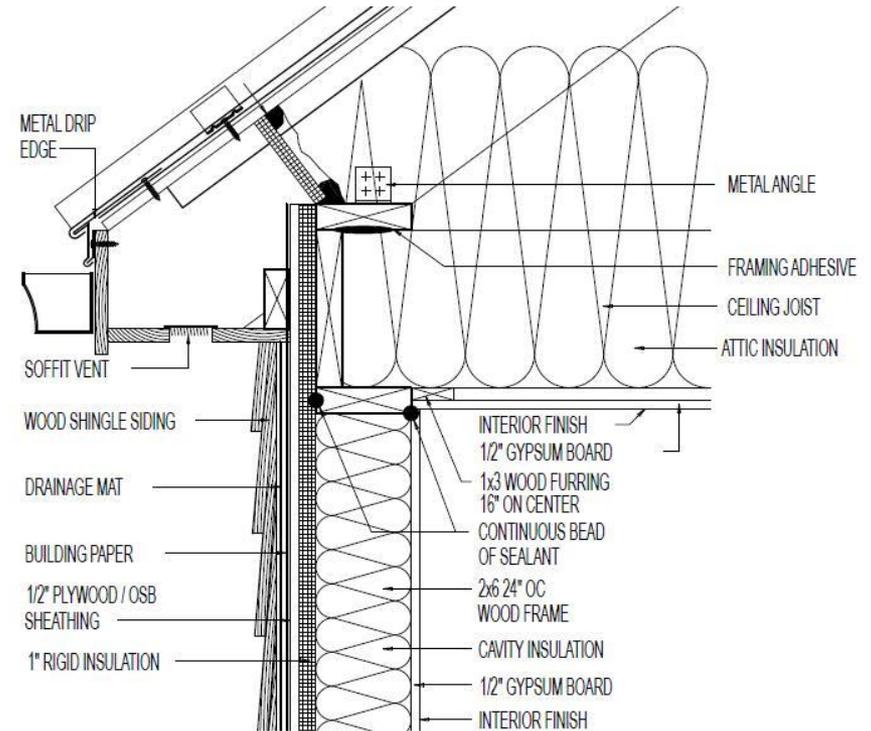
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Compliance Path – Prescriptive

Example Building Sections



Foundation/floor connection



Wall/roof connection

<http://www.greenbuildingadvisor.com>

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Compliance

Mandatory Provisions

AND

A. Prescriptive

B.1 U-Factor

B.2 UA Alternative

C. Simulated Performance Alternative

Prescriptive Approaches



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Compliance Path – U-Factor

- U-factors dependent on climate zone
- Alternative to the R-value in Table 402.1.1
- *Equivalent U-Factors* [Table 402.1.3]
- Could cite values directly from code
- Can use software for help with basic U-Factor calculations
- No trade offs

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Compliance Path – U-Factor

TABLE 402.1.3
EQUIVALENT U-FACTORS^a

CLIMATE ZONE	FENESTRATION U-FACTOR	SKYLIGHT U-FACTOR	CEILING U-FACTOR	FRAME WALL U-FACTOR	MASS WALL U-FACTOR ^b	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR ^c
1	1.20	0.75	0.035	0.082	0.197	0.064	0.360	0.477
2	0.65	0.75	0.035	0.082	0.165	0.064	0.360	0.477
3	0.50	0.65	0.035	0.082	0.141	0.047	0.091 ^c	0.136
4 except Marine	0.35	0.60	0.030	0.082	0.141	0.047	0.059	0.065
5 and Marine 4	0.35	0.60	0.030	0.057	0.082	0.033	0.059	0.065
6	0.35	0.60	0.026	0.057	0.060	0.033	0.050	0.065
7 and 8	0.35	0.60	0.026	0.057	0.057	0.028	0.050	0.065

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Compliance Path – U-Factor

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

Energy Details - Climate Zone 4	
2009 IECC Compliance - Prescriptive/U-Factor	
Basement Walls	2x4 with R-13 cav (FB)
Above Grade Walls	2x4 with empty cav and 2" of PI Foam on exterior [U-Factor - 0.059]
Floor Over Garage	11.875" TJ with R-43 cav (BC)
Ceiling - Attic	R-50 (BC)
Windows	All U-Factors equal or below 0.30
Lighting	75% or more to be CFL

FB - Fiberglass Batt (R-3.7/inch)

BC - Blown Cellulose (R-3.66/inch)

PI - Polyisocyanurate Rigid Foam (R-6.25/inch)

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Compliance

Mandatory Provisions

AND

- A. Prescriptive
- B.1 U-Factor
- B.2 UA Alternative
- C. Simulated Performance Alternative

Prescriptive Approaches

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Compliance Path – UA Alternative

Total UA Alternative [402.1.4]

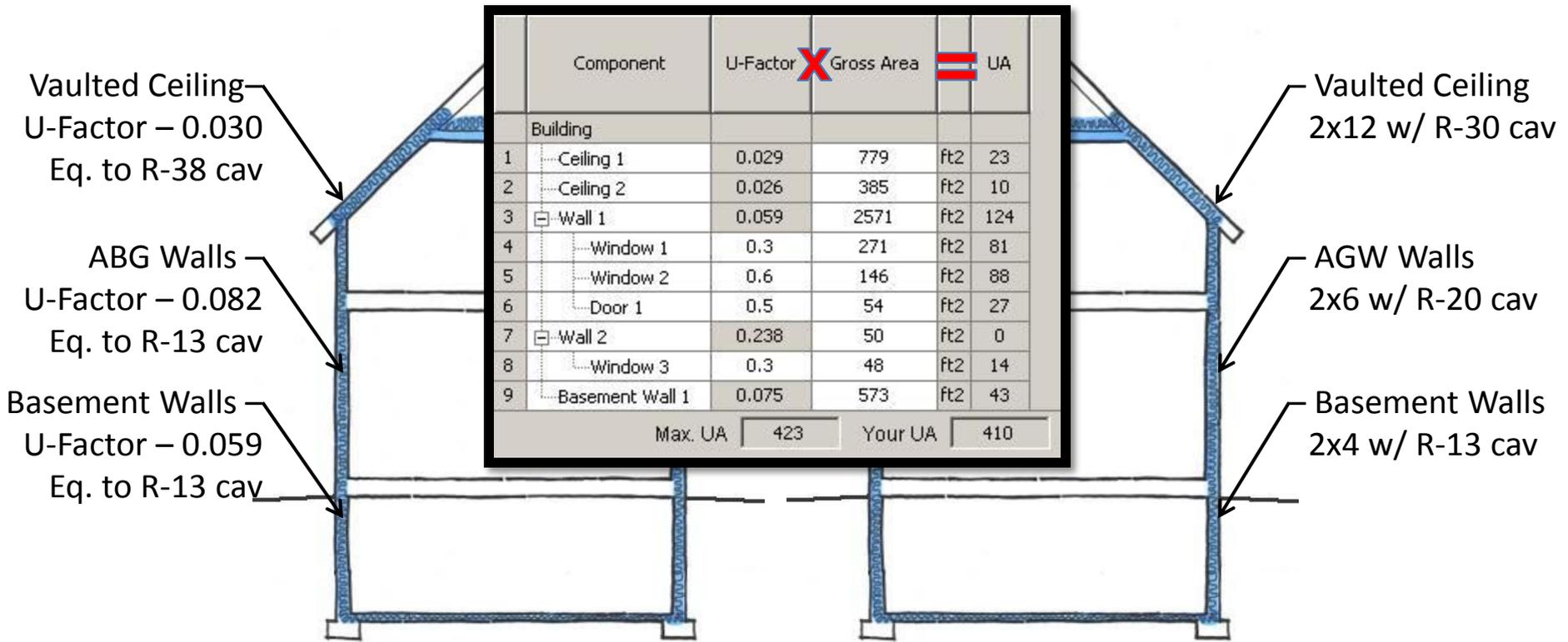
- Total UA is the sum of all the construction type areas multiplied by their respective U-factor
- Allows for trade offs between different portions of building envelope
- There is a hard limit on trade-offs
 - Area-weighted U-Factor of windows must be 0.48 or less
- REScheck – Department of Energy



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Compliance Path – UA Alternative



Max UA



Design UA

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Compliance Path – UA Alternative

Missouri_Home_UA.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Project Envelope Mechanical

Location

State Missouri

City Jefferson City

Project Type

New Construction Addition/Alteration

Building Characteristics

1- and 2-Family, Detached Multifamily

Conditioned Floor Area 3508 ft2

All ducts and air handlers located within conditioned spaces

[Explanation of duct testing requirements...](#)

Project Details (optional)

This information will appear on the compliance certificate. [Edit Project Details...](#)

Title/Site/Permit

Jefferson City Home
1234 ABC Lane
Jefferson City, MO 65101

Owner/Agent

Designer/Contractor

Notes



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Compliance Path – UA Alternative

The screenshot shows the REScheck 4.4.2 software interface. The title bar reads "Missouri_Home_UA.rck - REScheck 4.4.2" and "Code: 2009 IECC". The menu bar includes "File", "Edit", "View", "Options", "Code", "Tools", and "Help". The "Options" menu is open, showing "Compliance Method" with a sub-menu containing "UA Trade-Off" (selected) and "Performance Alternative". Other options in the "Options" menu include "Orientation (Envelope)" and "Comments/Description (Envelope)".

The main interface is divided into several sections:

- Project**: Includes "Location" (State: Missouri, City: Jefferson City), "Project Type" (New Construction selected, Addition/Alteration unselected), and "Building Characteristics" (1- and 2-Family, Detached selected; Multifamily unselected; Conditioned Floor Area: 3508 ft²; All ducts and air handlers located within conditioned spaces checked).
- Project Details (optional)**: Includes "Title/Site/Permit" (Jefferson City Home, 1234 ABC Lane, Jefferson City, MO 65101), "Owner/Agent", "Designer/Contractor", and "Notes".



