**CRCA Membership Luncheon**
March 11, 2014

# *Roof air barriers and insulation*

presented by

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## New minimum LTTR values

PIMA Quality Mark[cm] program (minimum values)

| Revised LTTR values | | |
|---|---|---|
| **Thickness (inches)** | **New LTTR values per inch thickness** | **New LTTR values per thickness** |
| 1 | 5.6 | 5.6 |
| 2 | 5.7 | 11.4 |
| 3 | 5.8 | 17.4 |
| 4 | 5.9 | 23.6 |

"Tech today," *Professional Roofing,* August 2013

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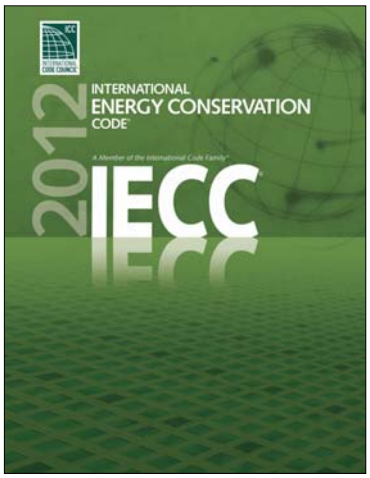
## *International Energy Conservation Code, 2012 Edition* (IECC 2012)

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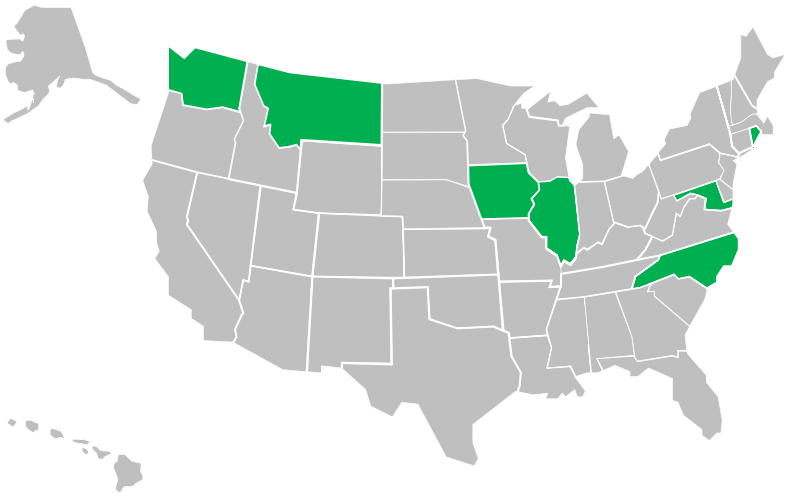
## Status of states' adoptions

Adoption of IECC 2012 before May 17, 2014



## Roofing-specific adaptation of Table R402.1.1

*International Energy Conservation Code, 2012 Edition*

| Insulation and Fenestration Requirements by Component[a] | |
|---|---|
| **Climate zone** | **Ceiling R-value** |
| 1 | 30 |
| 2 | 38 |
| 3 | |
| 4 | 49 |
| 5 | |
| 6 | |
| 7 | |
| 8 | |

[a] R-values are minimums. …
[Other footnotes omitted for clarity]

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## Roofing-specific adaptation of Table C402.2

*International Energy Conservation Code, 2012 Edition*

| Opaque Thermal Envelope Assembly Requirements | | | |
|---|---|---|---|
| **Climate zone** | **Roof assembly configuration** | | |
| | **Insulation entirely above deck** | **Metal buildings (with R-5 thermal blocks)** | **Attic and other** |
| 1 | R-20ci | R-19 + R-11 LS | R-38 |
| 2 | | | |
| 3 | | | |
| 4 | R-25 ci | | |
| 5 | | | |
| 6 | R-30ci | R-25 + R-11 LS | R-49 |
| 7 | R-35ci | R-30 + R-11 LS | |
| 8 | | | |

ci = Continuous insulation
LS = Liner system (a continuous membrane installed below the purlins and uninterrupted by framing members; uncompressed, faced insulation rests on top of the membrane between the purlins)

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## R-value determination

IECC 2012, Section C303.1.4-Insulation Product Rating

**C303.14 Insulation product rating.** The thermal resistance (R-value) of insulation shall be determined in accordance with the U.S. Federal Trade commission R-value rule (CFR Title 16, Part 460) in units of h x $ft^2$ x °F/Btu at a mean temperature of 75°F (24°C).

What about tapered insulation?

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## Tapered insulation

*International Energy Conservation Code, 2012 Edition*

**C402.2.1 Roof assembly.** The minimum thermal resistance (R-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

**Exceptions:**

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U-factor is* equivalent to the same assembly with the *R-value* specified in Table C402.2.
2. …

IECC Commentary indicates Exception 1 applies to tapered insulation systems.

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## 2012 IECC Code and Commentary

Tapered insulation

"…The exception to this section permits a roof that is "continuously insulated" to have areas that do not meet the required *R*-values, provided that the area-weighted values are equivalent to the specified insulation values. This type of insulation referred to as tapered insulation is where the roof insulation varies to provide slope for drainage…."

[continued…]

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## 2012 IECC Code and Commentary

Tapered insulation

"…This 1-inch (25 mm) limitation does not prevent the provisions from being applied to roofs that have a greater variation; it simply does not allow the additional thickness to be factored into the average insulation values. Where the variation exceeds 1 inch (25 mm), it would be permissible to go to the thinnest spot and measure the *R*-value at that point (for the example call this Point "a"). Then go to a point that is 1 inch (25 mm) thicker than Point "a" and measure the *R*-value there (for the example, call this Point "b"). The remaining portions of the roof that are thicker than the additional 1-inch (25 mm) portion (Point "b") would simply be assumed to have the same *R*-value that Point "b" had. All portions of the roof that meet or exceed the Point "b" *R*-value would simply use the Point "b" *R*-value when determining the area weighted *U*-factor for the roof. "

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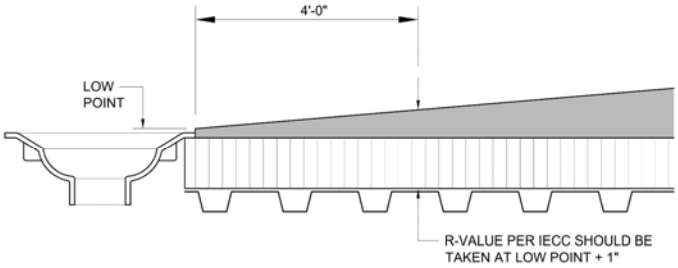
## Graphically depicted…

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## So….

- Do increased R-values make sense?
- Is there a realistic payback?

…we've done some calculations

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## In a heating climate

10,000 sq. ft. single-story building in Chicago, IL

| R-value increase | Annual Btu savings | Payback time |
|---|---|---|
| R-10 to R-15 | 58,340,933 Btu | 9.6 years |
| R-15 to R-20 | 32,175, 508 Btu | 16.3 years |
| R-20 to R-25 | 18,512,379 Btu | 29.7 years |
| R-25 to R-30 | 13,047,818 Btu | 64.7 years |

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