

**CITY & COUNTY OF DENVER
COMMUNITY PLANNING & DEVELOPMENT
BUILDING PERMIT POLICY**

Subject: SUBMITTAL REQUIREMENTS FOR THE IECC RESIDENTIAL PROVISIONS

Approved: Scott V. Prisco, AIA, Building Official

**Number: IECC Sections R101.5.1 and
R103.2 and IRC Chapter 11**

**Effective Date: April 25, 2016
Revised: November 7, 2017**

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Reference: International Energy Conservation Code (IECC) *Residential Provisions* and the International Residential Code (IRC) Chapter 11

Scope

This policy outlines the information that must be submitted to document compliance with the 2015 IECC's *residential provisions*.

Applicability

The IECC addresses the design of an energy-efficient building envelope (consisting of the roof and ceiling, walls, floors, and foundation assemblies that surround the conditioned space) as well as the selection and installation of energy-efficient mechanical, lighting and service water-heating systems.

The *residential provisions* of the IECC and Chapter 11 of the IRC apply to new residential buildings—detached one- and two-family dwellings and multiple single-family dwellings (townhouses). Additionally, the IECC's *residential provisions* apply to Group R-2, R-3, and R-4 buildings three stories or less in height above grade plane. These provisions apply to any such buildings undergoing an addition, remodel, alteration, repair, or change of occupancy that would result in an increase in demand for either fossil fuel or electrical energy.

- IECC Chapter 5 [RE] addresses alterations, repairs, additions, and change of occupancy of existing buildings. Unconditioned additions, such as sunrooms, separated from the existing building by building thermal envelope assemblies are exempt from the building envelope requirements.

If your project has a mixture of residential and commercial uses, the respective provisions of the IECC will apply, and submittals are required as applicable for each portion of the mixed-use building.

I. Methods of Compliance

There are three methods to document compliance with the 2015 IECC.

Method	Must Comply with These Code Sections	
	IECC	IRC
1. Prescriptive	<ul style="list-style-type: none"> • R401 through R404 • Includes U-Factor Alternative and Total UA Alternative 	<ul style="list-style-type: none"> • N1101.14 through N1104 • Includes U-Factor Alternative and Total UA Alternative
2. Simulated Performance Alternative	<ul style="list-style-type: none"> • R405 • All provisions labeled "mandatory" in R401 - R404 	<ul style="list-style-type: none"> • N1105 • All provisions labeled "mandatory" in N1101.14 - N1104
3. Energy Rating Index (ERI)	<ul style="list-style-type: none"> • R406 • All provisions labeled "mandatory" in R401 - R404 • R403.5.3 	<ul style="list-style-type: none"> • N1106 • All provisions labeled "mandatory" in N1101.13 - N1104 • N1103.5.3

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II. Information to be Submitted on Construction Documents for All Projects

Construction documents must be drawn to scale and clearly show pertinent data and features of the building, systems, and equipment as governed by the IECC (or IRC and other codes that may apply).

All projects must clearly identify the information below on the submitted construction documents:

- A. Plans must clearly indicate the code **and** method of compliance used.
- B. The exact location of the building thermal envelope (including vapor retarder) must be marked out on the plans, details, and cross-sections, per IECC Section R103.2.1/IRC Section N1101.5.1. For the prescriptive path, the thermal envelope must meet the requirements of IECC Sections R402.1.1 through R402.1.5/IRC Sections N1102.1.1 through N1102.1.4.
- C. Provide all insulation R-values or U-factors, materials, and locations to be installed (walls, ceilings, cantilever floors, floors over garage, crawl space, basement walls, etc.). For the prescriptive path, insulation R-values must meet IECC Table R402.1.2 (or R402.2.6 for steel-framed construction)/IRC Table N1102.1.2 (or N1102.2.6 for steel-framed construction).
- D. Provide all fenestration U-factors for all glazing for each window and door (per IECC Table R402.1.4/IRC Table N1102.1.4 [schedule supplied by designer] for the prescriptive path).
- E. Provide details on how all areas listed in IECC Table R402.4.1.1/IRC Table N1102.4.1.1 will be protected against air leakage.
 - **Exception:** Air barrier details are not required for projects in existing buildings that are interior renovations only, or for additions that increase the existing floor area (not including basements) by 30% or less.
- F. Indicate if crawlspace(s) are conditioned or vented. Exposed earth in unvented crawl spaces must be covered with a Class I vapor retarder with overlapping joints taped/sealed.
- G. Indicate duct insulation R-values. Insulation is not required if ductwork is completely within the building thermal envelope.
- H. Indicate duct sealing methods per the IRC or International Mechanical Code (IMC).
- I. **Post Certificate per IECC Section R401.3/IRC Section N1101.14.** A permanent certificate must be completed by the builder or registered design professional and posted on a wall where the furnace is located, a utility room, or an approved location inside the building. Use the Residential Energy Efficiency Certificate of Compliance located at the end of this policy, or an equivalent certificate containing the same information, and post it by the time of the project's final inspection.
- J. When new HVAC equipment is part of the design, construction documents must include 2 copies of the ACCA Manual J and S calculation packages for the HVAC equipment sizing. When new ducts are proposed as well, documents must also include 2 copies of the Manual D calculations.
 - **Exception:** Manual J, S, and D are not required for projects that are interior renovations only, or for additions that increase the existing floor area (not including basements) by 30% or less.
- K. Show any additional applicable information per IECC Section R103.2/IRC Section N1101.5.
- L. Based upon your method of compliance, review the additional documentation outlined next.

