ROXUL® The Better Insulation™

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History of roof insulation in North America

presented by

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NRCA

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Some history…

Two distinct time periods:

- Pre-1970s
- 1970s and after

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Pre-1970s

- In commercial buildings, roof insulation was an exception instead of the norm
- In residential buildings, minimum poured-in or batt insulation was used in attics

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Some more recent history

- 1973: Arab states' oil embargo
- 1974: NBS Interim Report 74-452
  - NCSBC request of ASHRAE to develop a standard
- 1975: ASHRAE 90-75
- 1977: CABO Model Energy Code
- 1980: ASHRAE 90A-80
- 1989: ASHRAE 90.1-89 (commercial)

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Still some more recent history

- 1992: Energy Policy Act
  - Reduce building energy use by 50%
- 1999: ASHRAE 90.1-99
- 2000: *International Energy Conservation Code*
  - References ASHRAE 90.1-99
- 2003: *International Energy Conservation Code*
- 2006: *International Energy Conservation Code*
  - References ASHRAE 90.1-04 (13.9% improvement)

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More currently

- 2009: *International Energy Conservation Code*
  - References ASHRAE 90.1-07 (3.9% improvement)
- 2012: *International Energy Conservation Code*
  - References ASHRAE 90.1-10
  - IECC 2012 is 30% more stringent than IECC 2006
- 2015: *International Energy Conservation Code*
  - References ASHRAE 90.1-13

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Federal Register, May 17, 2012

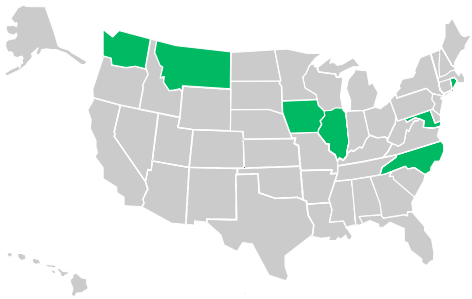
Key points:

- US DOE has determined IECC 2012 will achieve greater energy efficiency in low-rise residential buildings than IECC 2009
- States must certify by May 17, 2014 their energy code meets or exceeds the levels of IECC 2012

This typically trigger states to update their state energy code

Status of states' adoptions

Adoption of IECC 2012 before May 17, 2014



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Status of states' adoptions

Adoption of IECC 2012 before Jan. 1, 2015

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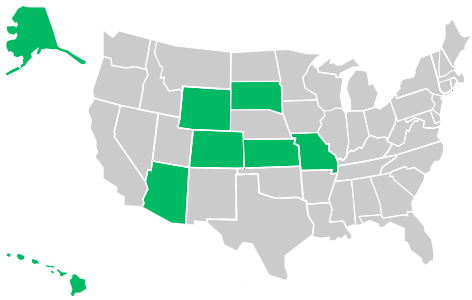
Status of states' adoptions

States without state energy codes



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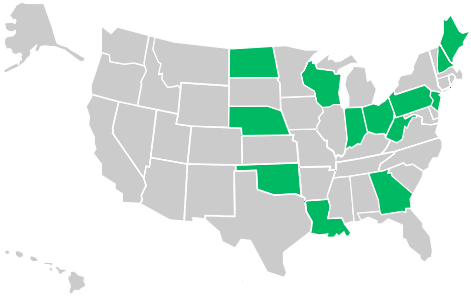
Status of states' adoptions

Do not intend to adopt IECC 2012



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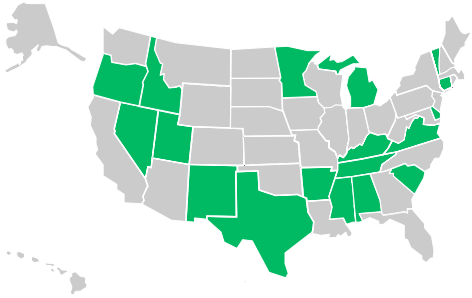
Status of states' adoptions

IECC 2012 adoption date unknown



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Beware of the status of your States' energy code adoption

www.nrca.net/Technical/EnergyCodes

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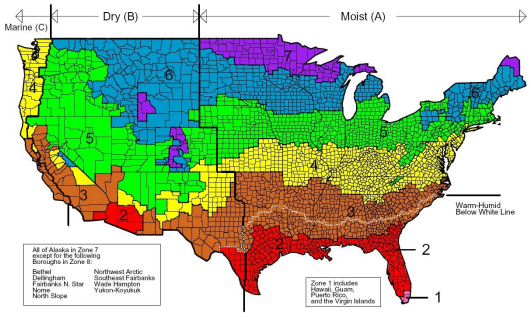
Climate zones

IECC 2012, Section C301 and Sec. R301—Climate Zones



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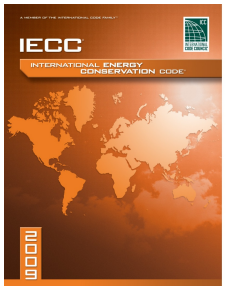
International Energy Conservation Code, 2009 Edition (IECC 2009)



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Roofing-specific adaptation of Table 402.1.1

International Energy Conservation Code, 2009 Edition (Residential buildings)

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

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

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Roofing-specific adaptation of Table 502.2(1)

International Energy Conservation Code, 2009 Edition (Commercial buildings)

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-15ci	R-19	R-30
2	R-20ci	R-13 + R-13	R-38
3			
4			
5			
6		R-13 + R-19	
7	R-25ci		
8			R-49

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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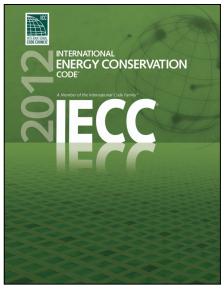
International Energy Conservation Code, 2012 Edition (IECC 2012)



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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).

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Insulation products

- Cellular glass
- Expanded polystyrene (EPS)
- Extruded polystyrene (XPS)
- Faced gypsum
- Fiber-reinforced gypsum
- Perlite
- Polyisocyanurate
- Stone wool
- Wood fiberboard

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Insulation Market

2013-14 NRCA Market Survey

Type	New construction	Reroofing
EPS	5%	8%
XPS	1%	<1%
Cellular glass	8%	11%
Gypsum (faced and reinforced)	1%	1%
Stone wool	1%	1%
Perlite	3%	3%
Polyisocyanurate	75%	69%
Wood fiberboard	6%	7%
Composite boards	1%	1%

Data based upon installed costs

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The challenges…

- The industry sells "R-value"
- Most building owners are first cost resistant
- R-value/performance needs to be redefined:
  - Real long-term R-value/thermal performance
  - Board joints (8% loss)
  - Thermal shorts (fasteners) (4-9%)
- Roxul has a very good story to tell

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