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Compliance Path – UA Alternative

Missouri_Home_UA.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Project **Envelope** Mechanical

Ceiling Skylight Wall Window Door Basement Floor Crawl Wall

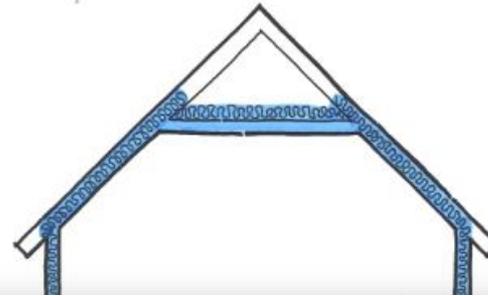
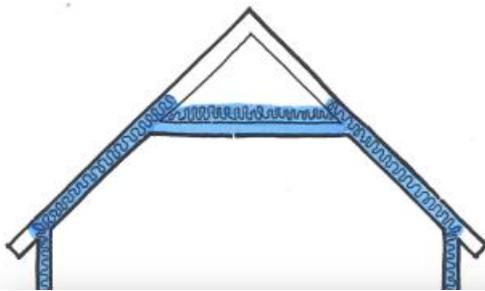
	Component	Assembly	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	SHGC	Wall Height (ft)
Building										
1	Ceiling 1	Cathedral Ceiling	779	ft2	30.0	5.0	0.029	23		
2	Ceiling 2	Flat Ceiling or Scissor Truss	385	ft2	25.0	13.0	0.026	10		
3	Wall 1	Wood Frame, 16" o.c.	2571	ft2	20.0	0.0	0.059	124		
4	Window 1	Wood Frame:Double Pan...	271	ft2			0.3	81	0.40	
5	Window 2	Wood Frame:Double Pan...	146	ft2			0.6	88	0.50	
6	Door 1	Solid	54	ft2			0.5	27		
7	Wall 2	Wood Frame, 16" o.c.	50	ft2	0.0	0.0	0.238	0		
8	Window 3	Wood Frame:Double Pan...	48	ft2			0.3	14	0.40	
9	Basement Wall 1	Solid Concrete or Masonry	573	ft2	13.0	0.0	0.075	43		7.0



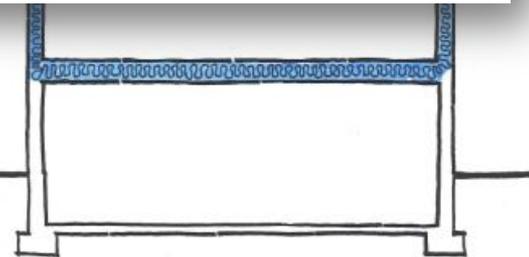
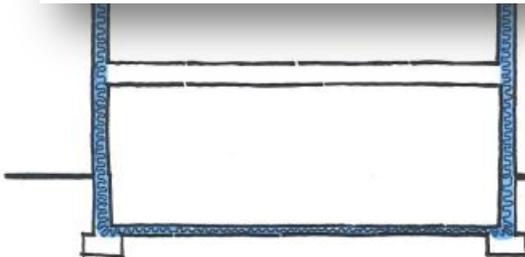
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Compliance Path – UA Alternative



CONDITIONED SPACE. An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.



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Compliance Path – UA Alternative



Missouri_Home_UA.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Project Envelope Mechanical

Component	Assembly	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	SHGC	Wall Height (ft)	Depth Below Grade (ft)	Depth of Insulation (ft)
Building										
1 Ceiling 1	Cathedral Ceiling	779	ft2 30.0	5.0	0.029	23				
2 Ceiling 2	Flat Ceiling or Scissor Truss	385	ft2 25.0	13.0	0.026	10				
3 Wall 1	Wood Frame, 16" o.c.	2571	ft2 20.0	0.0	0.059	124				
4 Window 1	Wood Frame:Double Pan...	271	ft2		0.3	81	0.40			
5 Window 2	Wood Frame:Double Pan...	146	ft2		0.6	88	0.50			
6 Door 1	Solid	54	ft2		0.5	27				

Passes 3.1 % Better Than Code

Compliance Method: UA Trade-Off Max. UA 423 Your UA 410

Passes 3.1 % Better Than Code

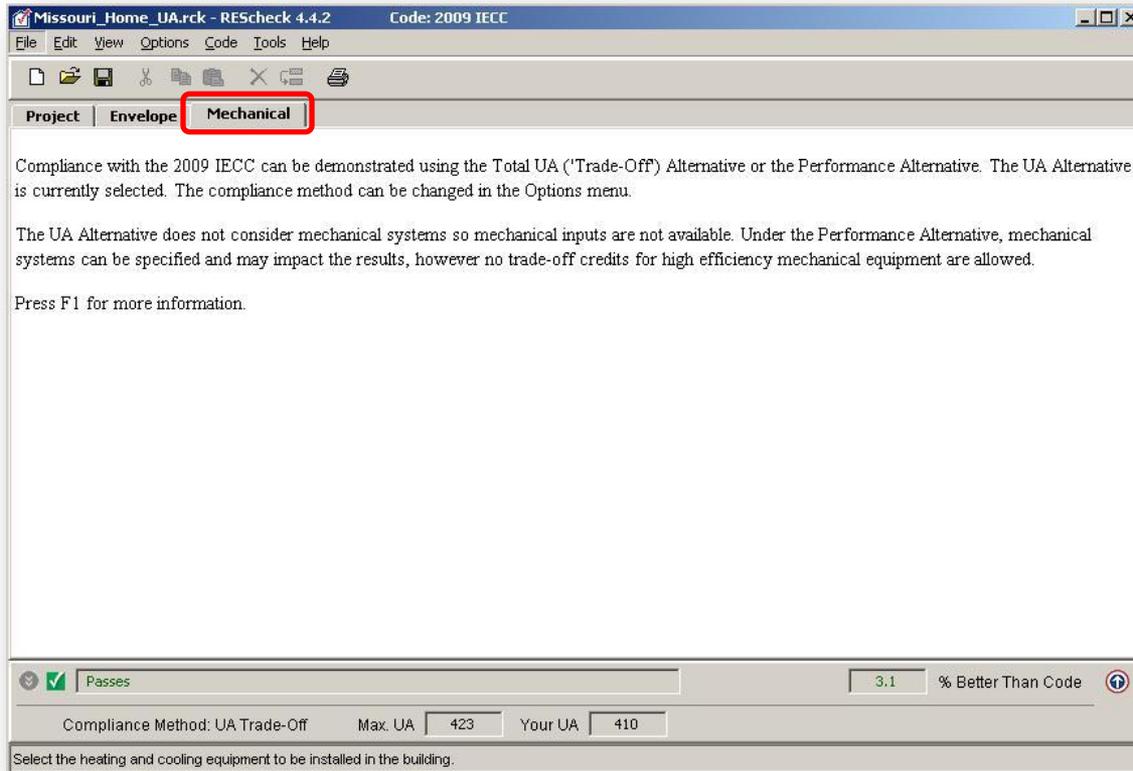
Compliance Method: UA Trade-Off Max. UA 423 Your UA 410



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Compliance Path – UA Alternative



The screenshot shows the REScheck 4.4.2 software interface. The title bar reads "Missouri_Home_UA.rck - REScheck 4.4.2" and "Code: 2009 IECC". The menu bar includes "File", "Edit", "View", "Options", "Code", "Tools", and "Help". The toolbar contains icons for file operations. The "Mechanical" tab is selected and highlighted with a red box. The main text area contains the following information:

Compliance with the 2009 IECC can be demonstrated using the Total UA ("Trade-Off") Alternative or the Performance Alternative. The UA Alternative is currently selected. The compliance method can be changed in the Options menu.

The UA Alternative does not consider mechanical systems so mechanical inputs are not available. Under the Performance Alternative, mechanical systems can be specified and may impact the results, however no trade-off credits for high efficiency mechanical equipment are allowed.

Press F1 for more information.

At the bottom, a status bar shows a green checkmark icon, a "Passes" label, a "3.1" value, and "% Better Than Code". Below this, a table displays compliance details:

Compliance Method: UA Trade-Off	Max. UA	423	Your UA	410
---------------------------------	---------	-----	---------	-----

Below the table, a prompt reads: "Select the heating and cooling equipment to be installed in the building."



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Compliance Path – UA Alternative

Missouri_Home_UA.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Project Envelope Mechanical

Location

State: Missouri

City: Jefferson City

Project Type

New Construction Addition/Alteration

Building Characteristics

1- and 2-Family, Detached Multifamily

Conditioned Floor Area: 3508 ft²

All ducts and air handlers located within condition

[Explanation of duct testing requirements...](#)

Project Details (optional)

This information will appear on the compliance certificate. [Edit Project Details...](#)

Title/Site/Permit

Jefferson City Home
1234 ABC Lane
Jefferson City, MO 65101

View / Print Report

Select Report Options

Compliance Certificate

Inspection Checklist

Panel Certificate

OK Cancel

Notes



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Compliance Path – UA Alternative



REScheck Software Version 4.4.2 Compliance Certificate



Project Title: Jefferson City Home

Energy Code: 2009 IECC
 Location: Jefferson City, Missouri
 Construction Type: Single Family
 Glazing Area Percentage: 18%
 Heating Degree Days: 5302
 Climate Zone: 4

Construction Site:
 1234 ABC Lane
 Jefferson City, MO 65101

Owner/Agent:

Designer/Contractor:

Compliance: Passes using UA trade-off

Compliance: 3.1% Better Than Code Maximum UA: 423 Your UA: 410

The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules.
 It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Cathedral Ceiling	779	30.0	5.0		23
Ceiling 2: Flat Ceiling or Scissor Truss	385	25.0	13.0		10
Wall 1: Wood Frame, 16" o.c.	2571	20.0	0.0		124
Window 1: Wood Frame:Double Pane with Low-E	271			0.300	81
Window 2: Wood Frame:Double Pane with Low-E	146			0.600	88
Door 1: Solid	54			0.500	27
Wall 2: Wood Frame, 16" o.c.	50	0.0	0.0		0
Window 3: Wood Frame:Double Pane with Low-E	48			0.300	14
Basement Wall 1: Solid Concrete or Masonry	573	13.0	0.0		43
Wall height: 7.0'					
Depth below grade: 3.5'					
Insulation depth: 7.0'					

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2009 IECC requirements in REScheck Version 4.4.2 and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.



