

# Significant Changes to the 2024 International Energy Conservation Code (IECC) from the 2018 IECC



The International Code Council (ICC) published the 2024 International Energy Conservation Code (IECC) on August 14, 2024. All ICC I-Codes can be viewed on [ICC's website](#) free of charge (read-only) or can be purchased as a subscription, PDF, or hard copy. This document details significant changes from the 2018 IECC to the 2024 IECC.

The 2024 IECC Residential Provisions includes **three main compliance pathways** that any dwelling can follow:

- **Prescriptive Compliance Path** – Sets prescriptive requirements for compliance [Sections R402-R404].
- **Simulated Building Performance Path** – Utilizes energy modeling to compare estimated energy costs of the proposed dwelling with energy costs of a reference home [Section R405]
- **Energy Rating Index Path** – Utilizes energy modeling to calculate an energy rating index (ERI). The proposed dwelling ERI must be less than the maximum allowed for that climate zone (CZ) [Section R406].

Significant changes are organized by pathway. As a reminder, this document only covers the significant changes. NAHB recommends reviewing the [full 2024 IECC code](#) to understand any obstacles or impacts on construction. If you have any questions about the changes under the 2024 IECC, please contact:

**Nathan Kahre**

Sr. Program Manager, Codes & Standards  
202-266-8566  
[nkahre@nahb.org](mailto:nkahre@nahb.org)

## Significant Changes to the Prescriptive Compliance Path (Sections R401-R404 & R408)

Topic	Description
<b>Inspections</b>	This change requires inspections for air barriers and insulation. This may increase permit costs, require hiring third-party inspectors, and impact sequencing of inspections. [R107.2.2 & R107.2.6]
<b>Vertical fenestration U-factor</b>	This change increases the requirements for window U-factors in some climate zones as follows [Table R402.1.2 & Table R402.1.3]: <i>Climate Zones 0-1:</i> Not Required (NR) to U-factor 0.50 <i>Climate Zone 2:</i> No change (U-0.40) <i>Climate Zones 3-4:</i> U-0.30 <i>Climate Zones 5-6:</i> U-0.28 <i>Climate Zones 7-8:</i> U-0.27
<b>Skylight U-factor</b>	This change increases the requirements for skylight U-factors in all Climate Zones. [Table R402.1.2 & Table R402.1.3]
<b>Wood frame wall R-value</b>	This change increases the requirements for wood frame wall R-value in some climate zones as follows [Table R402.1.2 & Table R402.1.3]: <i>Climate Zones 0-2:</i> Adds option for R-value R-10ci (continuous insulation) <i>Climate Zone 3:</i> No change (R-20 or R-13&5ci) <i>Climate Zones 4-5:</i> R-20&5ci, R-13&10ci, 30, or 0&20ci* <i>Climate Zones 6-8:</i> Add option for R-30 or R-0&20ci *R408.2.9 allows a reduction in above grade wall insulation by meeting enhanced additional energy efficiency requirements.
<b>Floor R-value</b>	This change allows for additional options for floor insulation by providing options for a cavity only insulation method, cavity + continuous insulation method, and continuous insulation only method across all climate zones. Increases floor insulation requirements in Climate Zone 4 to R-30. [Table R402.1.3]
<b>Slab R-value &amp; depth</b>	This change increases the requirements for slab edge insulation in some climate zones as follows [Table R402.1.2 & Table R402.1.3]: <i>Climate Zones 0-2:</i> No change (R-0) <i>Climate Zone 3:</i> R-10ci, 2 ft <i>Climate Zones 4-5:</i> R-10ci, 3 ft <i>Climate Zones 6-8:</i> No change (R-10ci, 4 ft)
<b>Component Performance Alternative</b>	Changes the name from Total UA Alternative to Component Performance Alternative. This change was made to account for the addition of F-factors for slab edge insulation but does not change the calculation methodology from previous code versions. [R402.1.5]
<b>Attic knee walls</b>	This change provides clarification that attic knee walls need to meet the requirements as above grade wood frames walls. This was implied but not explicitly stated in previous versions of the code. [R402.2.3] <i>(Note: the new provision in R408 allowing the use of R-20 walls in Climate Zones 4 &amp; 5 also applies to attic knee walls)</i> [R408]
<b>Floors</b>	This change provides additional clarification on the installation of insulation in floors above unconditioned space and allows for different options on how to air seal and insulate. [R402.2.8]

