



## International Energy Conservation Code Consensus Committee-Residential

### Draft Meeting Agenda (4/11 posting)

[Webex Meeting Link](#)

April 14, 2022

2:00 PM EST to 5 PM EST (3 hours)

**Committee Chair:** JC Hudgison, CBO, Assoc. AIA

**Committee Vice Chair:** Bridget Herring & Robin Yochum, LEED Green Associate

1. Call to order.
2. Meeting Conduct.
  - a. Identification of Representation/Conflict of Interest
  - b. ICC [Council Policy 7](#) Committees: Section 5.1.10 Representation of Interests
  - c. ICC [Code of Ethics](#): ICC advocates commitment to a standard of professional behavior that exemplifies the highest ideals and principles of ethical conduct which include integrity, honesty, and fairness. As part of this commitment it is expected that participants shall act with courtesy, competence and respect for others.
3. Roll Call.
4. Approve Agenda
5. Approval of Minutes
6. Administrative issues-staff
7. Action Items
  - a. Code Change Proposals
    - REPI-61-21 (Air Leakage Testing Multifamily)(Envelope as modified 8-7)
    - REPI-64-21 (Air Tightness Improvements) (Envelope as modified 13-4-1)
    - REPI-63-21 (Air Tightness Improvements) (Envelope approve 14-1-3)
    - REPI-60-21 (Air Leakage Testing Rate) (Envelope as modified 10-6)
    - REPI-38-21 (Air Sealing Rim Joist) (Envelope disapprove 10-5-3)
    - REPI-39-21 (Attic knee or pony wall) (Envelope approve 10-8)
    - REPI-44-21 (Thermal Envelope Installation) (Envelope disapprove unanimously)
    - CEPI-19-21 Part II (Insulation Mark Install) (Envelope as modified 17-0-1)
    - REPI-5-21 (Embodied Energy) (Envelope disapprove 12-6)
    - REPI-6-21 (Window to Wall Ratio) (Envelope disapprove 15-2)
    - REPI-12-21 (Insulation Density) (Envelope disapprove 13-3-3)

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REPI-28-21 (Fenestration Table) (Envelope as modified unanimously)  
REPI-27-21 (Fenestration and Proj. Factor) (Envelope disapprove 14-1-2)  
REPI-31-21 (Window Performance) (Envelope disapprove 15-3-1)  
REPI-41-21 (Basement walls) (Envelope disapprove 14-0-4)  
REPI-150-21 (Alterations Building Envelope)(Existing Buildings as modified 8-0)  
RECPI-2-21 (Townhome footnote) (Admin approve 4-0-1)  
CEPI-11-21 Part II (Attic Definition) (Admin disapprove 4-0-1)  
REPI-77-21 (Duct Insulation) (HVACR disapprove 11-0-1)  
~~REPI-78-21 (Distribution System Efficiency) (HVACR approve 12-0)~~ back to  
subcommittee  
REPI-79-21 (Ducts in Conditioned Space) (HVACR approve 12-0)  
REPI-82-21 (Ducts Buried in Ceiling Insulation) (HVACR as modified 12-0)  
REPI-83-21 (Duct Deeply Buried) (HVACR approve 12-0)  
REPI-97-21 (Ventilation Sampling Multi-family) (HVACR disapprove 6-5-1)  
REPI-99-21 (Electric Resistance Zone Heat) (HVACR disapprove 7-4-1)

8. Subcommittee Reports

9. Other business.

10. Upcoming meetings. April 28 at 2 PM EST

11. Adjourn.

FOR FURTHER IECC Residential INFORMATION BE SURE TO VISIT THE ICC WEBSITE:  
[IECC Residential Website](#)

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

Kristopher Stenger, AIA, CBO  
Director of Energy Programs  
International Code Council  
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## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-061-21     Air leakage testing multifamily units
CDP ID #	516
Code	IECC RE
Code Section(s)	R402.4.1.2, R402.4.1.3, R402.4.1.4 (New)     New Section y
Location	base
Proponent	Aaron Gary     aaron.gary@texenergy.org
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Air leakage test sampling proposal had mixed response. Was debated on both sides. Not consistent with what's in the commercial code. Edits have improved proposal. Significant weakening of testing provision by allowing sampling.
Recommendation	AM Reason: sampling increase efficiencies Drumheller motions to approve as modified, Hickman seconds
Vote	8-7
Recommendation Date	3/2/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>  X  </u>
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

## REPI-61-21 (Modification replaces version in the monograph)

IECC®: R402.4.1, R402.4.1.4 (New)

Proponents: Aaron Gary, representing Self (aaron.gary@texenergy.org)

### 2021 International Energy Conservation Code

#### Revise as follows:

**R402.4 Air leakage.** The *building thermal envelope* shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.5.

**R402.4.1 Building thermal envelope.** The *building thermal envelope* shall comply with Sections R402.4.1.1 through R402.4.1.3. The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

**R402.4.1.1 Installation.** The components of the *building thermal envelope* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer's instructions and the criteria indicated in Table R402.4.1.1, as applicable to the method of construction. Where required by the code official, an approved third party shall inspect all components and verify compliance.

#### **R402.4.1.2 Testing.**

The *building* or each dwelling unit in the building shall be tested for air leakage. The maximum air leakage rate for any *building* or *dwelling unit* under any compliance path shall not exceed 5.0 air changes per hour or 0.28 cubic feet per minute (CFM) per square foot [0.0079 m<sup>3</sup>/(s × m<sup>2</sup>)] of dwelling unit enclosure area. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed.

**Exception:....**

[No change]

During testing:....

[No change]

**Exception:....**

[No change]

**Exception:** Where tested in accordance with R402.4.1.4, testing of each dwelling unit is not required.

#### **R402.4.1.3 Leakage rate.**

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

**Add new text as follows:**

#### **R402.4.1.4 Dwelling unit Sampling.**

For buildings with eight or more dwelling units, the greater of seven or 20 percent of the dwelling units in the building shall be tested. Tested units shall include a top floor unit, a ground floor unit, a middle floor unit, and the dwelling unit with the largest dwelling unit enclosure area. Where the air leakage rate of a tested unit is greater than the maximum permitted air leakage rate, corrective actions shall be made to the unit and the unit re-tested. For each tested unit that has a greater air leakage rate than the maximum permitted air leakage rate, an additional three units, including the corrected unit, shall be tested. Where buildings have fewer than eight dwelling units, each dwelling unit shall be tested.

Monograph version for context:



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-064-21    Air Tightness improvements
CDP ID #	299
Code	IECC RE
Code Section(s)	R402.4.1.2, R402.4.1.3, TABLE R405.4.2(1), R408.2.5    New Section y
Location	base
Proponent	William Fay    bill@energyefficientcodes.org
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Heard as modified, presented by Gayathri, confirmation does not conflict with REPI-60 as passed, straw poll for consensus on air leakage values
Recommendation	Chris Mathis moves as modified, Rob Buchanan seconded Reason: air leakage tightness is essential to energy efficiency, lasts the life of the building, and is the largest contributor to errors in HVAC equipment.
Vote	13-4-1
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>  X  </u> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

## REPI-64-21 – this modification replaces what is in the monograph

IECC®: R402.4.1.2, R402.4.1.3, Table R405.4.2 (1), R408.2.5

**Proponents:** William Fay, representing Energy Efficient Codes Coalition; Amy Boyce, representing Energy Efficient Codes Coalition (amy.boyce@imt.org); Amber Wood, representing Energy Efficient Codes Coalition (awood@aceee.org); Jason Reott, representing Energy Efficient Codes Coalition

### 2021 International Energy Conservation Code

#### Revise as follows:

**R402.4 Air leakage.** The building thermal envelope shall be constructed to limit air leakage in accordance with the requirements of Sections R402.4.1 through R402.4.5.

**R402.4.1 Building thermal envelope.** The building thermal envelope shall comply with Sections R402.4.1.1 through R402.4.1.3....

**R402.4.1.1 Installation.** The components....

**R402.4.1.2 (N1102.4.1.2) Testing and maximum air leakage rate.**

The *building or dwelling unit* shall be tested for air leakage. The maximum air leakage rate for any *building or dwelling unit* under any compliance path shall not exceed 5.0 air changes per hour or 0.28 cubic feet per minute (CFM) per square foot [0.0079 m<sup>3</sup>/(s × m<sup>2</sup>)] of *dwelling unit enclosure area*. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed.

**Exception:** For heated, attached private garages and heated, detached private garages accessory to one- and two-family dwellings and townhouses not more than three stories above grade plane in height, building envelope tightness and insulation installation shall be considered acceptable where the items in Table R402.4.1.1, applicable to the method of construction, are field verified. Where required by the code official, an approved third party independent from the installer shall inspect both air barrier and insulation installation criteria. Heated, attached private garage space and heated, detached private garage space shall be thermally isolated from all other habitable, conditioned spaces in accordance with Sections R402.2.12 and R402.3.5, as applicable.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, where installed at the time of the test, shall be open.
4. Exterior or interior terminations for continuous ventilation systems shall be sealed.

5. Heating and cooling systems, where installed at the time of the test, shall be turned off.
6. Supply and return registers, where installed at the time of the test, shall be fully open.

**Exception:** When testing individual *dwelling units*, an air leakage rate not exceeding 0.30 cubic feet per minute per square foot [0.008 m<sup>3</sup>/(s × m<sup>2</sup>)] of the *dwelling unit enclosure area*, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pa), shall be permitted in all climate zones for:

1. Attached single-family and multiple-family building *dwelling units*.
2. Buildings or *dwelling units* that are 1,500 square feet (139.4 m<sup>2</sup>) or smaller.

