

Text modifying original proposal

Text deleted from original proposal

## REPI-150-21 (Modification)

IECC®: R503.1.1, R503.1.1.1, R503.1.1.2 (N1111.1.1.2) (New), 503.1.1.3 (N1111.1.1.3) (New), R503.1.1.4 (N1111.1.1.4) (New), R503.1.1.5 (N1111.1.1.5) (New), R503.1.1.6 (N1111.1.1.6) (New)

Proponents: Jay Crandell, P.E., ABTG/ARES Consulting, representing Foam Sheathing Committee of the American Chemistry Council (jcrandell@aresconsulting.biz)

## 2021 International Energy Conservation Code

Add new definition 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 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 any of the following roof alteration conditions as applicable:

1. Sheathing or insulation is exposed during reroofing and the roof assembly has no insulation and is above conditioned space.
2. Roof replacements where the existing roof covering is removed and where the existing roof assembly contains for roofs with insulation entirely above the roof 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 an approved source documenting details of the limiting conditions affecting compliance with the insulation requirements.

**2. Construction documents that include a roof design by an approved source that minimizes deviation from the insulation requirements.**

3. Conversion of an unconditioned attic space into conditioned space, and/or
4. Replacement of ceiling finishes exposing cavities or surfaces of the roof assembly to which insulation can be applied.

**503.1.1.3 (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 cavity shall be filled with existing or new insulation complying with Section R303.1.4;
2. Where exterior wall coverings 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.

**Reason (for AS MODIFIED):** This modified proposal includes important modification to REPI-150 proposal that follows the proposed provisions in the commercial energy code. REPI-150 establishes an important framework for roof alterations under Section R503.1.1.2 (N1111.1.1.2) allowing exception to the roof replacement with insulation entirely above the roof deck to be included. This provision could not be included without the broader framework offered by REPI-150. The proposed modification correlates the proposed provisions in the residential and the commercial energy code.

**Cost Impact (MODIFICATION ONLY):** The modification will reduce the cost of construction compared to the original proposal. The exception language for roof alterations creates a reasonable process (use of an approved source with expertise in roofing design) to approve an alternative roof insulation design. The approved design will cost-effectively achieve the maximum level of compliance with the envelope requirements for roofs with limiting conditions.

**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.
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.