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Compliance Path – UA Alternative



REScheck Software Version 4.4.2
Inspection Checklist

Ceilings:

- Ceiling 1: Cathedral Ceiling, R-30.0 cavity + R-5.0 continuous insulation

Comments: _____

- Ceiling 2: Flat Ceiling or Scissor Truss, R-25.0 cavity + R-13.0 continuous insulation

Comments: _____

Above-Grade Walls:

- Wall 1: Wood Frame, 16" o.c., R-20.0 cavity insulation

Comments: _____

- Wall 2: Wood Frame, 16" o.c., R-0 (uninsulated)

Comments: _____

Basement Walls:

- Basement Wall 1: Solid Concrete or Masonry, 7.0' ht / 3.5' bg / 7.0' insul, R-13.0 cavity insulation

Comments: _____

Windows:

- Window 1: Wood Frame:Double Pane with Low-E, U-factor: 0.300

For windows without labeled U-factors, describe features:

#Panes _____ Frame Type _____ Thermal Break? _____ Yes _____ No

Comments: _____

- Window 2: Wood Frame:Double Pane with Low-E, U-factor: 0.600

For windows without labeled U-factors, describe features:

#Panes _____ Frame Type _____ Thermal Break? _____ Yes _____ No

Comments: _____

- Window 3: Wood Frame:Double Pane with Low-E, U-factor: 0.300

For windows without labeled U-factors, describe features:



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Compliance Path – UA Alternative



2009 IECC Energy Efficiency Certificate

Insulation Rating R-Value

Ceiling / Roof	35.00
Wall	20.00
Floor / Foundation	13.00
Ductwork (unconditioned spaces):	_____

Glass & Door Rating U-Factor SHGC

Window	0.30	0.40
Door	0.50	NA

Heating & Cooling Equipment Efficiency

Heating System:	_____
Cooling System:	_____
Water Heater:	_____

Name: _____ Date: _____

Comments:

This document or a similar one needs to be installed near the main electrical panel



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Compliance

Mandatory Provisions

AND

A. Prescriptive

B.1 U-Factor

B.2 UA Alternative

C. Simulated Performance Alternative

Prescriptive Approaches



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Compliance Path – Simulated Performance

- Simulated performance analysis [405]
 - Heating, cooling, service water heating energy only
- Design shown to have less than or equal to annual energy cost of standard reference design [405.3]
- Standard reference design [Table 405.5.2(1)]

TABLE 405.5.2(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame. Gross area: same as proposed U-factor: from Table 402.1.3 Solar absorptance = 0.75 Emittance = 0.90	As proposed As proposed As proposed As proposed As proposed
Basement and crawl space walls	Type: same as proposed Gross area: same as proposed U-factor: from Table 402.1.3, with insulation layer on interior side of walls.	As proposed As proposed As proposed
Above-grade floors	Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3	As proposed As proposed As proposed
Ceilings	Type: wood frame Gross area: same as proposed U-factor: from Table 402.1.3	As proposed As proposed As proposed
	Type: composition shingle on wood sheathing Gross area: same as proposed	As proposed As proposed

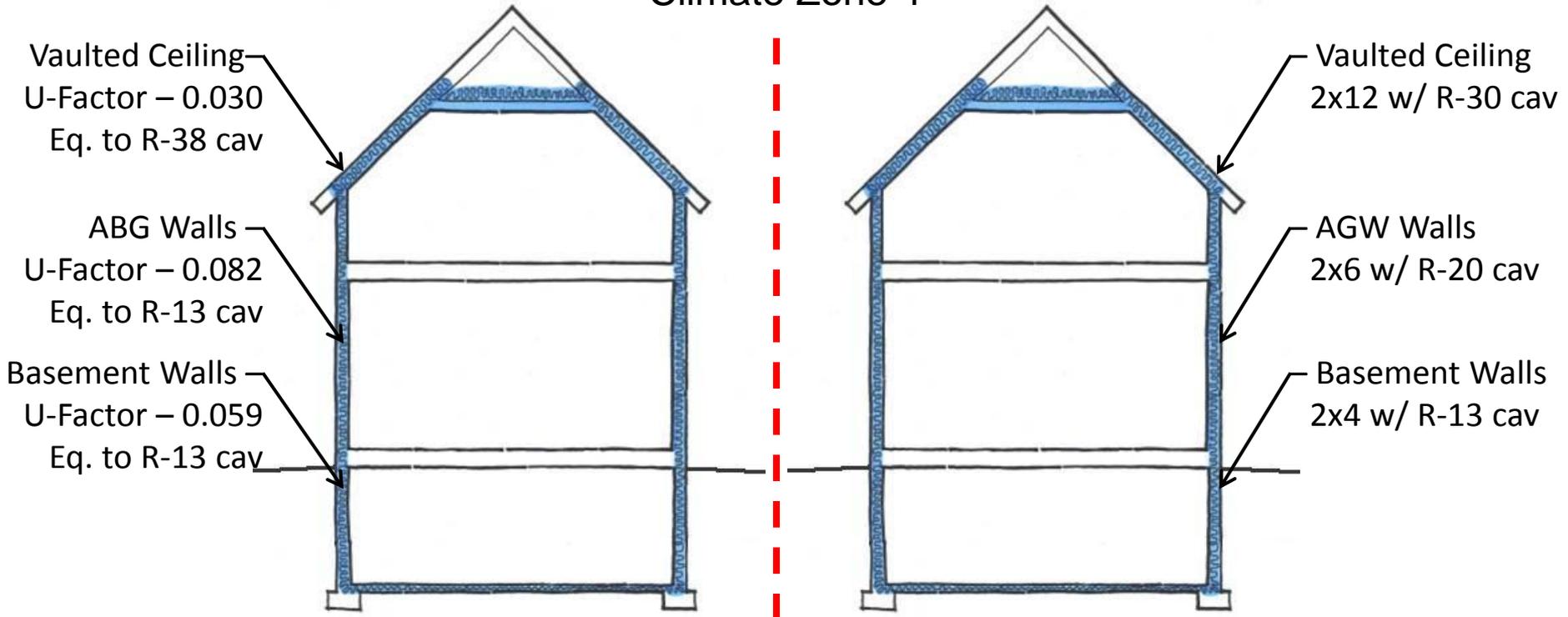


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Compliance Path – Simulated Performance

Climate Zone 4



Reference Design
2009 IECC

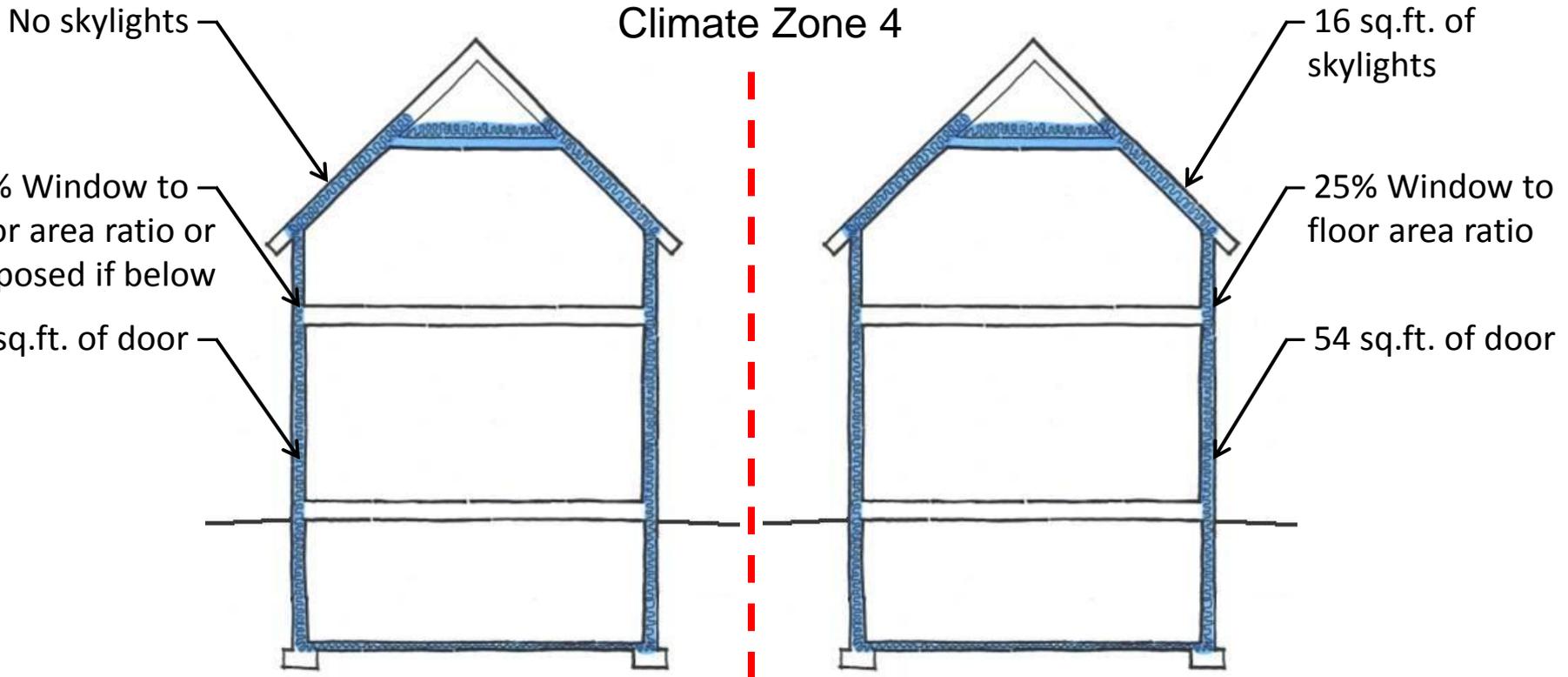


Proposed Design

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Compliance Path – Simulated Performance



Reference Design
2009 IECC



Proposed Design

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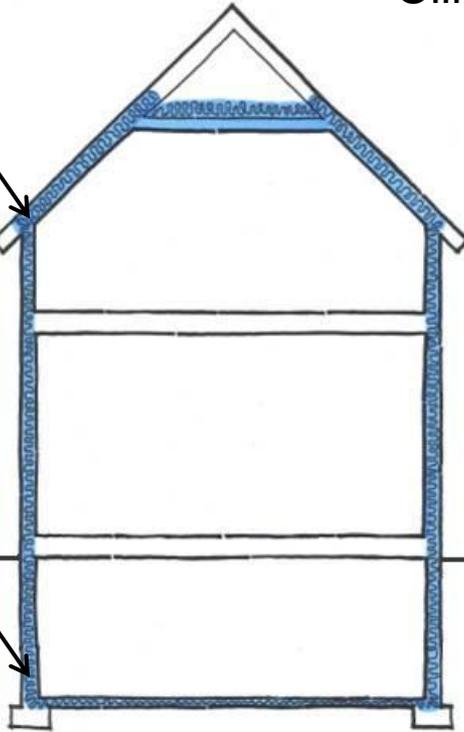
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Compliance Path – Simulated Performance