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III. Additional Information to be Submitted Specific to Certain Projects

The items listed below must be submitted in addition to the items listed in part II of this policy.

A. Prescriptive Thermal Envelope, U-factor Alternative, or Total UA Alternative

Prescriptive projects can either meet the thermal envelope requirements of IECC Table R402.1.2/IRC Table 1102.1.2, or meet the U-factor alternative requirements of IECC Table R402.1.4/IRC Table N1102.1.4, or meet the total UA alternative per IECC Section R402.1.5/IRC Section N1102.1.5 (e.g., REScheck™ or similar software).

REScheck calculations (or other applicable software) can be printed on the drawings or submitted as a separate report if you provide two copies. REScheck software can be downloaded for free at www.energycodes.gov/rescheck.

Submit two copies of the REScheck or other software report showing the following information:

- orientation of each individual wall;
- insulation types, R-values, and whether they are continuous or cavity;
- accurate square footage; and
- accurate window and door sizes, the specific wall where they are located, and the U-factors.

Air leakage testing for additions

Additions larger than 30% of the existing floor area (not including basement area) have two options:

1. Perform a blower door test as a baseline before construction (to be submitted with the construction documents for plan review) and again once construction is complete (to be submitted at final inspection). The final blower door test must demonstrate the same air changes per hour (ACH) or less than the baseline. This path may be optimal for additions on older homes.
2. Or, only perform a final blower door test once construction is complete. The final blower door test must demonstrate five ACH or better. This does not require a baseline blower door test before construction, but could result in costs for improvements to the building envelope at the end of a project in order to meet five ACH.

B. Simulated Performance Alternative (Compliance reports required)

Compliance based on the simulated performance alternative requires that the proposed design have an annual energy cost that is less than or equal to the annual energy cost of the reference design, as demonstrated by a cost compliance report.

If this method is selected, projects must also submit the following:

- An initial (“projected”) compliance report per IECC Section R405.4.2.1/IRC Section N1105.4.2.1 with construction documents. The compliance report must include the information listed in IECC Section R405.4.2.1/IRC Section N1105.4.2.1.

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- A final (“confirmed”) compliance report based on the as-built condition of the building to the construction inspector before a certificate of occupancy can be issued. The compliance report must include the information outlined in IECC Section R405.4.2.2/IRC Section N1105.4.2.2.
- For guidelines on verification, see part IV “Using an Energy Rater.” Projects that are inspected by an energy rater are eligible for a \$150 discount on permit fees. Submit attachment #3 (located at the end of this policy) during plan review for the fee reduction.

For additions larger than 30% of the existing floor area (not including basements), a blower door test is required as a baseline before construction (to be submitted with the construction documents for plan review) and once construction is complete (to be submitted at final inspection). The final blower door test must demonstrate the same ACH or less as outlined in the compliance report.

C. Energy Rating Index or “ERI” (Compliance report and energy rater required)

Compliance based on an ERI analysis requires that the rated design have an ERI less than or equal to 55 when compared to the ERI reference design. The building thermal envelope must be greater than or equal to the levels of efficiency in Tables 402.1.1 or 402.1.3 of the 2009 IECC. Supply and duct returns not completely inside the thermal envelope must be insulated to a minimum of R-6.

- If the ERI method is selected, submit a compliance report confirming that the ERI of the rated design complies with IECC Sections R406.3 and R406.4/IRC Sections N1106.3 and N1106.4. The compliance report must contain the information outlined in IECC Section R406.6.2/IRC Section N1106.6.2.
- Verification to be completed by an approved third party. See part IV “Using an Energy Rater.” Projects that are inspected by an energy rater are eligible for a \$150 discount on permit fees. Submit attachment #3 (located at the end of this policy) during plan review for the fee reduction.