<b>Sunroom and heated garage insulation</b>	This change includes heated garages in the alternate insulation requirements previously reserved for sunrooms. [R402.2.13 & R402.4.5]
<b>Air leakage rates</b>	<p>This change increases the stringency of the prescriptive air leakage rate requirements in some climate zones as follows:</p> <p><i>Climate Zones 0-2:</i> 4 ACH50</p> <p><i>Climate Zones 3-5:</i> 3 ACH50 (No change)</p> <p><i>Climate Zones 6-8:</i> 2.5 ACH50</p> <p>Section includes an exemption for attached dwelling units and buildings 1,500 ft<sup>2</sup> or less. (0.27 cfm/ft<sup>2</sup>) [R402.5.1.3]</p>
<b>Dwelling unit sampling for testing</b>	Allows for sampling for blower door testing, duct leakage testing, and ventilation testing in multifamily buildings with 8 units for more. Only 1 in 7 or 20% of units must be tested, and additional units will need to be tested if a unit fails. [R402.5.1.2.1, R403.3.9, & R403.6.4]
<b>Duct system design</b>	The change expands previous requirements to size HVAC equipment per ACCA Manual J and Manual S to also require ductwork be designed per ACCA Manual D [R403.3.1].
<b>Duct system leakage</b>	This change requires testing of 100% of ductwork, alters the duct leakage requirements, and provides more flexible targets based on conditioned floor area, number of ducted returns, and location of ductwork and space conditioning equipment. This allows for increased flexibility in homes with larger amounts of ductwork and smaller homes (1,000 ft <sup>2</sup> or less) that may have struggled to comply with the cfm/100 ft <sup>2</sup> requirements in the past. [R403.3.7 & R403.3.8]
<b>Hot water pipe insulation</b>	This changes hot water pipe insulation requirements from an R-3 minimum to a minimum thickness of 1" based on typical pipe insulation conductivity and water temperature. This does not change what pipes must be insulated. [Table R403.5.2]
<b>Heat or energy recovery ventilation</b>	This change requires heat or energy recovery ventilation systems in Climate Zones 6-8. The 2021 IECC required ERV or HRV in Climate Zones 7 and 8. [R403.6.1]
<b>Intermittent exhaust control for bathrooms and toilet rooms</b>	This change requires an additional controller be added to an intermittently operating exhaust fan in bathrooms or toilet rooms. This controller can be a timer, occupant sensor, humidity sensor, or contaminant sensor. [R403.6.5]
<b>Electric-resistance space heating</b>	Limits the amount of electric resistance heating that can be used in Climate Zones 4-8 to 2 kW unless a heat pump is installed. [R403.7.1]
<b>Mechanical systems outside of the building envelope</b>	Previous versions of the IECC have included required controls for ice melt systems to prevent their use when not necessary, this change has expanded the number of systems that need controls including outdoor heating, roof and gutter deicing systems, and freeze protection systems. [R403.9.1]
<b>Gas fireplaces</b>	This change requires that gas fireplace systems shall not be equipped with a continuous pilot light and sets a minimum efficiency for vented gas fireplace heaters. [R403.13]
<b>Lighting equipment</b>	All permanently installed lighting must meet a set efficacy. Luminaires (light fixtures) must be not less than 45 lumens per watts and lamps (bulbs) must be not less than 65 lumens per watt. There are exceptions for appliance lamps and other specific lighting. [R404.1]

<b>Multifamily exterior lighting power</b>	This change increases the stringency for exterior lighting power allowances for Group R-2, R-3, and R-4 residential buildings. It also brings the lighting power allowance tables and calculation methods relevant to low-rise multifamily buildings from Section C405.5 in the IECC commercial provisions to the residential provisions. [R404.1]
<b>Interior lighting controls</b>	This change separates lighting control requirements for habitable spaces and key specific locations including garages, unfinished basements, laundry rooms, and utility rooms. Habitable spaces keep the same requirements as the 2021 IECC while key specific locations are limited to automatic shut-off controls. The automatic shut-off controls must automatically turn off lights within 20 minutes of occupants leaving the space and must also include a manual control. [R404.2]
<b>Additional energy efficiency</b>	Requires additional efficiency credits earned based on measures in Table R408.2. A minimum of 10 credits are required using a minimum of two practices. For dwellings larger than 5,000 sf of living space above the grade plane, an additional 5 credits are required for a total of 15 credits. [R408] This new table details the credits available by climate zone for over 50 additional energy efficiency measures. [Table R408.2] A summary of the available measures is included in this document.
<b>Opaque walls</b>	This change allows for a reduction in wood frame wall requirements to a maximum U-factor of 0.060 (i.e., R-20 walls) in Climate Zones 4 and 5 when meeting additional efficiency requirements dictated in R408.2.9. [R408.2.9]