**R402.4.1.3 (N1102.4.1.3) Prescriptive air leakage rate.**

When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 0, 1 and 2, and **2.0 3.0** air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.

**TABLE R405.4.2(1) (TABLE N1105.4.2(1)) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

Portions of table not shown remain unchanged.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Air exchange rate	The air leakage rate at a pressure of 0.2 inch w.g. (50 Pa) shall be Climate Zones 0 through 2: 5.0 air changes per hour. Climate Zones 3 through 8: <del>2.0 3.0</del> air changes per hour.	The measured air exchange rate. <sup>a</sup>
	The mechanical ventilation rate shall be in addition to the air leakage rate and shall be the same as in the proposed design, but not greater than $0.01 \times CFA + 7.5 \times (N_{br} + 1)$ where:  <i>CFA</i> = conditioned floor area, ft <sup>2</sup> . <i>N<sub>br</sub></i> = number of bedrooms.	The mechanical ventilation rate <sup>b</sup> shall be in addition to the air leakage rate and shall be as proposed.
	The mechanical ventilation system type shall be the same as in the proposed design. Energy recovery shall not be assumed for mechanical ventilation.	

**R408.2.5 (N1108.2.5) Improved air sealing and efficient ventilation system option.**

The measured air leakage rate shall be less than or equal to **2.0 3.0** ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 cubic feet per minute per watt (0.03 m<sup>3</sup>/min/watt) and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).





## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-063-21     Air Tightness improvements
CDP ID #	312
Code	IECC RE
Code Section(s)	R402.4.1.2, R402.4.1.3, TABLE R405.4.2(1)     New Section n
Location	base
Proponent	William Fay     bill@energyefficientcodes.org
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Aims to limit air leakage in warmer climates, some discussion on whether it should be even lower.
Recommendation	Alison Lindberg motions to approve and Joel Martell seconded Reason: controlling air leakage is important in warm climates as well.
Vote	14-1-3 - motions carries
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>  X  </u> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-060-21     Air leakage testing rate
CDP ID #	419
Code	IECC RE
Code Section(s)	R402.4.1.2, R402.4.1.3     New Section n
Location	base
Proponent	Robby Schwarz     robby@btankinc.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Presented by air leakage working group considered 60, 63 and 64 together. Working groups conducted straw poll of SC voting members on leakage rates.
Recommendation	Approve as Modified. Chris Mathis motion, Alison Lindberg seconded.
Vote	AM 10-6
Recommendation Date	
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <input checked="" type="checkbox"/> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

## REPI-60-21 (this modification replaces what is in the monograph)

IECC®: R402.4.1.2

**Proponents:** Robby Schwarz, BUILDTank, Inc., representing Colorado Chapter of the ICC (robby@btankinc.com)

### 2021 International Energy Conservation Code

Revise as follows:

#### R402.4.1.2 (N1102.4.1.2) Testing.

The *building* or *dwelling unit* shall be tested for air leakage. The maximum air leakage rate for any *building* or *dwelling unit* under any compliance path shall not exceed ~~5-0-3-0~~ 4.0 air changes per hour or ~~0-28-0-19~~ 0.22 cubic feet per minute (CFM) per square foot [~~0.00632~~ ~~0.0079~~  $\text{m}^3/(\text{s} \times \text{m}^2)$ ] of *dwelling unit enclosure area*. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed.

**Exception:** For heated, attached private garages and heated, detached private garages accessory to one- and two-family dwellings and townhouses not more than three stories above grade plane in height, building envelope tightness and insulation installation shall be considered acceptable where the items in Table R402.4.1.1, applicable to the method of construction, are field verified. Where required by the code official, an approved third party independent from the installer shall inspect both air barrier and insulation installation criteria. Heated, attached private garage space and heated, detached private garage space shall be thermally isolated from all other habitable, conditioned spaces in accordance with Sections R402.2.12 and R402.3.5, as applicable.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures.
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, where installed at the time of the test, shall be open.
4. Exterior or interior terminations for continuous ventilation systems shall be sealed.
5. Heating and cooling systems, where installed at the time of the test, shall be turned off.
6. Supply and return registers, where installed at the time of the test, shall be fully open.

**Exception:** When testing individual *dwelling units*, an air leakage rate not exceeding ~~0-30~~ 0.25 cubic feet per minute per square foot [~~0.006~~ ~~0.008~~  $\text{m}^3/(\text{s} \times \text{m}^2)$ ] of the *dwelling unit enclosure area*, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pa), shall be permitted in all climate zones for:

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1. Attached single-family and multiple-family building *dwelling units*.
2. Buildings or *dwelling units* that are 1,500 square feet (139.4 m<sup>2</sup>) or smaller.

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

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

Reason Statement:

This proposal was changed through the Air leakage working group to be a proposal that put forward the idea of a single air leakage rate for the entire country to a proposal that is being used to lower the back stop air leakage rate for performance modeling from 5.0 to 4.0 ACH50. That is all the modification does is lower the air leakage rate in Section R402.4.1.2 Testing.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-38-21     Air Sealing Rim Joist
CDP ID #	544
Code	IECC RE
Code Section(s)	R402.2.11 (New), TABLE R402.4.1.1    New Section y
Location	base
Proponent	Robby Schwarz     robby@btankinc.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	rim joists are under insulated. Reason: Repetitive and unnecessary. The language "six-sided" is a concept, not good code language
Recommendation	Motion to disapprove Bobby Parks, Rob Austin
Vote	10-5-3
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee __X_____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

**REPI-38 New Rim Joist section – Edited as recommended by Envelope SC**

IECC®: R402.2.11 (N1102.2.11) (New), TABLE R402.4.1.1

Proponents:

Robby Schwarz, BUILDTank, Inc., representing BUILDTank, Inc. (robby@btankinc.com)  
2021 International Energy Conservation Code

**Add new text as follows:**

**R402.2.11 (N1102.2.11) Rim ~~and band~~ joist and sill plate requirements.**

~~At~~ Where a rim joist rests upon a sill plate on top of a foundation wall that separates conditioned from unconditioned space ~~locations adjacent to the foundation~~, the junction of the sill plate to the foundation shall be sealed. Capillary break materials installed between the sill plate and the foundation shall not be used as air sealing materials unless specifically designed for ~~such that~~ use. For all rim ~~and band~~ joists ~~separating conditioned from unconditioned space~~, the rim ~~joist board~~ to the sill plate, and the rim ~~joist board~~ to the subfloor ~~adjacent to the building thermal envelope~~ shall be air sealed. Plates and rim ~~joists boards~~ which are part of the ~~rim and band joist~~ thermal envelope assembly shall be insulated to at least the same R-value as the above grade exterior wall and shall be enclosed on six sides ~~of the assembly with an air barrier~~.

**Revise as follows:**

**TABLE R402.4.1.1  
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION<sup>a</sup>**

COMPONENT	AIR BARRIER, <u>AIR SEALING</u> CRITERIA	<u>INSULATION INSTALLATION</u> CRITERIA
Rim <del>and band</del> joists	Rim <del>and band</del> joists shall include an <del>exterior</del> air barrier. <sup>b</sup>  The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.	<u>Rim <del>and band</del> joist shall be insulated per Section R402.2.11</u>  <del>Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.<sup>b</sup></del>

a. Inspection of log walls shall be in accordance with the provisions of ICC 400.

b. Air barrier and insulation full enclosure is not required in unconditioned or ventilated attics spaces ~~and at rim joists~~.

**Reason:**

Rim joist at foundations and between floor are notoriously leaky and difficult to insulate. They are one of the first areas of the Building Thermal Envelope that are addresses when seeking to build a more air tight house, yet the IECC continues not to address them well or call them out specifically in the installation sections or R402. A specific requirement section is needed to address them. This proposal deals with the air leakage issues and the insulation issues. For too long fibrous insulation has been allowed to be installed in location without complete enclosure. Fibrous air permeable insulation in any cavity must be enclosed on six sides. This cavity is not tall, but convection through the material occurs because it is open to large volume spaces within the floor system or potentially the greater volume of the basement or crawl space. Building durability is often associated with this location and lack of enclosure when warm moist air migrates through air permeable insulation and condenses on the rim joist surface.

Some believe that the above grade wall definition should be enough to ensure that the rim joist is insulated to the same R-value as the above grade wall. It does include the language “peripheral edges of floors” in the definition, but it is almost comical to believe that builders, trades, and code officials in the field read the definition especially when “Above Grade Wall” is not a term that is used in Table R402.4.1.1. It is common to see the Rim Joist insulated with less R-value that the above grade wall. This section just makes it clear that the minimum requirement is the same above grade walls as the rim joist is a unique and separate building envelope assembly.

**Cost Impact:**

The code change proposal will increase the cost of construction.

This will impact the first cost of construction as it is a new code requirement to enclose the fibrous insulation installed in the rim/band joist. However, performance will improve, and operational cost and comfort will be impacted positively.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-039-21     Attic knee or pony wall
CDP ID #	375
Code	IECC RE
Code Section(s)	R402.2.3 (New), Table R402.4.1.1 (New), TABLE R405.2, TABLE R406.2     New Section y
Location	base
Proponent	Robby Schwarz     robby@btankinc.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	provides more details on how to insulate knee walls, adds additional clarity for these spaces
Recommendation	Motion to approve Rob Buchanan, Chris Mathis seconded Reason: assembly often overlooked and with low compliance rates. Language has issues but it's necessary.
Vote	10-8-0
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>  X  </u> _____
Consensus Committee	
Committee Response	



Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

Proposed modification

**REPI-39 Knee Wall**

**Definition**

Knee wall – usually a short wall assembly of the building thermal envelope that may support rafters or is defined by ceiling trusses and is used to separated conditioned space from unconditioned buffered space such as ventilated attics.