D. New Option for Existing Buildings (Additions, Remodels, Alterations/Repairs, Change of Occupancy)

Existing buildings have the option of comparing ERI scores to show compliance with the energy code. This method may be useful for additions and “pop-tops” where it is challenging to isolate and measure the energy efficiency of the newly constructed portion, by allowing a project to demonstrate that the building with the new addition uses the same or less energy than the existing building.

This method requires the project to obtain a ERI score at three points:

1. A baseline ERI of the existing structure before construction (this will need a blower door test),
2. A projected ERI of the whole building (both existing and addition) based on the proposed building design and using at least the minimum allowed standards in the code, and
3. A confirmed ERI to verify whole building performance after construction is complete (this will need another blower door test). The final ERI score must be equal to or better than the baseline score.

Both the baseline and the projected ERI scores must be submitted during plan review and must be accompanied by the specifications used to determine the projected score. The confirmed ERI score must be submitted at time of final inspection.

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E. Type-Approved (TA) and Master Submittals

For TA and Master submittals, the worst-case building exposure scenario must be identified and the submittal based on this condition. Both TA and Master submittals must include IECC compliance documentation as outlined in this policy. Documents submitted as part of the Master application and plans must have original signatures—TA projects can submit copies of the originals.

IV. Using an Energy Rater

Energy raters must have current HERS accreditation documents on file with the Building Official.

Any project that uses an energy rater must have submitted proof of the rater's certifications if they are not already on file, **and** must submit an inspection verification form signed by the energy rater confirming that the air barrier, insulation values, and blower door results meet or exceed both design expectations and the requirements of the 2015 IECC/2015 IRC. The inspection verification form is included as attachment #2 at the end of this policy—submit it with the final compliance report at the time of final inspection.

A \$150.00 fee reduction in the building permit fee for a new home is available to builders, contractors or home owners who use a third-party energy rater. Submit attachment #3 located at the end of this policy during plan review for the fee reduction.

V. Summary of Information to be Submitted at Final Inspection

The City must receive the documents below before a Certificate of Occupancy can be approved.

Prescriptive Path:

- Blower door and duct leakage testing results (when applicable)
- Residential Energy Efficiency Certificate of Compliance (or equivalent certificate)

Simulated Performance Alternative:

- Final (or “confirmed”) cost compliance report
- Blower door and duct leakage testing results (when applicable)
- Residential Energy Efficiency Certificate of Compliance (or equivalent certificate)
- Energy Rater Inspection Verification Form

ERI Method:

- Final (or “confirmed”) ERI compliance report
- Blower door and duct leakage testing results (when applicable)
- Residential Energy Efficiency Certificate of Compliance (or equivalent certificate)
- Energy Rater Inspection Verification Form

Comparative ERI Scores in Existing Buildings:

- A confirmed ERI score
- Blower door and duct leakage testing results (when applicable)
- Residential Energy Efficiency Certificate of Compliance (or equivalent certificate)
- Energy Rater Inspection Verification Form

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END OF DOCUMENT

- Encl. #1 Residential Energy Efficiency Certificate of Compliance (To be posted at the job site)
#2 Energy Rater Inspection Verification Form
#3 Homebuilder Energy Rating Program Code Compliance Agreement (Submit this form with your plans for the \$150 fee reduction for using an energy rater)

ENERGY EFFICIENCY CERTIFICATE OF COMPLIANCE
City and County of Denver

Address: _____

Permit Number: _____

Residential Compliance Path (only one shall apply)	
<input type="checkbox"/> Prescriptive R	<input type="checkbox"/> ERI
<input type="checkbox"/> Prescriptive UA	<input type="checkbox"/> Prescriptive U
<input type="checkbox"/> Performance	
Component Values	
Building Envelope Air Leakage: _____ Air Changes Per Hour (Max 3, unless building meets amended IRC Section N1102.4.1.2/R402.4.1.2 Exception 2)	Duct System Air Leakage: _____ cfm per 100sf Post Construction Testing <input type="checkbox"/> Rough-in Testing <input type="checkbox"/>
Ceiling R or U-value: _____	Heating System Efficiency: _____
Wood Frame Wall R or U-value: _____	Cooling System Efficiency: _____
Mass Wall R or U-value: _____	Water Heating Efficiency: _____
Floor R or U-value: _____	Basement Wall R-value: _____
Slab R-value: _____	Crawl Space R-value: _____
Crawl Space R-value: _____	Gas Fired Unvented Room Heater: <input type="checkbox"/>
Fenestration U-value: _____	Electric Furnace: <input type="checkbox"/>
Skylight U-factor: _____	Baseboard Electric Heat: <input type="checkbox"/>
Ducts Outside of Thermal Envelope R-value: Supply R-8 <input type="checkbox"/> Other R-6 <input type="checkbox"/>	
Signature	

I certify the information contained on the certificate is true and complete:

Builder/Designer (print name): _____ Signature of Builder/Designer: _____

Date: _____

The 2015 IECC requires a certificate, listing the energy conservation measures, be posted as outlined at the time of the project's final inspection per Section R401.3.