Climate Zone 4

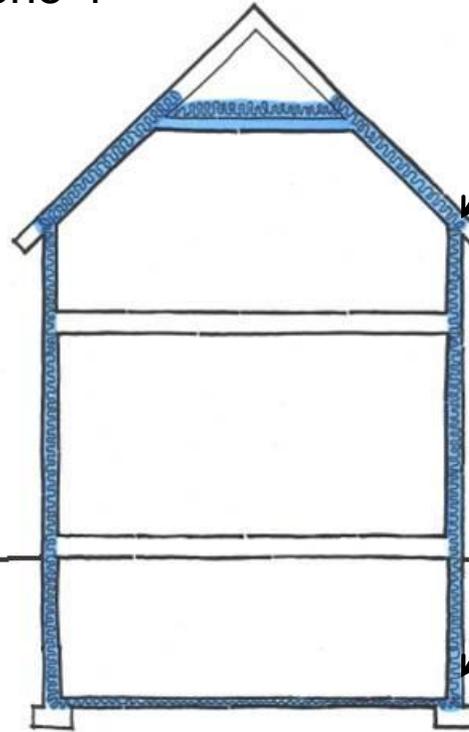
ACH of
0.00036 SLA

Mechanical
same as proposed



ACH not tested
then same as
reference OR
actual value down
to 0.35 OR
actual value if
mechanically
ventilated

Mechanical as
proposed



Reference Design
2009 IECC



Proposed Design

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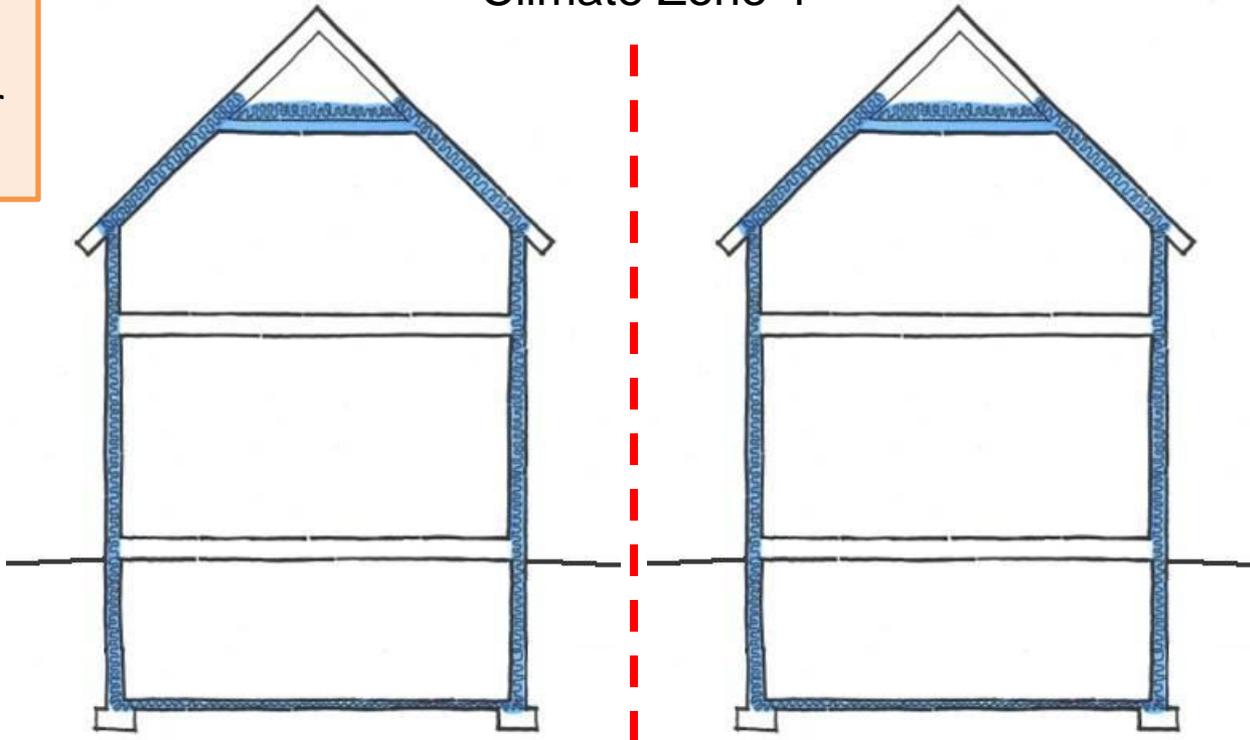
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Compliance Path – Simulated Performance

Heat
+ Cool
+ Hot Water
= \$917

Climate Zone 4

Heat
+ Cool
+ Hot Water
= \$770



Reference Design
2009 IECC



Proposed Design

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Compliance Path – Simulated Performance

Differences between UA and Performance

- Performance takes into consideration weather
- Performance does not require 50% high efficacy lighting
- Performance allows for R-6 duct insulation, instead of R-8 for supply ducts
- Performance has limits to doors and windows
 - Glass house could be compliant in the prescriptive paths but not compliant in the performance path

Main Software

- REScheck
- REM/Design or REM/Rate (considers air infiltration and duct tightness)



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Compliance Path – Simulated Performance

The screenshot shows the REScheck 4.4.2 software interface. The title bar reads "Missouri_Home_Performance.rck - REScheck 4.4.2 Code: 2009 IECC". The menu bar includes File, Edit, View, Options, Code, Tools, and Help. The "Compliance Method" dropdown is open, showing "UA Trade-Off" and "Performance Alternative". The "Project" tab is active, with sub-tabs for "Env" and "Comments/Description (Envelope)".

Location:
State: Missouri
City: Jefferson City

Project Type:
 New Construction Addition/Alteration

Building Characteristics:
 1- and 2-Family, Detached Multifamily
Conditioned Floor Area: 3508 ft²
 All ducts and air handlers located within conditioned spaces
[Explanation of duct testing requirements...](#)

Project Details (optional):
This information will appear on the compliance certificate. [Edit Project Details...](#)

Title/Site/Permit:
Jefferson City Home
1234 ABC Lane
Jefferson City, MO 65101

Owner/Agent:

Designer/Contractor:

Notes:



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Compliance Path – Simulated Performance

The screenshot shows the REScheck software interface. The main window is titled "Missouri_Home_Performance.rck - REScheck 4.4.2" and "Code: 2009 IECC". The "Project" tab is selected, and the "Envelope" sub-tab is active. The "Location" section shows "State: Missouri" and "City: Jefferson". The "Project Type" is "New Construction" and "Building Characteristic" is "1- and 2-Family". The "Compliance Method" is "UA Trade-Off". The "Max. UA" is 423 and the "Your UA" is 410. The "Passes" status is indicated by a green checkmark. The "3.1 % Better Than Code" result is shown. A dialog box titled "2009 IECC Performance Alternative Information" is open, providing details about the compliance alternative.

2009 IECC Performance Alternative Information

Compliance with the 2009 IECC can be demonstrated using the Total UA Alternative (Section 402.1.4), or the Performance Alternative (Section 405). However, neither of these alternatives allow credit for high efficiency mechanical equipment.

The performance alternative is based on the simulated performance of your proposed building as compared to an equivalent code building. Both simulations are based on the proposed mechanical equipment efficiency that you enter. The compliance index may not always seem consistent with changes you make in equipment efficiency due to the complex interactions between the building envelope (including window SHGCs and U-factors), the building and wall orientation, and mechanical equipment efficiency.

Using the performance alternative requires additional inputs including conditioned floor area, orientation of the building, a minimum of four walls having unique orientations, and a minimum of one roof and floor.

Press 'F1' or see Help for additional information.

Buttons: Help, OK

Compliance Method: UA Trade-Off Max. UA: 423 Your UA: 410

3.1 % Better Than Code

Select the building's location and construction type.



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Compliance Path – Simulated Performance



Missouri_Home_Performance.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Front Faces: East

Project Envelope Mechanical

Ceiling Skylight Wall Window Door Basement Floor Crawl Wall

	Component	Assembly	Orientation	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	SHGC	Wall Height (ft)	Depth Below Grade (ft)	Depth of Insulation (ft)
Building												
1	Ceiling 1	Cathedral Ceiling		779	ft2 30.0	5.0	0.029	23				
2	Ceiling 2	Flat Ceiling or Scissor Truss		385	ft2 25.0	13.0	0.026	10				
3	Wall 2	Wood Frame, 16" o.c.	Left Side	50	ft2 0.0	0.0	0.238	0				
4	Window 3	Wood Frame:Double Pan...	Left Side	48	ft2		0.3	14	0.40			
5	Wall 1	Wood Frame, 16" o.c.	Front	429	ft2 20.0	0.0	0.059	18				
6	Window 1	Wood Frame:Double Pan...	Front	100	ft2		0.3	30	0.30			
7	Door 1	Solid	Front	20	ft2		0.3	6				
8	Wall 1 copy 1	Wood Frame, 16" o.c.	Back	429	ft2 20.0	0.0	0.059	18				
9	Window 1 copy	Wood Frame:Double Pan...	Back	100	ft2		0.3	30	0.30			
10	Door 1 copy 1	Solid	Back	20	ft2		0.3	6				
11	Wall 1 copy 2	Wood Frame, 16" o.c.	Right Side	857	ft2 20.0	0.0	0.059	44				
12	Window 1 copy	Wood Frame:Double Pan...	Right Side	73	ft2		0.35	26	0.40			
13	Window 1 copy	Wood Frame:Double Pan...	Right Side	35	ft2		0.3	11	0.30			
14	Wall 1 copy 3	Wood Frame, 16" o.c.	Left Side	857	ft2 20.0	0.0	0.059	43				
15	Window 1 copy	Wood Frame:Double Pan...	Left Side	73	ft2		0.35	26	0.40			
16	Window 1 copy	Wood Frame:Double Pan...	Left Side	35	ft2		0.3	11	0.30			
17	Door 1 copy 2	Solid	Left Side	20	ft2		0.3	6				
18	Basement Wall 1	Solid Concrete or Masonry	Front	96	ft2 13.0	0.0	0.075	7		7.0	3.5	7.0
19	Basement Wall 1 c	Solid Concrete or Masonry	Back	96	ft2 13.0	0.0	0.075	7		7.0	3.5	7.0
20	Basement Wall 1 c	Solid Concrete or Masonry	Right Side	190	ft2 13.0	0.0	0.075	14		7.0	3.5	7.0
21	Basement Wall 1 c	Solid Concrete or Masonry	Left Side	190	ft2 13.0	0.0	0.075	14		7.0	3.5	7.0

Compliance method: Performance Alternative

Check Compliance

TBD %

Explanation of results...