**R402.2.3 Attic knee ~~or pony~~ wall.**

Attic knee ~~or pony~~ wall assemblies that separate conditioned space from unconditioned attic spaces shall be constructed to be insulated to the R-value of the above grade wall. ~~described in Table R402.1.3. Knee or pony~~ Such knee walls shall have a sealed air barrier between conditioned and unconditioned space and shall be sheathed on the attic or unconditioned side of the assembly. to the unconditioned side of the assembly. Air permeable insulation installed in knee or pony wall cavities shall be enclosed on six sides of the cavity. Insulation installed in knee or pony wall cavities shall be installed in substantial contact with the air barrier.

R402.2.3.1 ~~Where knee or pony wall cavities defined by~~ roof truss framing members are used to create a knee wall that separates conditioned and unconditioned space, they shall be insulated to the same R-value as the above grade wall. ~~level as other exterior above grade walls.~~

R402.2.3.2 ~~When~~ Vertical or diagonal surfaces built to raise a ceiling into the attic space that are greater than 1’ foot in height into a ventilated attic, they shall be considered a knee wall. ~~or pony wall.~~ Vertical or diagonal surfaces that are 1’ foot or less in height into a ventilated attic shall be buried with insulation to maintain the ceilings required R-value.

Table R402.4.1.1  
AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION a

COMPONENT	AIR BARRIER, AIR SEALING CRITERIA	INSULATION INSTALLATION CRITERIA
<u>Knee <del>or pony</del> walls</u>	<u>Knee <del>or pony</del> walls shall have a sealed air barrier between conditioned and</u>	<u>Insulation installing in a knee <del>or pony</del> wall assembly shall</u>

	<p><u>unconditioned space and shall be sheathed on the attic or unconditioned side of the assembly.</u></p> <p><u>be constructed to have a sealed air barrier on six sides of the wall assembly including to the unconditioned side of the assembly.</u></p>	<p><u>be installed in accordance with Section R402.2.3</u></p>
Walls	<p>The junction of the foundation and sill plate shall be sealed.</p> <p>The junction of the top plate and the top of exterior walls shall be sealed.</p> <p><del>Knee walls shall be sealed.</del></p>	<p>Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance, <i>R</i>-value, of not less than R-3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.</p>

Reason Statement

Attic knee walls, in the field, are a unique assembly that have been overlooked by the IECC. The assembly separates interior conditioned space from exterior unconditioned space but is buffered from directly being connected to the ambient outdoors by a ventilated attic. The ventilated attic space often has harsher unconditioned side temperatures than normal above grade walls causing more significant heat loss or gain through the assembly than through normal insulated above grade walls. This being the case we see across the country, in the field, that attic knee walls are often insulated to a lower R-value than the exterior walls associated with the same house. In addition, the IECC has not been clear about the need for attic sheathing and a sealed air barrier systems installation.

This proposal defines, describes how to address, and adds this unique assembly to the list of required assemblies that must be detailed in the requirements section of the IECC. It will ensure proper air barriers, insulation installation, air sealing of the assembly and will increase the performance of the home.

Raised ceiling that protrude into the attic are unique knee wall applications on which the code offers no guidance. They are particularly troublesome for maintaining the continuity of the building thermal envelope and therefore have been added to this section as a means to define when the vertical or diagonal surface must be treated as a knee wall and when normal attic insulation can be mounded over the raised ceiling.





**Cost**

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In theory, this assembly has been addressed as an above grade wall so this new section of code should not add cost to the construction of a home. In reality, this assembly has not been viewed in most of the country as a typical above grade wall so cost will be added to construction because of the realization of the significance of the assembly and the heat loss and gain that is driven through it because of it being adjacent to the ventilated attic.

The R-value of this part of the above grade wall assembly could be traded off to a lower R-value, or the same R-value that is currently being installed when using the UA alternative, Total Building Performance, or ERI compliance pathways. This would lower the cost associated with this code proposal. However, as cost goes down implementation would still become better because the proposal would ensure that the installed insulation is enclosed with sheathing on the attic side and that an air barrier has been defined this making the assembly perform better.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-044-21 Thermal Envelope Installation
CDP ID #	229
Code	IECC RE
Code Section(s)	R402.4.1.1 New Section n
Location	base
Proponent	Charles Haack chaack@naima.org
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Proponent recommends disapproval and says proposal is not ready at this time.
Recommendation	Motion to disapprove Parks, Johnson Seconded. Reason: Proponent says not ready
Vote	18-0-0
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee_x _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	CEPI-019-21 Part II      Insulation mark installation
CDP ID #	570
Code	IECC RE
Code Section(s)	R303.1.1, R303.1.2    New Section n
Location	base
Proponent	Darren Meyers      dmeyers@ieccode.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Part I approved by commercial SC with minor modification
Recommendation	<p>Charles Allen Motion to approve as modified, Abendroth seconded Reason: simply a clarification that R value should be visible</p> <p><b>Exception:</b> For roof insulation installed above the deck, the <i>R-value</i> shall be labeled as <b>required specified</b> by the material standards <b>specified</b> in <u>Table 1508.2 of the <i>International Building Code</i> or Table R906.2 of the <i>International Residential Code</i>, as applicable.</u></p>
Vote	17-0-1
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>  X  </u>
Consensus Committee	
Committee Response	

Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	





## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-005-21    Embodied Energy
CDP ID #	332
Code	IECC RE
Code Section(s)	R103.2    New Section
Location	base
Proponent	Seth Wiley    seth@siteisreal.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	addresses carbon directly, adds definition of carbon equivalent
Recommendation	motion to disapprove Greg Johnson, Amanda Hickman Reason: There is nothing for the CEO to do with this information. The information will be inaccurate as the electric grid becomes cleaner.
Vote	12-6
Recommendation Date	3/16/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u>X</u> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____

Date	
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## Proponent Proposed modification following subcommittee recommendation REPI-5-21 - MODIFIED

### Clerical Key:

~~Red strike through is language proposed in monograph version that is removed in this MOD.~~

Yellow highlighted text is current Code text brought into this MOD as reference and unchanged.

Blue highlighted underlined text is NEW language being proposed in this MOD.

IECC®: R103.2, R401.3, (New), R401.3.1 (New)

**Proponents:** Seth Wiley, Architect, Representing Self

### 2021 International Energy Conservation Code

#### Revise as follows:

**R103.2 Information on construction documents.** Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where 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 the following as applicable:

1. Energy compliance path.
2. Insulation materials and their R-values.
3. Fenestration U-factors and solar heat gain coefficients (SHGC).
4. Area-weighted U-factor and solar heat gain coefficients (SHGC) calculations.
5. Mechanical system design criteria.
6. Mechanical and service water-heating systems and equipment types, sizes and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.

~~10. CO<sub>2</sub>e annual electric energy usage emissions from building or dwelling unit operations, reported in kilograms (kgCO<sub>2</sub>e).~~

~~11. CO<sub>2</sub>e annual fossil fuel energy usage emissions from building or dwelling unit operations, reported in kilograms (kgCO<sub>2</sub>e).~~

**R401.3 Certificate.** A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the

visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the following:

1. The predominant R-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, basement walls, crawl space walls and floors and ducts outside conditioned spaces.
2. U-factors of fenestration and the solar heat gain coefficient (SHGC) of fenestration. Where there is more than one value for any component of the building envelope, the certificate shall indicate both the value covering the largest area and the area weighted average value if available.
3. The results from any required duct system and building envelope air leakage testing performed on the building.
4. The types, sizes and efficiencies of heating, cooling and service water-heating equipment. Where a gas-fired unvented room heater, electric furnace or baseboard electric heater is installed in the residence, the certificate shall indicate “gas-fired unvented room heater,” “electric furnace” or “baseboard electric heater,” as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters.
5. Where on-site photovoltaic panel systems have been installed, the array capacity, inverter efficiency, panel tilt and orientation shall be noted on the certificate.
6. For buildings where an Energy Rating Index score is determined in accordance with Section R406, the Energy Rating Index score **and CO<sub>2</sub>e Index**, both with and without any on-site generation, shall be listed on the certificate.
7. The code edition under which the structure was permitted and the compliance path used.

~~8. CO<sub>2</sub>e annual electric energy usage emissions from building or dwelling unit operations, reported in kilograms (kgCO<sub>2</sub>e).~~

~~9. CO<sub>2</sub>e annual fossil fuel energy usage emissions from building or dwelling unit operations, reported in kilograms (kgCO<sub>2</sub>e).~~

**R406.7.2.2 Confirmed compliance report for a certificate of occupancy.** A confirmed compliance report submitted for obtaining the certificate of occupancy shall be made site and address specific and include the following:

1. Building street address or other building site identification.
2. Declaration of ERI **and CO<sub>2</sub>e Index** on title page and on building plans.
3. The name of the individual performing the analysis and generating the report.
4. The name and version of the compliance software tool.
5. Documentation of all inputs entered into the software used to produce the results for the reference design and/or the rated home.
6. A final confirmed certificate indicating that the confirmed rated design of the built home complies with Sections R406.2 and R406.4. The certificate shall report the energy features that were confirmed to be in the home, including: component-level insulation R-values or U-factors; results from any required duct system and building envelope air leakage testing; and the type and rated efficiencies of the heating, cooling, mechanical ventilation, and service water-heating equipment installed. Where on-site renewable energy systems have been installed on or in the home, the certificate shall report the type and production size of the installed system.