ENERGY RATER INSPECTION VERIFICATION FORM

City and County of Denver

To the Building Official, Community Planning and Development Department,

Regarding a project located at *(address)* _____,

I certify that to the best of my knowledge, information and belief, the energy code compliance documents, calculations, or such computations accompanying the application for the above address, are in accordance with the energy code requirements of the Denver Building and Fire Code and all other pertinent laws and ordinances.

My company either prepared or thoroughly reviewed and became familiar with all requirements in the submittal for the IECC compliance and accompanying reports, which allowed approval from the residential plan review team and ultimately led to permit issuance.

I also certify that *(company name)* _____ has completed the following work to demonstrate that the project at the above address complies with the requirements of Denver's energy code:

- Inspected/tested the project site during construction,
- Reviewed the reports mentioned above, and
- Verified that the air barriers, thermal envelope, blower door test, and duct leakage test (if required) meet or exceed the criteria as outlined in the aforementioned documents, and that this home is consistent with the requirements as outlined in the 2015 IECC & 2015 IRC.

If the project used the ERI method to demonstrate compliance with the energy code, I have verified that the building thermal envelope is greater than or equal to the levels of efficiency in Tables 402.1.1 or 402.1.3 of the 2009 IECC.

Energy Rater (print name) _____ Certificate Number (RITN #) _____

Energy Rater (signature) _____ Date _____

Address _____ Phone _____

Email _____

**CITY & COUNTY OF DENVER
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Subject: ENERGY RATING PROGRAM PROCEDURES

Approved: Scott V. Prisco, AIA - Building Official

Number: IRC N1105 & IECC 405
IRC N1106 & IECC 406

Effective Date: November 1, 2004
Revised: November 7, 2017

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Reference: IRC Section N1105 & IECC 405 Simulated Performance Alternative (“performance”);
IRC Section N1106 and IECC Section 406 Energy Rating Compliance Alternative (“ERI”).

Scope: This policy establishes criteria for energy code compliance using an energy rater, and criteria for obtaining a \$150 discount in permit fees.

Policy: A reduction in permit fees is available for applicants who use a third-party energy rater to verify energy code compliance.

Compliance based on performance requires that the proposed design have an annual energy cost that is less than or equal to the annual energy cost of the reference design while compliance based on the ERI analysis requires that the rated design have an ERI less than or equal to 55 when compared to the ERI reference design. A pre-construction or “plans” rating obtained from the energy rater is required at the time plans are submitted for a building permit. A post-construction or “confirmed” rating obtained from the energy rater is required at the time of final inspection and must be submitted to the construction inspector. Insulation inspections will be the function of the energy rater and will not be required by Community Planning and Development when utilizing this program.

As part of the compliance report submitted to the construction inspector, energy raters must also verify that they have inspected and confirmed the air barrier, insulation values, and blower door results meet or exceed both design expectations and the requirements of the 2015 IECC/2015 IRC. Energy raters must have current HERS accreditation documents on file with the Building Official.

HOMEBUILDER ENERGY RATING PROGRAM CODE COMPLIANCE AGREEMENT

A \$150.00 reduction in the building permit fee is available to builders, contractors, or homeowners who use an energy rater. To obtain the fee reduction, include this form when plans are submitted for a permit.

Responsible Party:

I, _____, REPRESENTING _____

as the (circle one) **builder/contractor, owner, or owner’s agent**, hereby agree to use the following approved systems energy analysis:

Energy Rater (Name, Address, Phone, & Email): _____

The Responsible Party as noted above acknowledges that the ERI analysis and report for the project address (identified below) meets or exceeds all current code standards.

Project Address: _____

I also understand that a home completed without the use of the above after signing this agreement will result in the forfeiture of the \$150.00 permit fee reduction and that compliance with the most current applicable energy code (IECC) must be demonstrated before a Certificate of Occupancy is authorized by the City and County of Denver.

(SIGNATURE) _____ (DATE) _____

END OF DOCUMENT