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Compliance Path – Simulated Performance

Missouri_Home_Performance.rck - REScheck 4.4.2 Code: 2009 IECC

File Edit View Options Code Tools Help

Front Faces: East

Project Envelope Mechanical

Component	Assembly	Orientation	Gross Area	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	SHGC	Wall Height (ft)	Depth Below Grade (ft)	Depth of Insulation (ft)
Building											
1	Ceiling 1	Cathedral Ceiling	779	ft2	30.0	5.0	0.029	23			
2	Ceiling 2	Flat Ceiling or Scissor Truss	385	ft2	25.0	13.0	0.026	10			
3	Wall 2	Wood Frame, 16" o.c.	50	ft2	0.0	0.0	0.238	0			
4	Window 3	Wood Frame:Double Pan...	48	ft2			0.3	14	0.40		
5	Wall 1	Wood Frame, 16" o.c.	429	ft2	20.0	0.0	0.059	18			

Passes : Compliance based on performance alternative 5.4 % Better Than Code

Compliance Method: Performance Alternative [Explanation of results...](#)

12	Window 1 copy	Wood Frame:Double Pan...	73	ft2			0.35	26	0.40		
13	Window 1 copy	Wood Frame:Double Pan...	35	ft2			0.3	11	0.30		
14	Wall 1 copy 3	Wood Frame, 16" o.c.	857	ft2	20.0	0.0	0.059	43			
15	Window 1 copy	Wood Frame:Double Pan...	73	ft2			0.35	26	0.40		
16	Window 1 copy	Wood Frame:Double Pan...	35	ft2			0.3	11	0.30		
17	Door 1 copy 2	Solid	20	ft2			0.3	6			
18	Basement Wall 1	Solid Concrete or Masonry	96	ft2	13.0	0.0	0.075	7		7.0	3.5
19	Basement Wall 1 cc	Solid Concrete or Masonry	96	ft2	13.0	0.0	0.075	7		7.0	3.5
20	Basement Wall 1 cc	Solid Concrete or Masonry	190	ft2	13.0	0.0	0.075	14		7.0	3.5
21	Basement Wall 1 cc	Solid Concrete or Masonry	190	ft2	13.0	0.0	0.075	14		7.0	3.5

Passes : Compliance based on performance alternative 5.4 % Better Than Code

Compliance Method: Performance Alternative [Explanation of results...](#)



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MISSOURI DEPARTMENT OF NATURAL RESOURCES

Compliance Path – Simulated Performance



REScheck Software Version 4.4.2
Compliance Certificate



Project Title: Jefferson City Home

Energy Code: 2009 IECC
 Location: Jefferson City, Missouri
 Construction Type: Single Family
 Building Orientation: Bldg. faces 90 deg. from North
 Conditioned Floor Area: 3508 ft²
 Glazing Area Percentage: 18%
 Heating Degree Days: 5302
 Climate Zone: 4

Construction Site:
 1234 ABC Lane
 Jefferson City, MO 65101

Owner/Agent:

Designer/Contractor:

Compliance: Passes using performance alternative
 Compliance: 5.4% Better Than Code

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Cathedral Ceiling	779	30.0	5.0		23
Ceiling 2: Flat Ceiling or Scissor Truss	385	25.0	13.0		10
Wall 2: Wood Frame, 48" o.c.	60	2.0	2.0		0



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Compliance Path – Simulated Performance

- REScheck [405.6.1] minimum capabilities of the software
- REM/Design or REM/Rate

BEST PRACTICE: Homeowners and Builders should push for a third party inspector or HERS rater that is looking out for the owner, similar to an owner's representative. A HERS rating is the standard that most homes striving for ENERGY STAR or LEED follow and is the standard tool that is currently used to certify tax rebates from the IRS. HERS raters will typically use REM/Rate as their software.

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Compliance Path – Simulated Performance

The image displays two overlapping screenshots of the REM/Design software interface. The left window shows the 'Property Information' and 'Builder Information' sections. The right window shows the 'Site Information' and 'Utility' sections.

Property Information:

- Building Name: Jefferson City Home
- Owner's Name: [Empty]
- Property Address: 1234 ABC Lane
- City: Jefferson City
- State: MO Zip: 65101
- Phone Number: [Empty]

Builder Information:

- Builder's Name: [Empty]
- Builder's Address: [Empty]
- Builder's Email: [Empty]
- Phone Number: [Empty]
- Model Name/No: [Empty]
- Development Name: [Empty]

Site Information:

- Climate Location: Columbia, MD

Utility:

- Electricity: Default Electric Provider
- Gas: Default Gas Provider
- Propane: None
- Oil: None
- Kerosene: None
- Wood: None



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Compliance Path – Simulated Performance

REM/Design v 12.96 - Missouri_Home_REM.blg

File Building View Extras Libraries Reports Tools Help

Slab Floor Properties Summary

#	Name	Type	Area	Depth	Full Per	Grad...
1	Slab	R-10 Perimeter	1191	3.0	195	0

New Delete Copy

Slab Floor Properties

Name:

Type: R-10.0 Per ...

Area (sq ft): Full Perimeter (ft):

Depth Below Grade (ft): Total Exposed Perimeter (ft):
(0 if on-grade)

On-Grade Exposed Perimeter (ft):



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Compliance Path – Simulated Performance

2009 IECC ANNUAL ENERGY COST COMPLIANCE



Building Name:	Jefferson City Home	Date:	November 18, 2011
Owner's Name:		Builder's Name:	
Property:	1234 ABC Lane	Weather Site:	Columbia, MO
Address:	Jefferson City, MO 65101	File Name:	Missouri_Home_REM.blg

	Annual Energy Cost (\$)	
	2009 IECC	As Designed
Heating:	583	493
Cooling:	239	208
Water Heating:	95	70
SubTotal - Used to Determine Compliance:	917	770
Lights & Appliances:	751	751
Photovoltaics:	-0	-0
Service Charge:	120	120
Total:	1788	1641 *

Window U-Factor Check (Section 402.5)		
Window U-Factor (Design must be equal or lower):	0.480	0.330
Home Infiltration (Section 402.4.2):		
		PASSES
Duct Leakage (Section 403.2.2):		
		PASSES

This home MEETS the annual energy cost requirements and verifications of Section 405 of the 2009 International Energy Conservation Code based on a climate zone of 4A. In fact, this home surpasses the requirements by 16.0%.



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Topic 2 Summary

- Difference between the IECC and the IRC in how they pertain to residential buildings
- Applicability of the IECC
- Clarified some points of confusion about the IECC, building and duct tightness, and lighting efficacy
- Discuss compliance paths for applicants to meet the code
 - Actually four paths for compliance



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Topic 3

Tools to Enhance Compliance throughout Permit Review Process and Inspection



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Topic 3 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required



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Topic 3 Objectives

- **Review examples of tools to enhance compliance with the code prior to submittal**
 - Pre-application meetings
 - Code determination worksheet
 - Permit submittal checklist
 - Compliance form
 - Energy efficiency certificate



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Pre-Application Meetings

- Discuss compliance paths, and review code requirements
- Point applicants to information
- Review common misconceptions
- Identify a point-of-contact, which carries through review process



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Tools Prior to Submittal

Use of a “Determination Worksheet”

- Chicago Energy Conservation Code Compliance Determination Worksheet
 - Determine compliance requirements
 - Determine occupancy classification

Use the check boxes below to determine the classification for the project.

YES NO

Is the building **5 stories or more** above grade?

- If you checked “YES”, please complete the **Commercial Compliance Form**.

Is the building **4 stories or less** above grade and contains any permanent residential occupancy, such as houses, apartments, condos, or dorms (hotel and temporary housing units are not included here)?

- If you checked “YES”, please complete the **Residential Compliance Form**.

Is the building **4 stories or less** above grade and does it contain any permanent residential occupancy and any other occupancy which occupies more than 15% of the total building area?

- If you checked “YES”, please complete the **Commercial Compliance Form** as well as the **Residential Compliance Form**.



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Tools Prior to Submittal

- Use of a checklist for required documents needed for permit submittal

<u>APPLICANT'S INITIALS</u>	<u>VILLAGE VERIFICATION</u>	
_____	_____	<ol style="list-style-type: none">1. Two set of drawings2. Site plan detail sheet3. Foundation detail sheet4. Floor plans5. Wall construction detail sheet6. Floor construction detail sheet7. Roof/ceiling construction detail sheet8. Chimney/fireplace & chase detail sheet9. Mechanical detail sheet10. Plumbing detail sheet11. Electrical detail sheet12. Drainage Certificate Agreement13. Site Development Permit/Erosion Control14. Contractor Listing15. Open Space Disclaimer or Open Space Checklist & Receipts16. Energy Code Compliance
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	
_____	_____	

Signature of Applicant _____ Date _____

Accepted: Village of New Lenox _____ Date _____



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Tools Prior to Submittal

- Might want a detailed description of what is required for the “Energy Code Compliance”

1. Two set of drawings
2. Site plan detail sheet
3. Foundation detail sheet
4. Floor plans
5. Wall construction detail sheet
6. Floor construction detail sheet
7. Roof/ceiling construction detail sheet
8. Chimney/fireplace & chase detail sheet
9. Mechanical detail sheet
10. Plumbing detail sheet
11. Electrical detail sheet
12. Drainage Certificate Agreement
13. Site Development Permit/Erosion Control
14. Contractor Listing
15. Open Space Disclaimer or
Open Space Checklist & Receipts
16. Energy Code Compliance

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Tools Prior to Submittal

Compliance forms

- Chicago, IL - Residential Compliance Form
- Fort Collins, CO - Residential Energy Code Compliance Form
- Jefferson County, CO - Residential Energy Code Submittal Requirements

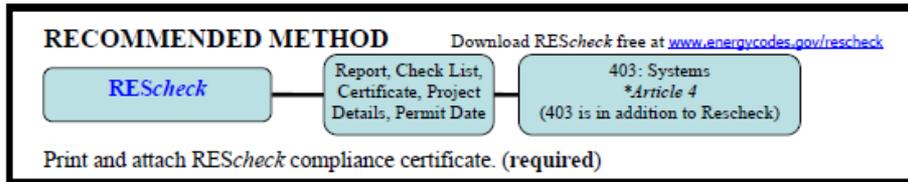


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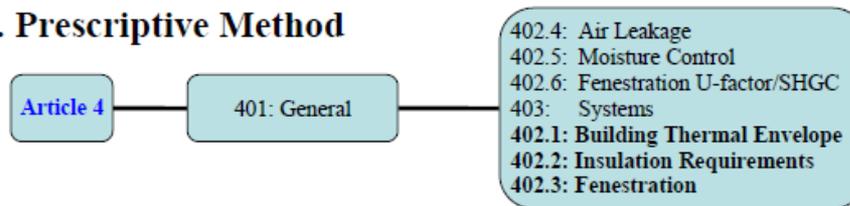
Tools Prior to Submittal – Chicago, IL