## Section R408 Additional Efficiency Requirements (Only Applies to Prescriptive Path)

Measure Areas	Description
<b>Building envelope, fenestration, &amp; air sealing improvements</b>	Credits available based on % TC above the reference home from 2.5% up to 30%, above code windows, roof reflectance, and reduced air leakage <b>[0-16 credits based on CZ]</b>
<b>High performance space heating and cooling (mixed fuels)</b>	Credits available for installation of a higher efficiency furnaces (90-97 AFUE), higher efficiency air conditioners (15.2 SEER2 or greater), or a combination of higher efficiency furnaces and air conditioners. Measures are split between warm climates (CZ 0-4A/4B) and cold climates (CZ 4C-8). <b>[0-10 credits based on CZ]</b>
<b>High performance space heating and cooling (heat pumps)</b>	Credits available for installation of a ground source heat pump (3.01 COP and 16.1 EER minimum), heat pump with electric resistance back up (7.8-8.1 HSPF2 and 15.2 SEER2 minimum), or heat pump with gas furnace back up (90-95 AFUE, 7.8-8.1 HSPF2 and 15.2 SEER2 minimum). Measures are split between warm climates (CZ 0-4A/4B) and cold climates (CZ 4C-8). <b>[0-21 credits based on CZ]</b>
<b>Gas water heaters</b>	Credits available for installation of a gas instantaneous (UEF $\geq 0.92$ ) or gas storage water heater (UEF $\geq 0.81$ ). <b>[2-11 credits based on CZ]</b>
<b>Electric water heaters</b>	Credits available for installation of a heat pump water heater (UEF $\geq 2.20$ based on volume, voltage, and system type). Credits also available for a solar water heater. <b>[3-13 credits based on CZ]</b>
<b>Compact hot water distribution</b>	Credits available for installation of a water distribution system with no more than 16 ounces of water stored in the pipes from the source to the farthest fixture. <b>[2 credits in every CZ]</b>
<b>Ductwork in conditioned space and duct leakage</b>	Credits available for ductwork and space conditioning equipment in conditioned space. Credits also available for reducing duct leakage rates. Credits vary based on how much of the ductwork is installed in conditioned space (80% vs. 100%). <b>[1-14 credits based on CZ]</b>
<b>Reduced air leakage and improved ventilation</b>	Credits available for installation of an ERV, HRV, or balanced ventilation systems paired with reductions in air leakage requirements ( $\leq 2.0$ ACH50) <b>[0-12 credits based on CZ]</b>
<b>Energy efficient appliances</b>	Credits available based on installation of an energy efficient refrigerator, dishwasher, clothes washer, or clothes dryer. Must install a minimum of 3 appliances to receive the credit. <b>[0-1 credits based on CZ]</b>
<b>Renewable energy</b>	Credits available based on installation of renewable energy resources on the building site. A minimum of 1.0 watt of renewable energy per square foot of conditioned floor area must be installed to receive the credit. <b>[4-17 credits based on CZ]</b>
<b>Demand responsive thermostat</b>	<b>1 credit</b> available for installation of a demand responsive thermostat.
<b>Lighting improvements</b>	Lighting improvement measures <b>provide 0 credits</b> but can <b>count as an earned measure</b> for complying with R408.2. These measures are focused on providing whole home lighting control and decreasing the lumen/watt efficacy requirements for lamps and luminaires.