~~Add new definition as follows:~~

**CARBON DIOXIDE EQUIVALENT (CO<sub>2</sub>e).** A measure used to compare the impact of various greenhouse gases based on their global warming potential (GWP). CO<sub>2</sub>e approximates the timeintegrated warming effect of a unit mass of a given greenhouse gas relative to that of carbon dioxide (CO<sub>2</sub>). GWP is an index for estimating the relative global warming contribution of atmospheric emissions of 1 kg of a particular greenhouse gas compared to emissions of 1 kg of CO<sub>2</sub>. The following GWP values are used based on a 100-year time horizon: 1 for CO<sub>2</sub>, 25 for methane (CH<sub>4</sub>), and 298 for nitrous oxide (N<sub>2</sub>O). [Carbon Dioxide Equivalent Definition courtesy of New Buildings Institute]

**Add new text as follows:**

**R401.3.1 Calculation of CO<sub>2</sub>e annual emissions.** Building or dwelling unit CO<sub>2</sub>e annual emissions shall be calculated in kgCO<sub>2</sub>e in the following manner:

1. Based on annual energy use in Mbtus as calculated in and documented on building or dwelling unit ANSI/RESNET/ICC 301 Standard Energy Rating Certificate and process:

1. That portion of building or dwelling energy use derived from electric grid sources as calculated per ANSI/RESNET/ICC 301 Standard Energy Rating Certificate process in Mbtus converted to kgCO<sub>2</sub>e based on current U.S. Environmental Protection Agency eGrid Summary Table 3 State Output Emissions Rates, lbCO<sub>2</sub>/MWh. [https://www.epa.gov/egrid/summary\\_data](https://www.epa.gov/egrid/summary_data)

2. Megawatt hours shall be converted to Mbtus.

3. That portion of building or dwelling energy use as derived from natural gas, liquefied petroleum gas, and fuel oil fossil fuel sources as calculated per ANSI/RESNET/ICC 301 Standard Energy Rating Certificate process in Mbtus converted to kgCO<sub>2</sub>e based on current U.S. Energy Information Administration Carbon Dioxide Emissions Coefficients by Fuel, lbCO<sub>2</sub>/Mbtu.

[https://www.eia.gov/environment/emissions/co2\\_vol\\_mass.php](https://www.eia.gov/environment/emissions/co2_vol_mass.php)

4. Pounds shall be converted to kilograms.

5. In coordination with the Energy Rating Certificate process, on-site electric energy generated by on-site renewable sources such as rooftop photovoltaic sources shall not be included in on-site electric energy usage provided the building or dwelling unit primary occupant has secured an annual or longer operational system installation agreement in cooperation with the local utility company, and can provide such agreement as required.

6. In coordination with the Energy Rating Certificate process, on-site electric energy generated by off-site renewable sources such as hydropower sources shall not be included in on-site electric energy usage provided the building or dwelling unit primary occupant has secured an annual or longer power purchase agreement in cooperation with the local utility company, and can provide such agreement as required.

7. Results shall separately indicate building or dwelling annual operational kgCO<sub>2</sub>e emissions from electric energy usage and fossil fuel energy usage for documentation per R103.2 and R401.3.

2. When a building or dwelling unit will not receive an ANSI/RESNET/ICC 301 Standard Energy Rating Certificate and accompanying calculation process, current U.S. Environmental Protection Agency (EPA) Estimated Home Energy Use shall be used to assess building and home annual energy use emissions in kgCO<sub>2</sub>e.

1. Current EPA Estimated Home Energy Use values equate to the following Emissions:

- ~~1. 2.839 kgCO<sub>2</sub>e/sf from electricity usage;~~
- ~~2. 1.181 kgCO<sub>2</sub>e/sf from natural gas usage;~~
- ~~3. 0.119 kgCO<sub>2</sub>e/sf from liquefied petroleum gas usage; and~~
- ~~4. 0.150 kgCO<sub>2</sub>e/sf from fuel oil usage.~~

~~<https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>~~

~~2. Multiply building or dwelling unit square footage by the EPA Estimated Home Energy Use values to calculate the building or dwelling annual operational kgCO<sub>2</sub>e emissions for documentation per R103.2 and R401.3.~~

~~3. Results shall separately indicate building or dwelling annual operational kgCO<sub>2</sub>e emissions from electric energy usage and fossil fuel energy usage for documentation per R103.2 and R401.3.~~

### **Reason:**

To improve occupant health and safety, improve energy efficiency, and decrease greenhouse gas emissions. An example as to how to calculate CO<sub>2</sub>e annual emissions is as follows.

### **Example:**

~~A 2,000-square foot new construction or renovation project will be appropriately documented, filed with authorities having jurisdiction, and constructed.~~

~~There will not be an ANSI/RESNET/ICC 301 Energy Rating Certification and its standard supporting analysis performed as part of the project.~~

~~The project's annual emissions from electric usage equate to 5,678.184 kgCO<sub>2</sub>e (2,000 x 2.839).~~

~~The project's annual emissions from natural gas usage equate to 2,362.042 kgCO<sub>2</sub>e (2,000 x 1.181).~~

~~The project's annual emissions from liquefied petroleum gas usage equate to 237.236 kgCO<sub>2</sub>e (2,000 x 0.119).~~

~~Therefore, the project's annual emissions from fuel oil usage equate to 299.123 kgCO<sub>2</sub>e (2,000 x 0.150).~~

~~Therefore, the project's CO<sub>2</sub>e annual emissions from electric energy usage is 5,678.184 kgCO<sub>2</sub>e and from fossil fuel energy usage is 2,898.401 kgCO<sub>2</sub>e (2,362.042 + 237.236 + 299.123) for documentation per R103.2 and R401.3.~~

### **Bibliography:**

Based on professional knowledge and experience, feedback from other professionals, established research, and established local and national construction quality frameworks

### **Cost Impact:**

The code change proposal will neither increase nor decrease the cost of construction.

This code change proposal is understood to neither increase nor decrease the cost of construction



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-006-21 Window to wall ratio
CDP ID #	449
Code	IECC RE
Code Section(s)	R103.2, TABLE R402.1.2, TABLE R402.1.3 New Section n
Location	base
Proponent	Robby Schwarz robby@btankinc.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Concerns about discouraging the use of daylighting. There are more appropriate means of accounting for window-to-floor area ratios. U-factors will need to adjust based on REPI-28.
Recommendation	Craig Drumheller motion to disapprove, Chris Mathis seconds. Reason: Not needed, taken care of in performance path, no evidence of abuse of window to floor ratio, double hit of performance path the way it is written.
Vote	15-2 motion to disapprove carries
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <u> X </u>
Consensus Committee	
Committee Response	

**Proponent Proposed Modification post subcommittee recommendation  
REPI – 6 Modification to address Slab Edge insulation only Table R402.1.3 footnote d.**

**R103.2 Information on construction documents.**

Construction documents shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *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 the following as applicable:

1. Energy compliance path.
2. Insulation materials and their *R* values.
3. Fenestration *U* factors and *solar heat gain coefficients (SHGC)*.
4. Area-weighted *U* factor and *solar heat gain coefficients (SHGC)* calculations.
5. Mechanical system design criteria.
6. Mechanical and service water heating systems and equipment types, sizes and efficiencies.
7. Equipment and system controls.
8. Duct sealing, duct and pipe insulation and location.
9. Air sealing details.
10. glazing area sqft as a percentage of floor area (windows to floor ratio)

**TABLE R402.1.2  
MAXIMUM ASSEMBLY *U*-FACTORS<sup>a</sup> AND FENESTRATION REQUIREMENTS**

CLIMATE ZONE	FENESTRATION <i>U</i> FACTOR <sup>f</sup>	SKYLIGHT <i>U</i> FACTOR	GLAZED FENESTRATION SHGC <sup>d,e</sup>	CEILING <i>U</i> FACTOR	WOOD FRAME WALL <i>U</i> FACTOR	MASS WALL <i>U</i> FACTOR <sup>b</sup>	WOOD FRAME WALL <i>U</i> FACTOR	BASEMENT WALL <i>U</i> FACTOR	CRAWL SPACE WALL <i>U</i> FACTOR
0	0.50/0.30 <sup>f</sup>	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
1	0.50/0.30 <sup>f</sup>	0.75	0.25	0.035	0.084	0.197	0.064	0.360	0.477
2	0.40/0.30 <sup>f</sup>	0.65	0.25	0.026	0.084	0.165	0.064	0.360	0.477
3	0.30/0.27 <sup>f</sup>	0.55	0.25	0.026	0.060	0.098	0.047	0.091 <sup>e</sup>	0.136
4 except Marine	0.30/0.27 <sup>f</sup>	0.55	0.40	0.024	0.045	0.098	0.047	0.059	0.065
5 and Marine 4	0.30/0.27 <sup>f</sup>	0.55	NR	0.024	0.045	0.082	0.033	0.050	0.055
6	0.30/0.27 <sup>f</sup>	0.55	NR	0.024	0.045	0.060	0.033	0.050	0.055
7 and 8	0.30/0.27 <sup>f</sup> 0.27/0.25 <sup>f</sup>	0.55	NR	0.024	0.045	0.057	0.033	0.050	0.055

For SI: 1 foot = 304.8 mm.

a. Non fenestration *U* factors shall be obtained from measurement, calculation or an approved source.

b. Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U* factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.

c. In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U* factor shall not exceed 0.360.

d. The SHGC column applies to all glazed fenestration.