A. Rescheck



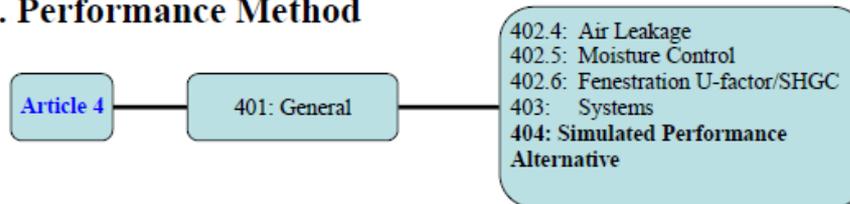
-----OR-----

B. Prescriptive Method



-----OR-----

C. Performance Method



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Tools Prior to Submittal – Chicago, IL

A. Rescheck

RECOMMENDED METHOD

Download REScheck free at www.energycodes.gov/rescheck

REScheck

Report, Check List,
Certificate, Project
Details, Permit Date

403: Systems
*Article 4
(403 is in addition to Rescheck)

Print and attach REScheck compliance certificate. **(required)**

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Tools Prior to Submittal – Chicago, IL

B. Prescriptive Method

Article 4

401: General

402.4: Air Leakage
402.5: Moisture Control
402.6: Fenestration U-factor/SHGC
403: Systems
402.1: Building Thermal Envelope
402.2: Insulation Requirements
402.3: Fenestration

OR

C. Performance Method

Article 4

401: General

402.4: Air Leakage
402.5: Moisture Control
402.6: Fenestration U-factor/SHGC
403: Systems
404: Simulated Performance Alternative

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Tools Prior to Submittal – Fort Collins, CO

updated 11-16-2010


Planning, Development & Transportation Services
Community Development & Neighborhood Services

2010 FORT COLLINS RESIDENTIAL ENERGY CODE COMPLIANCE FORM

Permit Number: _____

Address: _____

DIRECTIONS: Place a check next to Prescriptive, UA, or SPA indicating the path chosen. Next, circle the method within that path you intend to follow. If choosing prescriptive or UA, the applicant must also choose between an Air sealing checklist or Blower Door Test.

(A) PRESCRIPTIVE compliance for house, 2009 IRC, section N1102.1, climate zone 5.

BUILDING ENVELOPE	INSULATION R-VALUE
Wood frame wall insul r-value	R-20 or 13+5ci
Metal frame wall insul r-value	R-13+9ci or R-19+8
Crawl space wall	R-13 or R-10ci
Roof insulation in attic	R-38
Roof rafter insulation	R-30
Walls below grade	R-13 / R-10ci
Wood floor over un-cond	R-30
Slab on grade floor, unheat	R-10, 24" DEEP
Windows	U-.35

Circle one: **Air Sealing Checklist** **Blower Door Test**

(B) TOTAL UA ALTERNATIVE (ResCheck), 2009 IRC, SECTION N1102.1.3

Submit a passing UA calculation (i.e. ResCheck) using 2009 IRC/IECC. The rating must be submitted at time of application and must include address of residence; name of individual completing the rating form; name & version of software tool (i.e. ResCheck). Air Sealing Checklist or Blower Door Test is required.

Circle one: **Air Sealing Checklist** **Blower Door Test**

(C) SIMULATED PERFORMANCE ALTERNATIVE, 2009 IECC, SECTION 405

Current accredited programs: E-star of Colorado or Energylogic

HERS accredited energy rating system. Must submit HERS index of 100 maximum. A preliminary rating must be submitted at time of application and must include Address of residence; Name of individual completing the rating/compliance form; Name & version of software tool. Final rating requires a blower door test.

SIGN: _____ DATE: _____

CONTRACTOR: _____ PHONE: _____



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Tools Prior to Submittal – Fort Collins, CO

Option (A) - Prescriptive

- Simple - specific to the exact climate zone
- Could include the U-Factor values as an option

(A) PRESCRIPTIVE compliance for house, 2009 IRC, section N1102.1, climate zone 5.

BUILDING ENVELOPE	INSULATION R-VALUE
Wood frame wall insul r-value	R-20 or 13+5ci
Metal frame wall insul r-value	R-13+9ci or R-19+8
Crawl space wall	R-13 or R-10ci
Roof insulation in attic	R-38
Roof rafter insulation	R-30
Walls below grade	R-13 / R-10ci
Wood floor over un-cond	R-30
Slab on grade floor, unheat	R-10, 24" DEEP
Windows	U-.35

Circle one: **Air Sealing Checklist** **Blower Door Test**

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Tools Prior to Submittal – Fort Collins, CO

Option (B) – UA Alternative

<input type="checkbox"/>	(B)TOTAL UA ALTERNATIVE (ResCheck), 2009 IRC, SECTION N1102.1.3 Submit a passing UA calculation (i.e. ResCheck) using 2009 IRC/IECC. The rating must be submitted at time of application and must include address of residence; name of individual completing the rating form; name & version of software tool (i.e. ResCheck). Air Sealing Checklist or Blower Door Test is required. Circle one: Air Sealing Checklist Blower Door Test
--------------------------	---

Option (C) – §

<input type="checkbox"/>	(C)SIMULATED PERFORMANCE ALTERNATIVE, 2009 IECC, SECTION 405 Current accredited programs: E-star of Colorado or Energylogic HERS accredited energy rating system. Must submit HERS index of 100 maximum. A preliminary rating must be submitted at time of application and must include Address of residence; Name of individual completing the rating/compliance form; Name & version of software tool. Final rating requires a blower door test.
--------------------------	---



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Tools Prior to Submittal – Jefferson County, CO

Residential Energy Code Submittal Requirements

The Jefferson County Division of Building Safety has adopted the 2009 International Codes effective January 1, 2010. Included as part of this adoption are the International Residential Code (IRC), and the International Energy Conservation Code (IECC). The IECC contains specific design and submittal requirements. The submittal requirements for residential energy compliance are outlined below as determined by the Division.

Energy code submittals shall be required for all residential projects in accordance with the applicable provisions of the 2009 IRC and 2009 IECC. There are four design path options available to the designer.

- Option #1: Prescriptive path as outlined in IRC Chapter 11
- Option #2: Total UA Alternative path (trade-off) as outlined in IRC section N1102.1.3 & IECC 402.1.4
- Option #3: Simulated Performance Alternative (Performance) path as outlined in IECC section 405
- Option #4: A Professional Design

Note: All four options have similar requirements for submittal documents to meet the code requirements including:

- Building envelope information
- A Manual J equipment design in accordance with the IRC section M1401.3
- A Manual D duct design in accordance with the IRC section M1601.1

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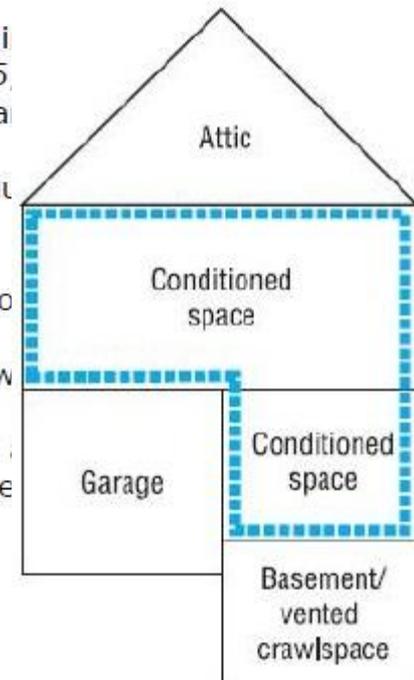
Tools Prior to Submittal – Jefferson County, CO

Option #1 Prescriptive Path

The Prescriptive Path requirements for the building envelope are found in the 2009 IRC. Unincorporated Jefferson County is located in Climate Zone 5, & Table N1102.1. All prescriptive information shall be taken from the applicable Zone 5 requirements.

The Prescriptive Building Envelope submittal shall include, at the minimum, the following information on the submitted plans.

- Address of the building (this is a site specific submittal)
- Define/ Delineate your Building Thermal Envelope (this information is to be shown on the plans rather than a separate document)
- Insulation materials; R values denoted for each individual area (wall, ceiling, floor over garage, etc.)
- Crawl space insulation for structural floors and other crawl space areas, whether the foundation wall or the structural floor system is to be used (per requirements of section N1102.2.9)
- Fenestration U factors 402.3
- Duct sealing and insulation. 403.2
- Manual J, specific to the site
- Manual D duct design, specific to the building
- Lighting equipment 404.1
- Specific insulation 402.2



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Tools Prior to Submittal

All projects should include:

- Air sealing details to limit air infiltration
- Air barrier and insulation notes (air barriers at *all* installed insulation)
- Duct sealing notes, note that no stud cavity shall be used as a supply duct, and possibly duct insulation notes
- Mechanical equipment details (type, efficiency, venting, location, etc.)
- Statement requiring a energy certificate to be installed on or near the electrical panel



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Tools Prior to Submittal

Prescriptive Pathway

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

Energy Details - Climate Zone 4	
2009 IECC Compliance - Prescriptive	
Basement Walls	2x4 with R-13 cav. (FB)
Above Grade Walls	2x6 with R-20 cav (BC)
Floor Over Garage	11.875" TJ with R-43 cav (BC)
Ceiling - Attic	R-50 (BC)
Windows	All U-Factors equal or below 0.30
Lighting	75% or more to be CFL

FB - Fiberglass Batt (R-3.7/inch)

BC - Blown Cellulose (R-3.66/inch)

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Tools Prior to Submittal

U-Factor Pathway

- Mandatory notes
- Insulation schedule
- Wall Sections specifying insulation
- High-efficacy lighting

Efficiency Schedule

Energy Details - Climate Zone 4	
2009 IECC Compliance - Prescriptive/U-Factor	
Basement Walls	2x4 with R-13 cav (FB)
Above Grade Walls	2x4 with empty cav and 2" of PI Foam on exterior [U-Factor - 0.059]
Floor Over Garage	11.875" TJ with R-43 cav (BC)
Ceiling - Attic	R-50 (BC)
Windows	All U-Factors equal or below 0.30
Lighting	75% or more to be CFL

FB - Fiberglass Batt (R-3.7/inch)

