



Tapered insulation R-value

A new approach in the energy code provides a revised basis for determination

by Mark S. Graham

A frequent question NRCA's Technical Services staff receives is: How is the R-value of a tapered insulation system determined for code-compliance purposes? Although the International Energy Conservation Code® provides some guidance, the answer depends on the edition of the energy code that applies to the project.

IECC 2018 and previous editions

Up to and including IECC 2018, above-roof deck tapered roof insulation only had been addressed vaguely.

IECC 2018, Exception 1 to Section C402.2.1-Roof Assembly indicates that where insulation thickness varies by 1 inch or less, an area-weighted U-factor is equivalent to the same assembly with the minimum R-value required by the code. In IECC 2015 and 2018, an additional statement indicates this also is intended to address above-roof deck tapered insulation.

The code's commentary provides some useful information for interpreting and using this exception. The 2018 *IECC Code and Commentary* explains when this exception is applied, the variation in tapered insulation thickness for energy code compliance purposes is limited to 1 inch. This 1-inch limitation does not prevent the provision

from being applied to tapered insulation systems that have greater variations; it simply does not allow additional insulation thickness to be factored into the average insulation calculation.

For example, if the thickness variation of a tapered insulation system exceeds 1 inch, it is permissible to determine the R-value at the low point. But the R-value also should be determined where the tapered insulation thickness is 1 inch thicker than the low point. The remaining portions of the roof would be assumed to have the same R-value as the area-weighted R-value for the roof.

Based on this example, for a 1/4-inch-per-foot tapered insulation system, the tapered insulation will be 1 inch thicker 4 feet away from the low point. The remaining thickness of tapered insulation provides no benefit for energy code compliance purposes.

IECC 2021

In IECC 2021, the code's requirements for addressing R-values of tapered insulation systems changed.

IECC 2021's Section C402.2.1.1-Tapered, Above-Deck Insulation Based on Thickness indicates when tapered insulation is used as a component of a roof-ceiling assembly R-value calculation, the tapered insulation's R-value contribution to that calculation must use the average thickness in inches along with the

“The method for determining the R-value of tapered insulation depends on the edition of the energy code”

material R-value per inch to comply with the minimum R-value required by the code.

Section C402.2.1.2-Minimum Thickness, Low Point indicates the minimum thickness of above-deck roof insulation at its lowest point, gutter edge, roof drain or scupper must be not less than 1 inch.

IECC 2021's new approach allows building owners to take advantage of the added energy efficiency of tapered insulation beyond the “1 inch thicker than the low point” prescriptive requirement in the code's previous editions.

In some instances, this new approach may allow for the use of less flat-stock fill material beneath tapered insulation systems to achieve the code's minimum R-value requirements.

NRCA was the proponent of the code change proposal that allows the use of the average R-value method.

Closing thoughts

The method for determining the R-value of tapered insulation systems for energy code compliance depends on the specific edition of the energy code that applies to the project.

Although the method prescribed in IECC 2018 and previous editions was ambiguous and often difficult to interpret, the new method in IECC 2021 is clearer and easier to understand. It is also how most tapered insulation suppliers report R-values on their drawings.

For IECC 2024, which has not yet been finalized, the average R-value method will remain for tapered insulation systems with some minor rewording and reformatting. Also, a clarifying statement is proposed indicating the average thickness of roof insulation should

be equal to the total volume of the roof insulation divided by the roof's area. This often is referred to as the “volumetric method.”

Additional information about tapered insulation systems for use in low-slope membrane roof systems is provided in *The NRCA Roofing Manual: Membrane Roof Systems—2019*, Chapter 4-Rigid Board Insulation, Section 4.14-Tapered Insulation, pages 158-169. 📖🔗

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ASTM International signs memorandum with Argentina

ASTM International and Argentina's national standards body, El Instituto Argentino de Normalización y Certificación (IRAM), have signed a Memorandum of Understanding. IRAM, a non-profit private civil association, coordinates the development of standards in Argentina.



ASTM International will focus on enhancing communications to build government and industry awareness of ASTM International as a trusted technical source of information that supports public health and safety, trade and the overall quality of life; encouraging collaboration regarding topics of mutual interest; and promoting standards education and related activities for students and professors. In addition, Argentinian stakeholders will be invited to participate in ASTM International technical committees to ensure ASTM International standards meet and support Argentina's local and global needs for public and private entities and consumers.

Help your employees adapt to new technology

When your company is looking to implement new technology, it is important to help your team realize the benefits, according to forconstructionpros.com.

Employees must understand the new processes and what will change in their daily lives once the technology is implemented. Following are some key factors to help your team adapt.

- **Start small.** Begin with a small rollout to help identify difficulties and questions before all staff becomes involved. Start with tech-savvy employees so they can pinpoint challenges they see with the rest of the team. But you also should choose one or two people with little technology experience who can work alongside the savvy team members to better understand how the technology works. When you roll it out to larger groups, trained members can help answer questions and give advice.
- **Choose a team champion.** Choose someone on the team to be an advocate and expert regarding the technology and function as a go-between for the vendor and company. The team champion should have leadership skills and be a problem solver.
- **Set expectations and goals.** Adoption rates may vary depending on employees' willingness to learn a new tool. Set clear benchmarks that measure your success during the process. Small rewards can encourage participation; for example, you can offer rewards for setting up a user account or completing a training module.
- **Invest in continuing education.** For example, in the case of new software, good training is key. The vendor often will offer some training but consider planning regular training to ensure the technology is used in the most efficient way possible and you are up to date regarding the latest features.



ANSI approves revision of low-slope roofing standard

The American National Standards Institute Board of Standards Review has approved the revision and publication of ANSI/ASSP A10.24-2022, "Roofing—Safety Requirements for Low-Sloped Roofs." The revision replaces the previous 2014 version of the standard.

The A10 committee comprises construction industry stakeholders and acknowledges this is a significant topic in the industry. The newly revised standard is available for purchase at store.assp.org.

NRCA is a member of the A10 Committee on Safety Requirements for Construction and Demolition Operations, and NRCA's enterprise risk management staff participated in the A10.24 subgroup regarding the revision.



SPRI reviews two roofing-related American National Standards

SPRI is reviewing and recanvassing two technical documents for reapproval as American National Standards. In accordance with SPRI's ANSI-approved procedures, standards are reviewed and reapproved every five years.

SPRI is in the process of reviewing ANSI/SPRI/FM 4435/ES-1, "Test Standard for Edge Systems Used with Low Slope Roofing Systems." The standard prescribes methodology for testing roof edge assemblies, excluding gutters, to evaluate their resistances to wind loads. It was previously revised and reapproved in 2017.

Also undergoing review is ANSI/SPRI/RCI NT-1, "Detection and Location of Latent Moisture in Building Roofing Systems by Nuclear Radioisotopic Thermalization." The standard contains information regarding proper handling of nuclear-based moisture survey equipment in the field, as well as calculating and analyzing survey results. It was reaffirmed in 2017.

Individuals who wish to participate in the canvass process can contact SPRI at info@spri.org.