## Major Changes to the Simulated Building Performance Path (Section 405)

Topic	Description
<b>General</b>	The Simulated Building Performance path [Section R405] underwent a significant revision that expanded the scope of measures included in the modeling for evaluating trade-offs. These changes will allow more design flexibility in achieving energy performance targets.
<b>Modeling basement, slab-on-grade, and crawl space insulation</b>	This change clarifies that insulation for slab-on-grade, basement walls, and crawl space walls do not need to meet the specific insulation requirements of R402.2 when they are modeled as designed or installed for Section R405. [R402.2.9.1, R402.2.10.2, & R402.2.11.2]
<b>Performance path air leakage rate</b>	This section allows the air leakage to be as high as 4 ACH50 for buildings or dwelling units in any climate zone when following the performance path [R402.5.1.3]
<b>Building thermal envelope backstop</b>	This change updates a backstop on the building thermal envelope for buildings following this pathway so that minimum insulation levels are maintained for each design. For Climate Zones 0-2, the thermal conductance (TC) of the <i>proposed design</i> must be $\leq 1.08 \times$ TC of the <i>prescriptive reference design</i> . For Climate Zones 3-8, TC of the <i>proposed design</i> must be $\leq 1.15 \times$ TC of the <i>prescriptive reference design</i> . [R405.2 (2)]
<b>Mandatory requirements table</b>	To consolidate all mandatory items for the Simulated Building Performance path, Table R405.2 was developed by identifying key items that cannot be traded off. Previously these items would be individually labeled mandatory throughout Sections R402-R404. [Table R405.2]
<b>Performance target</b>	This change updates the energy performance target to 80% energy cost of the <i>reference design</i> for a mixed fuel building and 85% of the <i>reference design</i> for an all-electric building. This change is intended to align with the prescriptive path changes where R408 requirements for additional measures have been expanded. Building larger than 5000 sf of living space above the grade plane must reduce energy costs by an additional 5%. [R405.2(3)]
<b>Equipment efficiency modeling and trade-offs</b>	This change set efficiency requirements for heating equipment, cooling equipment, and water heating equipment to federal minimum efficiencies for the reference home. This update effectively expands the scope of modeling to allow tradeoffs to include the use of higher efficiency equipment – a design strategy that was previously not allowed. [Table R405.4.2(1)]
<b>Duct location modeling and trade-offs</b>	This change expands the scope of modeling to include the location of ductwork (conditioned attic, crawl space, or conditioned space) based on the foundation type and number of floors in the residential building. This will allow the designer to evaluate tradeoffs that include the benefits of duct design strategies – a practice that was previously not allowed [R405.4.2(1)]
<b>Documentation</b>	This change includes minimum requirements for reports submitted at permit application and at time of certificate of occupancy. [R405.5.4]

## Major Changes to the Energy Rating Index Path (Section R406)

Topic	Description			
Modeling basement, slab-on-grade, and crawl space insulation	This change clarifies that insulation for slab-on-grade, basement walls, and crawl space walls do not need to meet the specific insulation requirements of R402.2 when they are modeled as designed or installed for Section R406. [R402.2.9.1, R402.2.10.2, R402.2.11.2]			
ERI path thermal envelope backstop	This change updates a backstop on the building thermal envelope for buildings following this pathway so that minimum insulation levels are maintained for each design. For Climate Zones 0-2, the thermal conductance (TC) of the <i>proposed design</i> must be $\leq 1.08 \times$ TC of the <i>prescriptive reference design</i> . For Climate Zones 3-8, TC of the <i>proposed design</i> must be $\leq 1.15 \times$ TC of the <i>prescriptive reference design</i> . [R406.3]			
Performance path air leakage rate	This section allows the air leakage to be as high as 4 ACH50 for buildings or dwelling units in any CZ when following the ERI Pathway [R402.5.1.3]			
Mandatory requirements table	To consolidate all mandatory items for the simulated building performance path, Table R406.2 was developed by identifying key items that cannot be traded off. Previously these items would be individually labeled mandatory throughout Sections R402-R404. [Table R406.2]			
Removal of alternate ventilation requirements	Previous version of the ERI path included different ventilation requirements that shifted the IECC ERI values away from ERI used for marketing and above code program compliance. The 2024 IECC has removed this ventilation requirement which better aligns the code’s ERI targets with the HERS Index.			
Maximum Energy Rating Index	The changes ERI based compliance to allow for compliance based on energy efficiency alone or energy efficiency with onsite power production (OPP) from renewable energy. See table below for changes in ERI requirements under the 2024 IECC. [R406.5]			
	Climate Zone	2018 ERI*	2024 ERI Not Including OPP	2024 ERI with OPP
	0-1	57	51	35
	2	57	51	34
	3	57	50	33
	4	62	53	40
	5	61	54	43
	6	61	53	43
	7	58	52	46
	8	58	52	46
	<i>*The 2021 IECC set a hard cap on the amount of renewable energy that could be included in ERI based compliance at 5%. This cap was removed in the 2024 IECC and replaced with two sets of maximum ERI targets: one that does not include renewables and one that does include renewables.</i>			
ERI average for larger multifamily buildings	This change allows for averaging the ERI for buildings with 20 or more dwelling units when allowed by the code official. This brings flexibility in the design. [R406.5]			
Documentation	This change includes minimum requirements for reports submitted at permit application and at time of certificate of occupancy. [R406.7.2]			