BC - Blown Cellulose (R-3.66/inch)

PI - Polyisocyanurate Rigid Foam (R-6.25/inch)



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Tools Prior to Submittal

UA Alternative Pathway

- REScheck Compliance Certificate
- Wall Sections specifying insulation
- Detail specifying high-efficacy lighting



**REScheck Software Version 4.4.2
Compliance Certificate**

Project Title: Jefferson City Home

Energy Code: 2009 IECC
 Location: Jefferson City, Missouri
 Construction Type: Single Family
 Glazing Area Percentage: 18%
 Heating Degree Days: 5302
 Climate Zone: 4

Construction Site: 1234 ABC Lane, Jefferson City, MO 65101
 Owner/Agent: _____
 Designer/Contractor: _____

Compliance: Passes using UA trade-off

Compliance: 3.1% Better Than Code Maximum UA: 423 Your UA: 410
 The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules.
 It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Cathedral Ceiling	779	30.0	5.0		23
Ceiling 2: Flat Ceiling or Scissor Truss	385	25.0	13.0		10
Wall 1: Wood Frame, 16" o.c.	2571	20.0	0.0		124
Window 1: Wood Frame:Double Pane with Low-E	271			0.300	81
Window 2: Wood Frame:Double Pane with Low-E	146			0.600	88
Door 1: Solid	54			0.500	27
Wall 2: Wood Frame, 16" o.c.	50	0.0	0.0		0
Window 3: Wood Frame:Double Pane with Low-E	48			0.300	14
Basement Wall 1: Solid Concrete or Masonry Wall height: 7.0' Depth below grade: 3.5' Insulation depth: 7.0'	573	13.0	0.0		43

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2009 IECC requirements in REScheck Version 4.4.2 and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.



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Tools Prior to Submittal

Simulated Performance Pathway

- Compliance Certificate
- Wall Sections specifying insulation



REScheck Software Version 4.4.2
Compliance Certificate

Project Title: Jefferson City Home

Energy Code: **2009 IECC**
 Location: **Jefferson City, Missouri**
 Construction Type: **Single Family**
 Building Orientation: **Bldg. faces 90 deg. from North**
 Conditioned Floor Area: **3508 ft²**
 Glazing Area Percentage: **18%**
 Heating Degree Days: **5302**
 Climate Zone: **4**

Construction Site: _____ Owner/Agent: _____ Designer/Contractor: _____
 1234 ABC Lane
 Jefferson City, MO 65101

Compliance: **Passes using performance alternative**

Compliance: 5.4% Better Than Code

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling 1: Cathedral Ceiling	779	30.0	5.0		23
Ceiling 2: Flat Ceiling or Scissor Truss	385	25.0	13.0		10
Wall 2: Mixed Frame, 48" x 16"	50	2.0	2.0		2

2009 IECC ANNUAL ENERGY COST COMPLIANCE		
Building Name:	Date:	
Owner's Name:	Builder's Name:	
Property Address:	Weather Site:	File Name:
Annual Energy Cost (\$)		
	2009 IECC	As Designed
Heating:	583	564
Cooling:	96	96
Water Heating:	108	108
SubTotal - Used to Determine Compliance:	788	788
Lights & Appliances:	592	592
Photovoltaics:	-0	-0
Service Charge:	120	120
Total:	1500	1480 *
Window U-Factor Check (per Section 402.5)		
Window U-Factor (Design must be lower):	0.480	0.300
Home Infiltration per Section 402.4.2:		PASSES
Duct Leakage per Section 403.2.2:		PASSES
This home MEETS the annual energy cost requirements and verifications of Section 405 of the 2009 International Energy Conservation Code based on a climate zone of 4A. In fact, this home surpasses the requirements by 2.6%.		
Name: _____	Signature: _____	
Organization: _____	Date: _____	
* Design energy cost is based on the following systems: Heating: Fuel-fired air distribution, 64.0 kBtu/h, 94.0 AFUE. Cooling: Air conditioner, 48.0 kBtu/h, 14.0 SEER. Water Heating: Conventional, Gas, 0.54 EF. Window-to-Floor Area Ratio: 0.10 Code default: Htg: 7.00 Clg: 7.00 ACH50		
In accordance with IECC, building inputs, such as setpoints, infiltration rates, and window shading may have been changed prior to calculating annual energy cost. Furthermore, the standard reference design HVAC system efficiencies are set to the "prevailing federal minimum standards" as of January, 2009. These standards are subject to change, and software updates should be obtained periodically to ensure the compliance calculations reflect current federal minimum standards.		



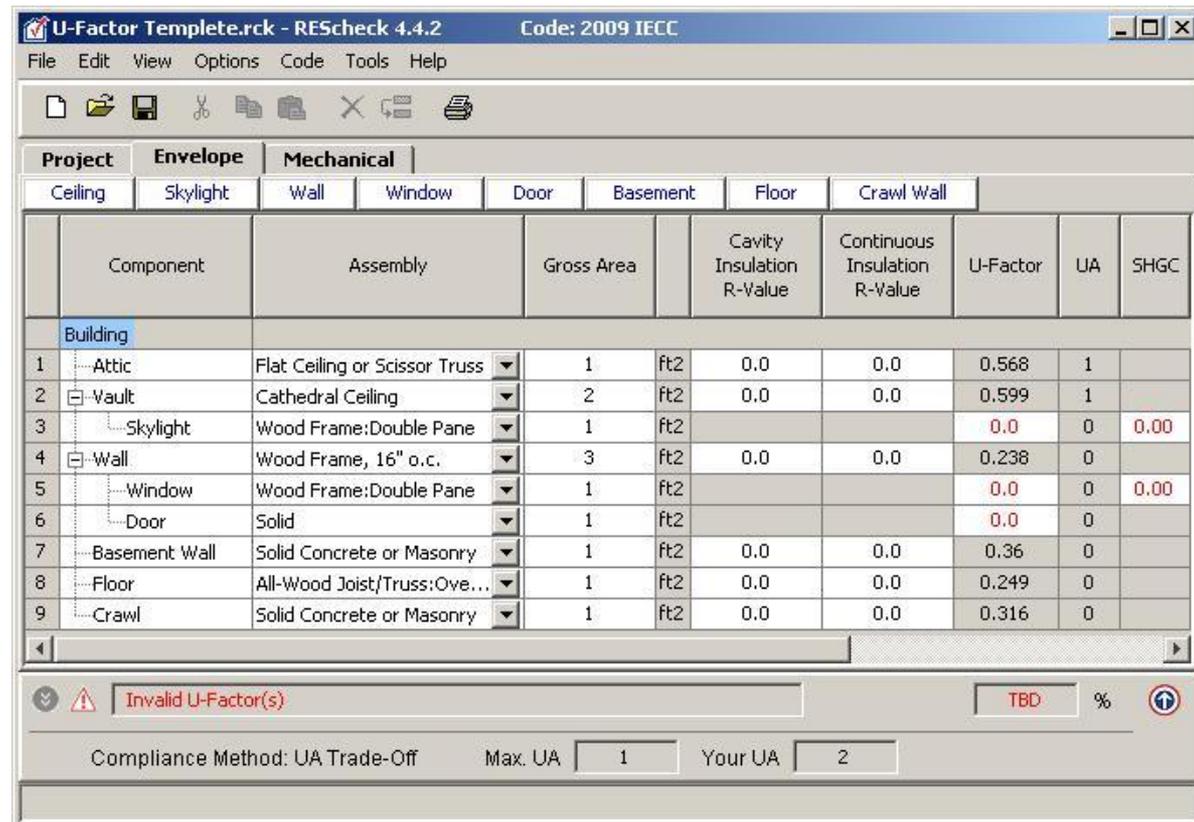
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Tools Prior to Submittal

Could use REScheck as a template also

- Automatically calculates the U-Factor of an assembly
- Focus on R-Value or U-Factor of assemblies



The screenshot shows the REScheck 4.4.2 software interface. The title bar reads "U-Factor Template.rck - REScheck 4.4.2" and "Code: 2009 IECC". The menu bar includes File, Edit, View, Options, Code, Tools, and Help. The toolbar contains icons for file operations and calculations. The main window is divided into tabs for Project, Envelope, and Mechanical. Under the Envelope tab, there are sub-tabs for Ceiling, Skylight, Wall, Window, Door, Basement, Floor, and Crawl Wall. A table lists building components with columns for Component, Assembly, Gross Area, Cavity Insulation R-Value, Continuous Insulation R-Value, U-Factor, UA, and SHGC. The table shows that skylights and windows have a U-Factor of 0.0, which is highlighted in red. A status bar at the bottom indicates "Invalid U-Factor(s)" and "TBD %". Compliance settings are shown as "Compliance Method: UA Trade-Off", "Max. UA: 1", and "Your UA: 2".

	Component	Assembly	Gross Area		Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	UA	SHGC
Building									
1	Attic	Flat Ceiling or Scissor Truss	1	ft2	0.0	0.0	0.568	1	
2	Vault	Cathedral Ceiling	2	ft2	0.0	0.0	0.599	1	
3	Skylight	Wood Frame:Double Pane	1	ft2			0.0	0	0.00
4	Wall	Wood Frame, 16" o.c.	3	ft2	0.0	0.0	0.238	0	
5	Window	Wood Frame:Double Pane	1	ft2			0.0	0	0.00
6	Door	Solid	1	ft2			0.0	0	
7	Basement Wall	Solid Concrete or Masonry	1	ft2	0.0	0.0	0.36	0	
8	Floor	All-Wood Joist/Truss/Ove...	1	ft2	0.0	0.0	0.249	0	
9	Crawl	Solid Concrete or Masonry	1	ft2	0.0	0.0	0.316	0	

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Topic 3 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required



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Plans Review

Phoenix, AZ has an 10 page review and on the last page is a requirement for the home to meet the energy code – it could be more helpful

ENERGY CODE COMPLIANCE:

- 1) IRC Chapter 11 or
- 2) IECC (Prescriptive or Performance).
 - a) Prescriptive IECC 401, 402, and 403
 - b) Performance based IECC 404

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Plans Review

Checklist:

- Defined pathway of compliance
- Mandatory notes included on the plans
 - Duct, air sealing, and air barrier notes
- Compliance is accurate/no inconsistencies
 - REScheck/REM/Manual J/S documents or insulation schedule matches the plan documents
- Fiberglass batts used in 2x6 to meet Climate Zone 5 Requirements
 - Standard batts compressed to fit a 2x6 cavity are rated at R-18 – requires UA Alternative or Simulated Performance Alternative to meet code if using fiberglass batts
- Any unique locations on the plans that might not be clear
 - Unfinished mechanical rooms (still need to be either insulated out of or into the house depending on combustion air)
 - Varying depth of cavity (but schedule states a consistent insulation)
 - Staircase to basement does not allow for 2x4 stud depth at an exterior foundation wall
 - Slab on grade insulation not shown
 - Stud cavity depth does not allow for standard insulation that would meet code



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Topic 3 Objectives

- Review examples of tools to enhance compliance with the code prior to submittal
- Review the plans review process
- Review the inspections required



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Inspections

Inspection checklists

- [REScheck inspection checklist](#)
- [REM/Design inspection checklist](#)
- [Georgia Residential Energy Code Inspection checklist](#)
- [Department of Energy 2009 IECC checklist:](#)
 - http://www.energycodes.gov/arra/compliance_evaluation.stm



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Inspections

Required Inspections:

Insulation:

- Insulation (to be covered) is sufficient and installed correctly
- Air sealing completed
- Installed insulation to have air barrier (thermal bypass)
- Possible duct testing verification

Final

- Remaining insulation is inspected
- Ducts are fully located in conditioned space or insulated
- Verify an accurate final certificate is posted near electrical panel
- Possible duct testing verification
- Possible whole house air infiltration testing or checklist verification

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Inspections

Thermal Bypass - “Exterior thermal envelope insulation for framed walls is not installed in substantial contact and continuous alignment with building envelope air barrier.”