**Exception:** In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

e. There are no SHGC requirements in the Marine Zone.

f. A maximum *U* factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:

1. Above 4,000 feet in elevation above sea level, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.

g. Where the proposed glazing area is more than 15.0% of the conditioned floor area, as provided by per Section R103.2 information on construction documents, the second *U* value shall be required. **Would this added to the *U* factor table double penalize the R405 performance path?**

**TABLE R402.1.3  
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY  
COMPONENT <sup>a</sup>**

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>b,i</sup>	SKYLIGHT <sup>b</sup> U-FACTOR GLAZED	FENESTRATION SHGC <sup>b, e</sup>	CEILING R-VALUE	WOOD FRAME WALL R-VALUE <sup>g</sup>	MASS WALL R-VALUE <sup>h</sup>	FLOOR R-VALUE	BASEMENT WALL R-VALUE <sup>c,g</sup>	SLAB <sup>d</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>c,g</sup> WALL R-VALUE
0	<del>NR/0.30</del> <sup>i</sup>	0.75	0.25	30	13 or 0 + 10	3 / 4	13	0	0	0
1	<del>NR/0.30</del> <sup>i</sup>	0.75	0.25	30	13 or 0 + 10	3 / 4	13	0	0	0
2	0.40/0.30 <sup>i</sup>	0.65	0.25	49	13 or 0 + 10	4 / 6	13	0	0	0
3	0.30/0.27 <sup>i</sup>	0.55	0.25	49	20 or 13 + 5ci or 0 + 15	8 / 13	19	5ci or 13 <sup>r</sup>	10ci, 2 ft	5ci or 13 <sup>r</sup>
4	0.30/0.27 <sup>i</sup>	0.55	0.40	60	20 + 5ci or 13 + 10ci or 0 + 15	8 / 13	19	10ci or 13	10ci, 4 ft	10ci or 13
5	0.30/0.27 <sup>i</sup>	0.55	0.40	60	20 + 5ci or 13 + 10ci or 0 + 15	13 / 17	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
6	0.30/0.27 <sup>i</sup>	0.55	NR	60	20 + 5ci or 13 + 10ci or	15 / 20	30	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci



7 and 8	<del>0.30</del> / <del>0.27</del> $\frac{1}{2}$	0.55	NR	60	0 + 20 20 + 5ci or 13 + 10ci or 0 + 20	19 / 21	38	15ci or 19 or 13 + 5ci	10ci, 4 ft	15ci or 19 or 13 + 5ci
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For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.

b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

**Exception:** In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.

c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13 + 5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.

d. R-5 10 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs as indicated in the table. [Slab edge insulation shall be installed to separate conditioned from unconditioned spaces including adjacent garages, entries, and porches.](#) The slab-edge insulation for heated slabs shall not be required to extend below the slab.

e. There are no SHGC requirements in the Marine Zone.

f. Basement wall insulation is not required in Warm Humid locations as defined by Figure R301.1 and Table R301.1.

g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13 + 5" means R-13 cavity insulation plus R-5 continuous insulation.

h. Mass walls shall be in accordance with Section R402.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.

i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:

1. Above 4,000 feet in elevation, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.

[j. Where the proposed glazing area is more than 15.0% of the conditioned floor area, as provided by per Section R103.2 information on construction documents, the second \*U\*-value shall be required.](#)

### Reason Statement

Under Slab and slab edge insulation is also addressed in footnotes to the *R*-value table. These installation criteria have been strengthened here to ensure the total boundary of the slab is insulated in places where it traditionally has not been such as between the conditioned space of the house and the non-conditioned garage.

### Cost

The slab edge footnote clarification may increase first cost of construction however, this detail not only will save operational cost, increase comfort in the home, but has been an implied requirement that has just been made evident.

Remember if brought back that the prescriptive path traditionally sets the base requirement for the reference home to. You can trade above or below. Duct leakage at 4 CFM attic at R60 you can trade below. Air leakage at 3 ACH you can trade below. In this case there is not base requirement in the prescriptive house so we are seeing large window to floor ratios and in fact you could build an all glass house. The base requirement is set in the performance path when it should be set in the prescriptive path.

Extreme weather events

People are spending more time in their houses

Parity between compliance paths.

~~Based on energy modeling and to create parity and calibration between the prescriptive and performance compliance paths, changes were made in the R and U value tables.~~

-

~~The U value changes for windows are based off of the Total Building Performance reference home table R405.4.2(1) Section "Vertical Fenestration other than opaque doors" where it states that: Total area=~~

~~(a) The proposed glazing area, where the proposed glazing area is less than 15 percent of the conditioned floor area.~~

~~(b) 15 percent of the conditioned floor area, where the proposed glazing area is 15 percent or more of the conditioned floor area.~~

-

~~This section makes compliance with the IECC more difficult when the window to floor ratio is above 15%. Changes in the R and U value table equalize compliance within the compliance paths to begin the journey to better energy performance in new homes.~~

~~In addition to achieving better parity between compliance options this proposal directly being to address glass in our buildings. Glass will never be able to retard heat gain and loss as well as a wall assembly. In theory we can still build an all-glass house that is code compliant, but we know that to build an efficient house we need to reduce window area and install better performing windows. This proposal is a small step to being having this discussion.~~

~~Lastly, although window to wall ratios would be a better metric for this proposal, window to floor ratio was chosen because it is what is used in the Total Building Performance reference home in Section R405.4.2(1). I did not change the ratio in the R405 reference home because I believe that every change to made to the reference home table need to be vetted by software developers not the ICC Committee. The ICC has no oversight role over software developers, which is a problem in and of itself, so this code development process needs to seek consult with developers while addressing changes to the R405 reference home.~~

-

### Cost

~~0.27 U value windows are the current EnergyStar compliant window and are readily available. 0.30 U value windows are the last version of EnergyStar compliant windows. This proposal may increase cost because creating parity also means leveling the required efficiency between compliance paths. However, if designers are forced through all compliance options to assess the window to floor ratio, they should reduce the cost of construction by lowering the ratio through better window placement. In addition, there is a movement to install fewer operable windows which in tandem with this proposal could reduce cost.~~



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-012-21    Insulation density
CDP ID #	307
Code	IECC RE
Code Section(s)	R303.1.1, R303.1.2    New Section n
Location	base
Proponent	Robert DeVries    rdevries@nuwool.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	density of spray foam affects the effective value and should be accounted for. Would it in fact add cost to do measurement. Reason: use documentation from the product rather than test on site, can't prove everything on site and will add cost.
Recommendation	Bobby Parks to disapprove as submitted, Charlie Allen seconded
Vote	13-3-3
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ____ X _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-028-21 Fenestration Table
CDP ID #	203
Code	IECC RE
Code Section(s)	R402.1.2 table, TABLE R402.1.3 New Section n
Location	base
Proponent	Thomas Culp culp@birchpointconsulting.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	This was the consensus among partners to combine multiple proposals. Consistent with Energy Star V6
Recommendation	Chris Mathis motion to approve as modified (see below), Drumheller second. Reason: improvement in almost every climate zone and represents broad stakeholder consensus.
Vote	19-0-0 motion to approve as modified carries
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

**Consensus modification to REPI-28 jointly submitted by:**

- **2050 Partners**
- **Fenestration & Glazing Industry Alliance (FGIA)**
- **Glazing Industry Code Committee (GICC)**, proponent of REPI-28
- **New Buildings Institute (NBI)**, proponent of REPI-29
- **Window & Door Manufacturers Association (WDMA)**

Original proposed changes shown in black. **Modifications relative to REPI-28 shown in red.**

Modify as follows:

**TABLE R402.1.2 (TABLE N1102.1.2) MAXIMUM ASSEMBLY U-FACTORS<sup>a</sup> AND FENESTRATION REQUIREMENTS**

Portions of table not shown remain unchanged.

Climate Zone	Fenestration U-Factor <sup>d</sup>	Skylight U-Factor <sup>d</sup>	Glazed Fenestration SHGC <sup>d,e</sup>
0	0.50 <del>0.40</del> 0.50	0.75 <u>0.60</u>	0.25
1	0.50 <del>0.40</del> 0.50	0.75 <u>0.60</u>	0.25
2	0.40	0.65 <u>0.60</u>	0.25
3	0.30	0.55 <u>0.53</u>	0.25
4 except Marine	0.30	0.55 <u>0.53</u>	0.4
5 and Marine 4	<del>0.30</del> <del>0.27</del> 0.28 <sup>f,g</sup>	0.55 <u>0.50</u>	<del>0.4</del> NR
6	<del>0.30</del> <del>0.27</del> 0.28 <sup>f,g</sup>	0.55 <u>0.50</u>	NR
7 and 8	<del>0.30</del> <del>0.27</del> <sup>f,g</sup>	0.55 <u>0.50</u>	NR

For SI: 1 foot = 304.8 mm.

- Nonfenestration U-factors shall be obtained from measurement, calculation or an approved source.
- Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- In warm-humid locations as defined by Figure R301.1 and Table R301.1, the basement wall U-factor shall not exceed 0.360.

d. The fenestration U-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

**Exception:** In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed ~~0.30~~ 0.28.

~~e. There are no SHGC requirements in the Marine Zone.~~

f. A maximum U-factor of ~~0.32~~ 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:

1. Above 4,000 feet in elevation above sea level, or
2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.

~~g. In Marine Climate Zone 4 and Climate Zones 5 through 8, the maximum U-factor for vertical fenestration shall be 0.28 when the SHGC is from 0.32 to 0.36, 0.29 when the SHGC is from 0.37 to 0.42, and 0.30 when the SHGC is greater than or equal to 0.42.~~

**TABLE R402.1.3 (TABLE N1102.1.3) INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT<sup>a</sup>**

Portions of table not shown remain unchanged.

