![Xcel Energy®]

2018 IECC RESIDENTIAL ENERGY COMPLIANCE PATHS

BUILDING CODE SUPPORT PROGRAM

COMPLIANCE PATHS: THE BASICS

All projects are required to choose an energy compliance path as part of complying with the International Energy Conservation Code (IECC). The energy compliance path determines parts of building's design and the level of flexibility that will be incorporated into the project.

The energy compliance path is required to be noted on the building plans (R103.2) and is an integral part of performing a plan review or inspections. The compliance path options can be found in Section R401.2 of the 2018 IECC.

Prescriptive– which is an umbrella for three options.

- **Insulation and fenestration criteria (R-value) - R402.1.2**
- **U-factor alternative - R402.1.4**
- **Total UA alternative (REScheck) - R402.1.5**

Total Building Performance

Energy Rating Index (ERI)

PRESCRIPTIVE	TOTAL BUILDING PERFORMANCE	ENERGY RATING INDEX

Insulation Fenestration Criteria (R-value)

U-factor Alternative

Total UA

Prescriptive– Insulation Fenestration Criteria

The R-value prescriptive energy compliance path is the most straightforward and historically the most commonly used method for demonstrating code compliance. Often referred to as the "by-the-book" approach, it follows the principle of "tell me what to do, and I'll do it." This method does not allow trade-offs between building components — meaning insulation R-values, fenestration U-factors, air leakage performance, mechanical systems, and lighting provisions must all meet or exceed their individual code-specified requirements. While trade-offs are not permitted, some flexibility is provided through specific allowances outlined in Section R402.2. Professionally this "tell me what to do and I'll do it" doesn't sound good. I would recommend just leaving it as the most straight forward and used path.

Thermal envelope is based on Table R402.1.2

- The R-values listed in the table are the minimum values permitted
- The U-factors are the maximum values permitted.
- Air Barrier and air sealing is based on Table R402.4.1.1
- All sections R401.2 through 404.1.1 apply if applicable in the design
- Everything should be placed on the plans– specifically items found in R103.2 and R103.2.1.
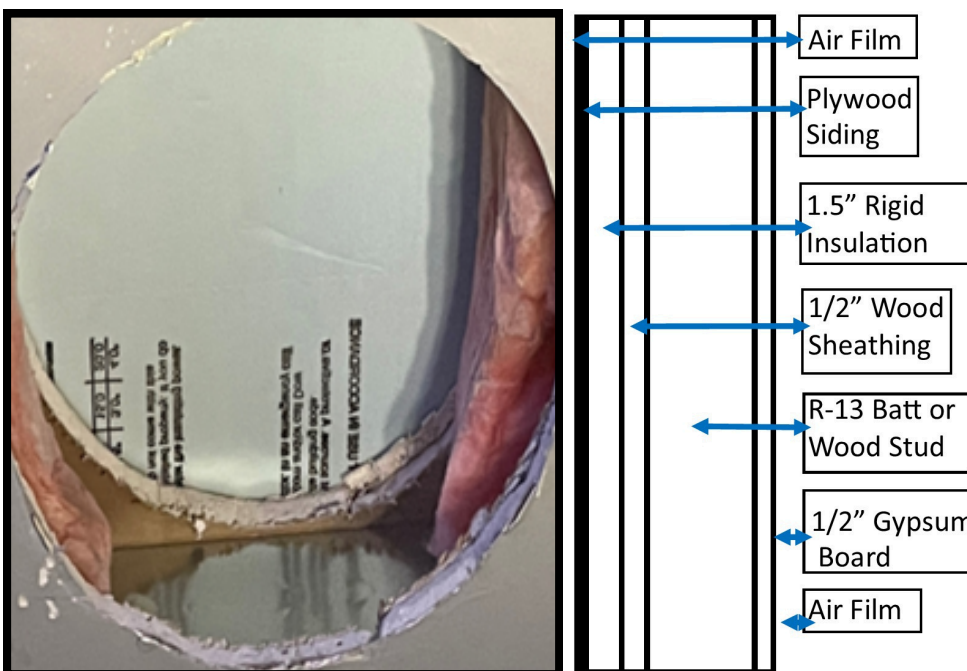- An energy compliance report is not required.

Prescriptive- Insulation and Fenestration Criteria (U-Factor)

This option of the prescriptive compliance pathway uses an assembly-by-assembly approach to meet energy code requirements. Due to the extensive documentation it requires, this method is not commonly used. Similar to other prescriptive approaches, it does not allow trade-offs between components — each element of the building envelope, including insulation values, fenestration U-factors, air leakage, mechanical systems, service water heating, and lighting, must independently comply with the code requirements.

Thermal envelope is based on Table R402.1.4

- Calculation of the proposed assembly values based on the ASHRAE Book of Fundamentals, or ASHRAE 90.1 Appendix A are acceptable
- Slab edge insulation and SHGC utilized Table R402.1.2
- Air Barrier and air sealing is based on Table R402.4.1.1
- All sections R401.2 through 404.1.1 apply if applicable in the design
- Everything should be placed on the plans– specifically items found in R103.2 and R103.2.1
- An energy compliance report is not required.