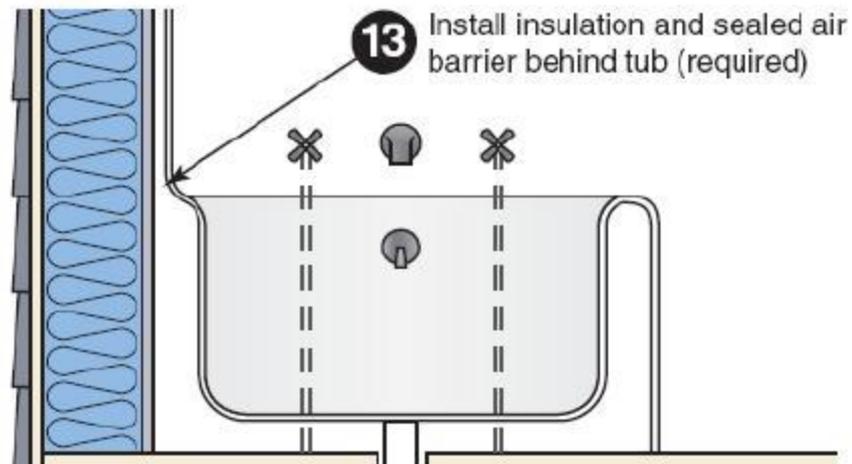


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Inspections

Common air barrier/insulation mistakes



http://www.dca.state.ga.us/development/constructioncodes/programs/documents/IECC2011Amendments-effective_001.pdf

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Inspections

No rigid air barrier is installed behind fireplace.



http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

Insulation is misaligned with floor above.



http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

Insulation has misalignment, compression, and gaps.



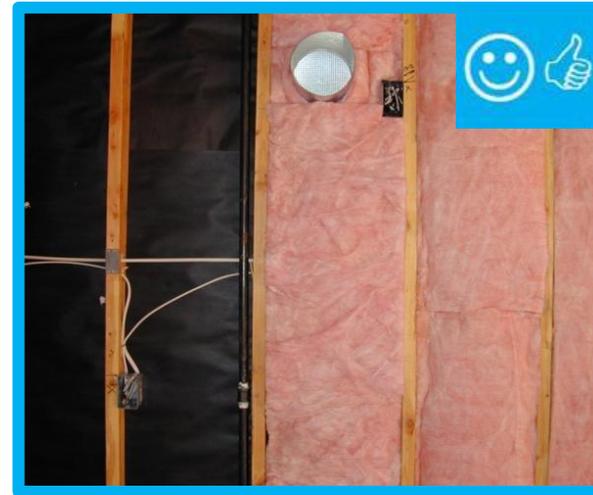
http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

Compression and misalignment because insulation is not split around wires.



http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

Improperly installed insulation and no rigid backing.



http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

Hole has not been air sealed.



http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v2_v3_training_resources

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Inspections

401.3 Certificate. A permanent certificate shall be posted on or in the electrical distribution panel... shall be completed by the builder or registered design professional...shall list the predominant *R*-values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall*, crawlspace wall and/or floor) and ducts outside conditioned spaces; U-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration...shall list the types and efficiencies of heating, cooling and service water heating equipment.

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Inspections

View / Print Report X

Select Report Options

Compliance Certificate

Inspection Checklist

Panel Certificate



2009 IECC Energy Efficiency Certificate

Insulation Rating	R-Value
-------------------	---------

Ceiling / Roof	30.00
Wall	33.00
Floor / Foundation	10.00
Ductwork (unconditioned spaces):	_____

Glass & Door Rating	U-Factor	SHGC
---------------------	----------	------

Window	0.30	
Door	0.31	NA

Heating & Cooling Equipment	Efficiency
-----------------------------	------------

Heating System: _____	_____
Cooling System: _____	_____
Water Heater: _____	_____

Name: _____ Date: _____

Comments:



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Inspections

APPENDIX D SAMPLE COMPLIANCE CERTIFICATE

Georgia Residential Energy Code Compliance Certificate*

Builder/Design Professional: _____ Phone: _____

Envelope Summary:

- List the R-Value for the following components:

Flat ceiling/roof: _____	Sloped/vault ceiling: _____
Exterior wall: _____	Above grade mass wall: _____
Attic kneewall: _____	Attic kneewall sheathing: _____
Basement stud wall: _____	Basement continuous: _____
Crawlspace stud wall: _____	Crawlspace continuous: _____
Foundation slab: _____	Floors over unconditioned space: _____
Cantilevered Floor: _____	Other insulation: _____

- Fenestration Components:

Window U-factor: _____	Window SHGC: _____
Skylight U-factor: _____	Skylight SHGC: _____
Glazed Door U-factor: _____	Opaque Door U-factor: _____ (< 50% glazed)

- Building Envelope Tightness (BET):

BET test conducted by: _____ Phone: _____
 Fan Flow at 50 Pascals = _____ CFM₅₀ Total Conditioned Volume = _____ ft³
 ACH₅₀ = CFM₅₀ x 60 / Volume = _____ ACH₅₀ (must be less than 7 ACH₅₀)
 Low Rise Multifamily Visual Inspection Option
 (The visual inspection option may be conducted by a third-party instead of the BET test for R-2 buildings only.)
 Visual inspection conducted by: _____ Phone: _____

Mechanical Summary:

Water Heater Energy Factor: _____ Ef Fuel type: Gas Electric Other

Number of Heating and Cooling Systems: _____

Heating System Type (choose one):

Gas: _____ AFUE Air-Source Heat Pump: _____ HSPF
 Other: _____ Efficiency: _____

Cooling System Type (Standard DX, Heat Pump, Geothermal, etc.): _____

Cooling System Efficiency: _____ SEER EER Other

Heating/Cooling Load Calculations Performed by: _____ Phone: _____

Total Heating Load (Based on ACCA Man. J or other approved methodology): _____ Btu/h

Total Cooling Load (Based on ACCA Man. J or other approved methodology): _____ Btu/h

Cooling Sensible Load: _____ Btu/h Cooling Latent Load: _____ Btu/h

Total Air Handler CFM (based on design calculations): _____ CFM

Duct Tightness Test Conducted by: _____ Phone: _____

CFM₂₅ per 100 ft² of conditioned floor area = CFM₂₅ x 100 / Conditioned floor area served
 If all ducts are not located within conditioned space, builder must verify that either the postconstruction duct leakage to outdoors (PCO) is ≤ 8 cfm/100 ft², the post construction total duct leakage (PCT) is ≤ 12 cfm/100 ft², or the rough-in test (RIT) with air handler installed is ≤ 6 cfm/100 ft². State which method was used to conduct the duct tightness test: duct blower (DB), modified blower door subtraction method (MBDS), or automated multipoint blower door (AMBD).

System	Method (DB, MBDS, AMBD)	Test (PCO, PCT, RIT)	CFM ₂₅	Area served (ft ²)	Test Result
1					
2					
3					

*Note: This permanent certificate shall be posted on or in the electrical distribution panel. Certificate shall be completed by the builder or registered design professional. Where there is more than one value for each component, certificate shall list the value covering the largest area.



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Topic 3 Summary

405.4.3. Additional documentation. The *code official* shall be permitted to require the following:

405.4.1. Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official*.

2. Documentation of the actual values of the compliance software calculations for the proposed design as shown in the building component energy analysis details.

3. Documentation of the actual values of the compliance software calculations for the proposed design as shown in the building component energy analysis details.

103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted

when approved by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, fenestration details; insulation materials and their *R*-values; fenestration details; area-weighted *U*-factor and SHGC; mechanical system design criteria; mechanical system and equipment types, sizes and descriptions; equipment and system horsepower (hp) and controls; ductwork and location; lighting fixture details; control narrative; and air sealing details.



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Overall Summary

- Topic 1 Awareness of the 2009 IECC
- Topic 2 Highlights of the residential 2009 IECC
- Topic 3 Tools to enhance compliance

- Questions?



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Next Steps

Adoption of the 2009 IECC

- How are current practices different?
- Obstacles to implementing the code?
- Solutions?
- 2012 IECC



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Next Steps

2012 IECC is already published (major changes)

- Prescriptive Items:
 - Increased insulation and fenestration requirements
 - Hot water pipe insulation and length requirements
- Mandatory Items:
 - Air infiltration test/verification
 - Mechanical ventilation
 - 75% high-efficacy lighting
 - Duct leakage is more stringent for systems outside of conditioned space



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Next Steps



2012 IECC Insulation and Fenestration Requirements

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 ^f	FLOOR R-VALUE	BASEMENT ^c WALL R-VALUE	SLAB ^d R-VALUE & DEPTH	CRAWL SPACE ^c WALL R-VALUE
4 except Marine	0.35	0.60 0.55	NR 0.40	38 49	20 or 13+5 ^h 13	5/10 8/13	19	10/13	10, 2 ft	10/13
5 and Marine 4	0.35 0.32	0.60 0.55	NR	38 49	20 or 13+5 ^h	13/17	30 ^g	10/13 15/19	10, 2 ft	10/13 15/19

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Thank You

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