Climate Zone	Fenestration U-Factor <sup>b</sup>	Skylight U-Factor <sup>b</sup>	Glazed Fenestration SHGC <sup>b,e</sup>
0	NR <del>0.40</del> <u>0.50</u>	<del>0.75</del> <u>0.60</u>	0.25
1	NR <del>0.40</del> <u>0.50</u>	<del>0.75</del> <u>0.60</u>	0.25
2	0.40	<del>0.65</del> <u>0.60</u>	0.25
3	0.30	<del>0.55</del> <u>0.53</u>	0.25
4 except Marine	0.30	<del>0.55</del> <u>0.53</u>	0.4
5 and Marine 4	<del>0.30</del> <u>0.27</u> <u>0.28</u> <sup>ci</sup>	<del>0.55</del> <u>0.50</u>	<del>0.4</del> NR
6	<del>0.30</del> <u>0.27</u> <u>0.28</u> <sup>ci</sup>	<del>0.55</del> <u>0.50</u>	NR
7 and 8	<del>0.30</del> <u>0.27</u> <sup>ci</sup>	<del>0.55</del> <u>0.50</u>	NR

For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.  
**Exception:** In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed ~~0.30~~ 0.28.
- c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13 & 5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab-edge insulation *R*-value for slabs, as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.
- ~~e. There are no SHGC requirements in the Marine Zone.~~
- f. Basement wall insulation is not required in warm-humid locations as defined by Figure R301.1 and Table R301.1.
- g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13 & 5" means R-13 cavity insulation plus R-5 continuous insulation.
- h. Mass walls shall be in accordance with Section R402.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- i. A maximum *U*-factor of ~~0.32~~ 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
  1. Above 4,000 feet in elevation above sea level, or
  2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.
- ~~j. In Marine Climate Zone 4 and Climate Zones 5 through 8, the maximum *U*-factor for vertical fenestration shall be 0.28 when the SHGC is from 0.32 to 0.36, 0.29 when the SHGC is from 0.37 to 0.42, and 0.30 when the SHGC is greater than or equal to 0.42.~~





## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-027-21 Fenestration and Projection Factor
CDP ID #	334
Code	IECC RE
Code Section(s)	R402.1.2 table, Table R402.1.3 New Section
Location	base
Proponent	Seth Wiley seth@siteisreal.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	This would provide an option to get lower SHGC in the window. Provides cooler and more comfortable environments. This trade-off does not belong in the prescriptive path. Inconsistent with already approved REPI-28
Recommendation	Chris Mathis motion to disapprove Drumheller seconded. Reason: moving performance compliance methods into the prescriptive path blurs this line
Vote	14-1-2 motion to disapprove carries
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee _____X_____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-031-21 Window performance
CDP ID #	485
Code	IECC RE
Code Section(s)	R402.1.2 table, TABLE R402.1.3 New Section n
Location	base
Proponent	Dan Wildenhaus dwildenhaus@trcccompanies.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	moving to high performance windows, this is more stringent than the consensus proposal and more stringent than the current values in Energy Star V6. Concerns with the accuracy of the cost analysis.
Recommendation	Motion to disapprove Chris Mathis, Craig Drumheller seconded Reason: issues with analysis being done and does not address cooling advantages through SHGC.
Vote	15-3-1 motion to disapprove carries.
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <input checked="" type="checkbox"/> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____

Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-041-21     Basement walls
CDP ID #	424
Code	IECC RE
Code Section(s)	R402.2.8, R402.2.8.1     New Section n
Location	base
Proponent	Robby Schwarz     robby@btankinc.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Adds a prescriptive requirement to the performance path; some language issues that were addressed in a modification to REPI-37 should be addressed here as well. Reason: issues with language and unintended consequences with adding a prescriptive requirement to the compliance path.
Recommendation	Motion to disapprove by Greg Johnson, Bobby Parks seconded
Vote	14-0-4 motion to disapprove carries
Recommendation Date	4/6/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ___ X _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	

Modification proposed by proponent following Subcommittee recommendation  
**REPI-41. Modification**

**formatting note: all blue text stricken and underlined is removed from the proposal (not the code)**

**blue text stricken and NOT underlined is removed from the code**

**black text stricken is removed from the reason statement**

**blue text underlined is proposed MOD.**

**R402.2.8 Basement walls.** Basement walls shall be insulated in accordance with Table R402.1.3 or the installed R-value shall be in accordance with the compliance path that is defined at the time of obtaining the building permit.

**Exception:** Basement walls associated with unconditioned basements where all of the following requirements are met:

1. The floor overhead, including the underside stairway stringer leading to the basement, is insulated in accordance with ~~Section~~ Table R402.1.3 and ~~applicable provisions of Sections R402.2 and R402.2.7.~~
2. There are no uninsulated duct, domestic hot water, or hydronic heating surfaces exposed to the basement.
3. There are no HVAC supply or return diffusers serving the basement.
4. The walls surrounding the stairway and adjacent to conditioned space are insulated in accordance with Section R402.1.3 and applicable provisions of Section R402.2.
5. The door(s) leading to the basement from conditioned spaces are insulated in accordance with Sections R402.1.3 and applicable provisions of Section R402.2, and weather-stripped in accordance with Section R402.4.

6. The building thermal envelope separating the basement from adjacent conditioned spaces complies with Section R402.4.

#### **R402.2.8.1 Basement wall insulation installation**

~~Where *b* Basement walls are insulated, the insulation shall be installed from the top of the basement wall down to 10 feet (3048 mm) below grade or to the basement floor, whichever is less. comply with the following:~~

Walls associated with conditioned basements shall be insulated on either the exterior or the interior side of the assembly and comply with the following:

1. Where exterior basement wall insulation is installed, it shall be permanently attached fastened to the wall and extend downward from the sill plate to not less than the footing or 10 feet, whichever is less.
2. Where interior basement wall insulation is installed, it shall extend downward from the interior edge of the sill plate at the top of the foundation wall to the finished floor below.

#### **Reason Statement**

Modifications have been made to section R402.2.8.1 per guidance from the envelope subcommittee to align the basement insulation installation requirements with the crawl space wall insulation installation proposal REPI-37 that passed subcommittee unanimously.

With recognition that Section R402.2.8 basement walls, is associated with the R-value of the wall assembly, this modification strikes language that specifically spoke to the ability to trade R-values when using a performance compliance alternative. Section R402.2.8 is not part of the mandatory requirement tables which is another reason why this proposed language was struck.

The R-value of the installed material will depend on the compliance path chosen and could vary.

The exception defines an unconditioned basement and refers to a section of code that is actually a table and then should point directly to floor insulation installation to separate the unconditioned basement from the conditioned living space above. The proposal fixes this confusion.

Foundation walls that define a basement can and often are insulated from the exterior. The language has been changed in this proposal to provide requirements for installation for not only interior application but also exterior insulation installation. Both installs require full coverage from the sill plate downward as was done with the stricken language to ensure full coverage.

#### Cost

This proposal does not impact the cost of construction. Instead, it provides greater flexibility in how basement assemblies can be insulated. It also better defines unconditioned basements and how to insulate from the interior or exterior.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-150-21 Alterations building envelope
CDP ID #	442
Code	IECC RE
Code Section(s)	R503.1.1, R503.1.1.1, R503.1.1.2 (New), 503.1.1.3 (New), R503.1.1.4 (New), R503.1.1.5 (New), R503.1.1.6 (New) New Section y
Location	base
Proponent	Jay Crandell jcrandell@aresconsulting.biz
Proposal Status	SC rev
Subcommittee	RE Existing Bldg
Subcommittee Notes	
Recommendation	Stephen Dent: Motion to approve as modified Paul Demers: Second
Vote	8-0 for, motion to approve carries
Recommendation Date	3/22/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <input checked="" type="checkbox"/> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## 2021 International Energy Conservation Code

*Add new definitions as follows:*

**APPROVED SOURCE.** An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

**CONSTRUCTION DOCUMENTS.** Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit.

*Revise existing definition as follows:*

**ROOF REPLACEMENT.** The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering. An alteration that includes the removal of all existing layers of roof assembly materials down to the roof deck and installing replacement materials above the existing roof deck.

*Revise text as follows:*

**R503.1.1 (N1111.1.1) Building thermal envelope.** Alterations of existing building thermal envelope assemblies shall comply with this section. New building thermal envelope assemblies that are part of the alteration shall comply with Section R402.1.2 or R402.1.4, Sections R402.2.1 through R402.2.12, R402.3.1, R402.3.2, R402.4.3 and R402.4.5. In no case shall the R-value of insulation be reduced or the U-factor of a building thermal envelope assembly be increased as part of a building thermal envelope alteration.

**Exception:** The following alterations shall not be required to comply with the requirements for new construction provided that the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
3. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
- 2.4. Roof recover.
5. ~~Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
- 3.6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided that the code does not require the glazing or fenestration assembly to be replaced.
4. An existing building undergoing alterations that is demonstrated to be in compliance with Section R405 or Section R406.

**R503.1.1.1 (N1111.1.1.1) Replacement Fenestration alterations.** Where new fenestration area is added to an existing building, the new fenestration shall comply with Section R402.3. Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for U-factor and SHGC as specified in Table R402.1.3. Where more than one replacement fenestration unit is to be installed, an area-weighted average of the U-factor, SHGC or both of all replacement fenestration units shall be an alternative that can be used to show compliance.

*Add new text as follows:*

**R503.1.1.2 (N1111.1.1.2) Roof alterations.** Roof insulation complying with Section R402.1 or an approved design shall be provided for the following roof alteration conditions as applicable:

1. An alteration to roof-ceiling construction where there is no insulation above conditioned space.
2. Roof replacement for roofs with insulation entirely above deck.