Diagram layers (top to bottom): Air Film, Plywood Siding, 1.5" Rigid Insulation, 1/2" Wood Sheathing, R-13 Batt or Wood Stud, 1/2" Gypsum Board, Air Film

R-Value at Cavity Insulation	R-Value at Stud
0.17	0.17
0.59	0.59
7.50	7.50
0.81	0.81
13.00	6.88
0.45	0.45
0.68	0.68
23.20	17.08

Prescriptive– Total UA Alternative

Considered to be the most flexible method for the prescriptive path, because it allows for some trading of the thermal envelope with the exception of the Solar Heat Gain Coefficient (SHGC) of the fenestration and slab-on-grade insulation. This method follows the "twin building" concept. It begins with a reference design building that uses the default values specified in Table R402.1.4 of the IECC, with the exception of the Solar Heat Gain Coefficient (SHGC). The proposed design building incorporates the thermal envelope values selected by the designer. Compliance is determined by comparing the two models in a report that uses overall U-factor analysis. If the report demonstrates that the proposed design is at least as energy-efficient as the reference design, then the project complies with the IECC requirements.

Thermal envelope may allow trading

- Energy compliance report required to show proposed total UA is < to the referenced total UA.
- REScheck is a free software – commonly used by architects and designers
- Ekotrope an REM/Rate can be utilized, but are not free - commonly used by energy raters
- Air Barrier and air sealing is based off of Table R402.4.1.1
- All sections R401.2 through 404.1.1 apply when applicable in the design
- Everything should be placed on the plans– specifically items found in R103.2 and R103.2.1

Generated by REScheck-Web Software
Compliance Certificate

Project	Hope's new

Energy Code:	**2024 IECC**
Location:	**Arvada, Colorado**
Construction Type:	**Single-family**
Project Type:	**New Construction**
Project SubType:	**None**
Conditioned Floor Area:	**2,000 ft2**
Glazing Area	**10%**
Climate Zone:	**5 (6158 HDD)**
Permit Date:	
Permit Number:	
All Electric	**false**
Is Renewable	**false**
Has Charger	**false**
Has Battery:	**false**
Has Heat Pump:	**false**

Construction Site:	Owner/Agent:	Designer/Contractor:

Compliance: Passes using UA trade-off

Compliance: **0.6% Better Than Code**   Maximum UA: **337**   Your UA: **335**
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.

Envelope Assemblies
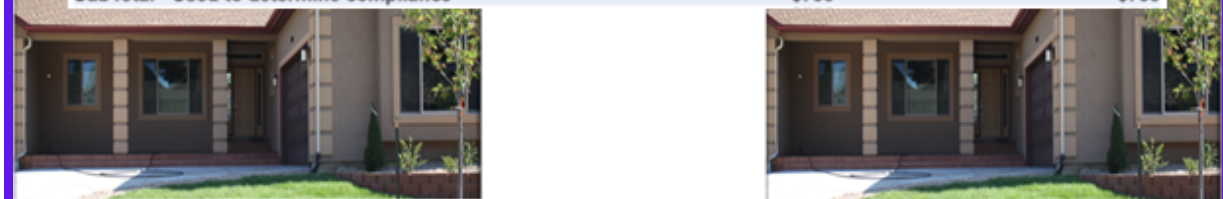
Total Building Performance

The Total Building Performance compliance path uses energy modeling to allow trade-offs between systems and components, enabling compliance through overall performance rather than prescriptive values. This approach also follows the twin building concept, where a Standard Reference Design is modeled using the default values found in the applicable column of Table R405.5.2(1). The Proposed Design reflects the actual intended values for the building, as specified in the same table.

To demonstrate compliance, the proposed design must show that the annual energy cost for heating, cooling, mechanical ventilation, and service water heating is equal to or less than that of the standard reference design. An energy compliance report must be submitted at both the permit stage and again at Certificate of Occupancy (CO) to confirm that the installed systems maintain compliance.

Commonly used software for this method includes REM/Rate and Ekotrope, though other programs may be acceptable if they meet the requirements outlined in Section R405.5.

- Energy Compliance report required at permit submittal and for CO
- Must comply with all sections that are listed as mandatory outside of section R405
- Air Barrier and air sealing is based off of Table R402.5.1.1
- Verified by a third party

Annual Energy Cost		
Design	IECC 2021 Performance	As Designed
Heating	$469	$453
Cooling	$111	$117
Water Heating	$165	$165
Mechanical Ventilation	$44	$23
SubTotal - Used to determine compliance	$788	$758

Energy Rating Index—ERI

This compliance path is another performance-based option that uses a scoring system and the twin building concept. The Energy Rating Index (ERI) method compares a proposed building to a Standard Reference Design based on the 2006 IECC prescriptive values. The proposed design may use any values, provided the building meets or exceeds the thermal envelope backstop requirements.

The ERI score represents how much more efficient the proposed design is compared to the 2006 IECC baseline — and the key point is: the lower the score, the better. Compliance is achieved when the ERI score is less than or equal to the target values listed in Table R406.4.

Common modeling software used to calculate the ERI includes Ekotrope and REM/Rate, though other tools may be acceptable if they meet the criteria specified in Section R406.6.1.

- ERI score can not exceed the values listed in Table R406.4
- If renewable energy is included in the ERI score then the thermal envelope must meet the values found in Table R402.1.2 or Table R402.1.4 of the 2015 IECC
- Energy Compliance report required with the specified items of R406.6.2
- Ekotrope, or REMRate,or other accepted software
- Score of 100 is a 2006 prescriptive building the lower the number indicates the percentage better than a building designed to the 2006 IECC.
- Must comply with all sections listed as mandatory outside of section R405
- Verified by a third party