**Exception:** Where compliance with Section R402.1 cannot be met due to limiting conditions on an existing roof, the following shall be permitted to demonstrate compliance with the insulation requirements:

1. Construction documents that include a report by a registered design professional or other approved source documenting details of the limiting conditions affecting compliance with the insulation requirements.
  2. Construction documents that include a roof design by a registered design professional or other approved source that minimizes deviation from the insulation requirements.
3. Conversion of an unconditioned attic space into conditioned space, and
  4. Replacement of ceiling finishes exposing cavities or surfaces of the roof-ceiling construction to which insulation can be applied.

**R503.1.1.3 (N1111.1.1.3) Above-grade wall alterations.** Above-grade wall alterations shall comply with the following requirements as applicable:

1. Where interior finishes are removed exposing wall cavities, the existing cavity shall be filled with existing or new insulation complying with Section R303.1.4;
2. Where exterior wall coverings and fenestration are removed and replaced for the full extent of any exterior wall assembly, continuous insulation shall be provided where required in accordance with Section R402.1 or an approved design;
3. Where Items 1 and 2 apply, the entire wall assembly shall be insulated in accordance with Section R402.1; and
4. Where new interior finishes or exterior wall coverings are applied to the full extent of any exterior wall assembly of mass construction, insulation shall be provided where required in accordance with Section R402.1 or an approved design.

Where any of the above requirements are applicable, the above-grade wall alteration shall comply with the insulation and water vapor retarder requirements of Section R702.7 of the *International Residential Code*. Where the exterior wall coverings are removed and replaced, the above-grade wall alteration shall comply with the water and wind resistance requirements of Section R703.1.1 of the *International Residential Code*.

**R503.1.1.4 (N1111.1.1.4) Floor alterations.** Where an alteration to a floor or floor overhang exposes cavities or surfaces to which insulation can be applied and the floor or floor overhang is part of the building thermal envelope, the floor or floor overhang shall be brought into compliance with Section R402.1 or an approved design. This requirement shall apply to floor alterations where the floor cavities or surfaces are exposed and accessible prior to construction.

**R503.1.1.5 (N1111.1.1.5) Below-grade wall alterations.** Where a below-grade space is changed to conditioned space, the below-grade walls shall be insulated where required in accordance with Section R402.1. Where the below-grade space is conditioned space and a below-grade wall is altered by removing or adding interior finishes, it shall be insulated where required in accordance with Section R402.1.

**R503.1.1.6 (N1111.1.1.6) Air barrier.** Building thermal envelope assemblies altered in accordance with Section R503.1.1 shall be provided with an air barrier in accordance with Section R402.4. The air barrier shall not be required to be made continuous with unaltered portions of the building thermal envelope. Testing requirements of Section R402.4.1.2 shall not be required.

Add a new footnote to Tables R402.1.2 and Table R402.1.3 as follows (portions of tables not shown are unchanged):

TABLE R402.1.2  
MAXIMUM ASSEMBLY U-FACTORS\* AND FENESTRATION REQUIREMENTS

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>1</sup>	SKYLIGHT U-FACTOR	GLAZED FENESTRATION SHGC <sup>2,3</sup>	CEILING U-FACTOR <sup>4</sup>	WOOD FRAME WALL U-FACTOR	MASS WALL U-FACTOR <sup>5</sup>	FLOOR U-FACTOR	BASEMENT WALL U-FACTOR	CRAWL SPACE WALL U-FACTOR
...									

<sup>g</sup> Roofs with insulation entirely above deck shall comply with Section C402.2.1 and the "Group R" U-factors of Table C402.1.4.

**TABLE R402.1.3  
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT\***

CLIMATE ZONE	FENESTRATION U-FACTOR <sup>(1)</sup>	SKYLIGHT <sup>2</sup> U-FACTOR	GLAZED FENESTRATION SHGC <sup>(3,4)</sup>	CEILING R-VALUE <sup>5</sup>	WOOD FRAME WALL R-VALUE <sup>6</sup>	MASS WALL R-VALUE <sup>6</sup>	FLOOR R-VALUE	BASEMENT <sup>(4)</sup> WALL R-VALUE	SLAB <sup>6</sup> R-VALUE & DEPTH	CRAWL SPACE <sup>(4)</sup> WALL R-VALUE
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**Roofs with insulation entirely above deck shall comply with Section C402.2.1 and the "Group R" R-values of Table C402.1.3.**

**Reason (Revisions):** This revised REPI-150 proposal coordinates with action taken by the Commercial Building Envelope Subcommittee on proposals CEPI-225 and CEPI-17. Included are new and revised definitions in coordination with a new exception added in Section R503.1.1.2, Item 2 to provide flexibility in addressing roof replacements with insulation entirely above deck. A related revision provides appropriate reference to R-value and U-factor requirements for these types of roof systems which currently are not addressed in the residential energy provisions, yet are commonly used for 3-story or lower multi-family buildings which have roof types no different than used on 4-story or taller multi-family buildings covered under the commercial energy provisions. Finally, some clarifying wording was added to Section R503.1.1.3 at the request of the IECC Residential Existing Buildings Committee resulting in a 5-0 (non-quorum) vote in support of REPI-150 as modified.

**Cost Impact (Revisions):** The revisions to REPI 150 will decrease the cost of construction. The revisions provide flexibility and help avoid impractical requirements being applied to existing building alterations, particularly for roof replacements and above-grade wall alterations. Thus, depending on the existing building conditions and the particular alterations being performed, the overall revised REPI-150 proposal may actually lower cost.

**Reason (Original Proposal):** Existing building alterations are perhaps one of the primary opportunities to reduce national energy consumption, yet Chapter 5 does little to address this need. There are many opportunities to cost-effectively improve energy efficiency of the existing building stock by use of reasonable criteria to trigger (or avoid) requirements with flexibility in the manner or extent of compliance where needed. This proposal attempts to strike that balance in a practical and cost-effective manner for building envelope assemblies of existing buildings that are undergoing specific types of alterations. Consequently, this proposal will help to address the 40% of national energy use that is attributed to the existing building stock and will only apply where alterations are proposed that provide opportunity to improve the performance of the existing building stock. A similar coordinated proposal was also submitted for the IECC-C committee.

Key changes made in this proposal are summarized as follows:

1. The revisions to charging language in Section R503.1.1 are made to be consistent with commercial building provisions in C503.2.
2. A clause is added to Section R503.1.1 to prevent reduction in existing building thermal envelope insulation levels as is included in the IECC provisions.
3. Exceptions 2 and 3 of Section R503.1.1 are deleted as they are now addressed and preserved within requirements in new subsections for above-grade walls, floors, and roofs.
4. Existing exception 5 of Section R503.1.1 is deleted because it is a requirement (not an exception) that is now moved to new Section R503.1.1.2 for roof alterations.
5. New exception 4 is added to Section R503.1.1 to provide the flexibility of a "whole" existing building compliance path using the existing total building performance and ERI paths in Sections R405 and R406. This would be most applicable to extensive or multiple alterations as may occur in a building renovation.
6. Section 503.1.1.1 for fenestration replacements is modified to address fenestration alterations including both added fenestration and fenestration replacements as both are also addressed in the IECC-C provisions for existing buildings and are relevant to existing residential building alterations.
7. A new Section R503.1.1.2 is provided to address multiple types of roof alterations to identify conditions where it is appropriate to provide insulation (if not already present).
8. A new Section R503.1.1.3 is provided for above-grade wall alterations which identifies conditions where it is appropriate and practical to provide insulation (if not already present). Language is also provided to ensure coordination with building code moisture control requirements which require integration with and can influence the method of complying with the insulation requirements.

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9. A new Section R503.1.1.4 is provided for floor alterations and takes an approach similar to that done for above-grade walls (although with fewer conditional requirements).

10. A new Section R503.1.1.5 is provided for below-grade wall alterations. This captures the cases where a below-grade space (e.g., basement) is being converted to conditioned space and where basement walls are altered and the basement is already conditioned.

11. Finally, new Section R503.1.1.6 is provided to address air barrier installations in altered building thermal envelope assemblies. However, it is made clear that continuity of the air barrier is not required with unaltered portions of the building thermal envelope as that would cause the alteration to extend beyond its intended scope. It also is made clear that whole building air leakage testing is not required.

**Cost Impact:** The code change proposal will increase the cost of construction.

Where requirements are triggered and where upgrades in energy efficiency were not already planned for an alteration, this proposal will increase cost for a limited set of envelope alteration activities for existing buildings. Some existing requirements such as roof replacements and filling of exposed stud cavities remain unchanged. For those existing buildings with deficient insulation levels (or no insulation) and where planned alterations allow that deficiency to be addressed efficiently, the cost-benefits are expected to closely align with that for new buildings. However, it is not possible to conduct a simple cost-benefit analysis for existing buildings because of the multitude of variables involved and the flexibility provided in this proposal that make it nearly impossible to quantify with any reasonable level of certainty. Thus, we consider these proposed provisions to be cost-effective by judgment as these types of existing building thermal envelope upgrades are currently being used in the existing building/remodeling/renovation market, although not consistently or in an enforceable manner. In addition, the current charging language in Section R503.1.1 requires compliance with insulation requirements for new buildings for all alterations, barring only those few exceptions. Now, this proposal provides requirements that also provide flexibility in means of compliance for the many alterations that are currently not included in exceptions to Section 503.1.1. For these cases, this proposal could be considered to reduce cost.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	RECPI-2-21 change to townhome in footnote h
CDP ID #	590
Code	IECC RE
Code Section(s)	R405.4.2(1) table CCC New Section n
Location	base
Proponent	Jeff Shapiro jeff.shapiro@intlcodeconsultants.com
Proposal Status	SC rev
Subcommittee	RE Admin
Subcommittee Notes	
Recommendation	Approval
Vote	4-0-1
Recommendation Date	4/5/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <input checked="" type="checkbox"/> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	CEPI-011-21 Part II    Attic definition
CDP ID #	338
Code	IECC RE
Code Section(s)	R202    New Section n
Location	base
Proponent	Darren Meyers    dmeyers@ieccode.com
Proposal Status	SC rev
Subcommittee	RE Admin
Subcommittee Notes	
Recommendation	Disapproval
Vote	4-0-1
Recommendation Date	4/5/22
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee <input checked="" type="checkbox"/> _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-077-21     Duct Insulation
CDP ID #	464
Code	IECC RE
Code Section(s)	R403.3, TABLE R403.6.2, R403.3.2, R403.3.3, TABLE R402.1.2, R403.3.3.1, TABLE R405.4.2(1)    New Section y
Location	base
Proponent	David Springer     iecc-ducts2@2050partners.com
Proposal Status	SC rev
Subcommittee	RE Envelope
Subcommittee Notes	Presented David Bixby HVACR WG to reject the Original proposal
Recommendation	David Bixby presented WG- Proponent Mark Lyles – Shilpa Surana agreeing to reject this Proposal- Subcommittee vote is to reject this “Original proposal with a count of 11 to reject – Reason statement- This Proposal should be revisited with the next code cycle
Vote	11 for with 1 abstain
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ___ x _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____  To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-079-21     Ducts in Conditioned Space
CDP ID #	551
Code	IECC RE
Code Section(s)	R403.3.2    New Section n
Location	Base
Proponent	Craig Conner <a href="mailto:craig.conner@mac.com">craig.conner@mac.com</a>
Proposal Status	SC rev
Subcommittee	RE HVACR & WH
Subcommittee Notes	Presented HVACR WG Chair David Bixby- accept as written to approve
Recommendation	David Bixby presented the proposal from the WG as Chair/ second Sonny Richardson – vote 12 yes/ zero NO/ no abstentions – approved as written
Vote	subcommittee vote to approve “as written” 12 yes/ zero NO/ no abstention
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ____ yes _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	





## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-082-21     Ducts buried within ceiling insulation
CDP ID #	556
Code	IECC RE
Code Section(s)	R403.3.3, N1103.3.3    New Section n
Location	base
Proponent	Craig Conner     craig.conner@mac.com
Proposal Status	SC rev
Subcommittee	RE HVACR & WH
Subcommittee Notes	David Bixby WG Chair presented the “as modified proposal” vote 12 unanimous
Recommendation	David Bixby presented this Proposal “As modified” for the subcommittee to approve – Modified Restore 3A in item 3 and add item 4 Motion David Bixby/ second Dean Potter - subcommittee sends to IECC committee to approve this Proposal  3. In Climate Zones 0A, 1A, 2 and 3A, the supply ducts shall be completely....
Vote	12 voting members motion – Proposal passed unanimously
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ____ yes _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____  To Subcommittee _____

Date	
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**R403.3.3 (N1103.3.3) Ducts buried within ceiling insulation.** Where supply and return air ducts are partially or completely buried in ceiling insulation, such ducts shall comply with all of the following:

1. The supply and return ducts shall have an insulation *R*-value not less than R-8.
2. At all points along each duct, the sum of the ceiling insulation *R*-value against and above the top of the duct, and against and below the bottom of the duct, shall be not less than R-19, excluding the *R*-value of the duct insulation.
3. In Climate Zones 0A, 1A, 2A and 3A, the supply ducts shall be completely buried within ceiling insulation, insulated to an *R*-value of not less than R-13 and in compliance with the vapor retarder requirements of Section 604.11 of the International Mechanical Code or Section M1601.4.6 of the International Residential Code, as applicable.

**Exception:** Sections of the supply duct that are less than 3 feet (914 mm) from the supply outlet shall not be required to comply with these requirements.

4. ~~In Climate Zones 0A, 1A, 2A and 3A when installed in a sealed attic with vapor diffusion port, the supply ducts shall be completely buried within ceiling insulation, insulated to an *R*-value of not less than R-8 and in compliance with the vapor retarder requirements of Section 604.11 of the International Mechanical Code or Section M1601.4.6 of the International Residential Code, as applicable.~~

~~**Exception:** Sections of the supply duct that are less than 3 feet (914 mm) from the supply outlet shall not be required to comply with these requirements.~~

- 4.1. ~~Air permeable insulation installed in sealed attics shall be in compliance with the requirements of Section R806.5.2 of the International Residential Code.~~



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-083-21    Ducts deeply buried
CDP ID #	553
Code	IECC RE
Code Section(s)	R403.3.3.1, N1103.3.3.1    New Section n
Location	base
Proponent	Craig Conner    craig.conner@mac.com
Proposal Status	SC rev
Subcommittee	RE HVACR & WH
Subcommittee Notes	David Bixby presented this Proposal from the HVACR WG- Craig Connor Proponent supported the motion to approve
Recommendation	David Bixby Presented and made the motion to accept this Original Proposal- second Sonny Richardson- Vote to approve 12 unanimous motions carried
Vote	12 members voting unanimous/ zero NO votes/ no abstentions
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee __yes _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____ To Subcommittee _____
Date	



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-097-21    Ventilation Sampling for multifamily
CDP ID #	522
Code	IECC RE
Code Section(s)	R403.6.3, R403.6.4 (New)    New Section y
Location	base
Proponent	Aaron Gary    aaron.gary@texenergy.org
Proposal Status	SC rev
Subcommittee	RE HVACR & WH
Subcommittee Notes	Aaron Gary presented the "As Modified Proposal to approve, with a lot of discussion a motion was made from a subcommittee voting member to disapprove – from that point on the committee appeared to lean against the Proposal – Aaron Gary reminded the subcommittee that previously the subcommittee approved Proposal REPI-085 which is similar to this Proposal-
Recommendation	Subcommittee vote is to disapprove this "As modified" Proposal and send the vote count and recommendation to the IECC Consensus committee for a vote
Vote	Vote to disapprove 6 yes, 5 no and 1 abstention
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ____ yes _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____  To Subcommittee _____
Date	

Proposed modification

## REPI-97-21 MOD1

IECC®: R403.6.3, R403.6.4 (New)

### Proponents:

Aaron Gary, representing Self ([aaron.gary@texenergy.org](mailto:aaron.gary@texenergy.org))

### 2021 International Energy Conservation Code

#### R403.6.3 Testing.

Each ~~M~~mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6. Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts. Where required by the code official, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.

**Exceptions:** The following systems are exempt:

1. Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.
2. Where tested in accordance with R403.6.4, testing of each mechanical ventilation system is not required.

#### **R403.6.4 Dwelling Unit Sampling for R2 multifamily dwelling units.**

~~For buildings with eight or more *dwelling units testing units* complying with R403.6.3, the mechanical ventilation systems in the greater of seven units or 20 percent of the *dwelling units testing units* in the building shall be tested, including a top floor unit, a ground floor unit, a middle floor unit, and the *dwelling unit* a unit with the largest testing unit *conditioned floor area*. For each tested unit Where buildings have fewer than eight *dwelling units testing units*, each *dwelling unit testing unit* shall be tested. Where the ventilation flow rate of a mechanical ventilation system is less than the ~~that does not meet~~ the minimum permitted ventilation flow rate, corrective actions shall be made to the system and the system retested unit it passes. For each *dwelling unit* that has less ventilation airflow rate than the minimum permitted airflow rate, an additional three units, including the corrected unit shall be tested, including a mixture of testing unit types and locations. Where buildings have fewer than eight testing units, each testing unit shall be tested.~~

Where buildings qualify under the scope of Section R101.2 of the International Residential Code, each mechanical ventilation system in each dwelling unit shall be tested.



## International Energy Conservation Code Code Change Proposal Tracking Sheet

Proposal #	REPI-099-21     Electric resistance zone heat unit
CDP ID #	330
Code	IECC RE
Code Section(s)	R403.7.1    New Section y
Location	base
Proponent	David Baylon     david@davidbaylon.com
Proposal Status	SC rev
Subcommittee	RE HVACR & WH
Subcommittee Notes	Proponent David Baylon and Kevin Rose presented this proposal. Motion subcommittee member to disapprove this Proposal
Recommendation	Proposal presented subcommittee made a motion and second to disapprove this "AS modified" proposal. The overall argument to disapprove found the "As modified" Proposal to be incomplete, over reaching across climate zone. The proposal is not ready and may need more work.
Vote	Vote 7 to disapprove, 4 NO to disapproval with 1 abstention
Recommendation Date	4/4/2022
Next Step	To Subcommittee _____ To Advisory Group _____ To Consensus Committee ___ yes _____
Consensus Committee	
Committee Response	
Vote	Affirmative _____ Negative _____ Table _____  To Subcommittee _____
Date	

## REPI-99 [revised]

**R403.7.1 Electric resistance zone heated units.** All detached one- and two-family dwellings and ~~multiple single-family dwellings (townhouses)~~ in Climate Zones 4-8 up to three stories in height above grade plane using electric resistance zonal heating as the primary heat source and not having central cooling or heating shall install an inverter-driven *ductless mini-split heat pump* in the largest zone in the dwelling. The heat pump shall meet the performance requirements in Table C403.3.2(2). Building permit drawings shall specify the heating equipment type and location of the heating system.

**Exception:** Total installed heating capacity of 2 kW per dwelling or less.

New definitions:

**Zonal Heating:** A heating system in which each *zone* or room has a separate heater with a single controller in each *zone*.

**Ductless Mini-Split Heat Pump System.** A heating and cooling system that is comprised of one or multiple indoor evaporator units and an outdoor condenser unit that is connected by refrigerant piping and electrical wiring. A ductless mini-split system is capable of cooling or heating one or more rooms without the use of a central ductwork system.