

CODES, STANDARDS, Rating Systems, AND THE ROOFING INDUSTRY

By Rebecca Cunningham, LEED AP, RA

Based on the number and type of questions received at the RCI office, there appears to be some confusion regarding “insulation above-deck” requirements in the various standards and codes. Questions asked are, “What are the current requirements?” and “When can I expect to see changes?” “What is driving these changes?” and “How can I explain the benefits to clients?” Below is a brief summary of what the current standards are and what we can expect in the future.

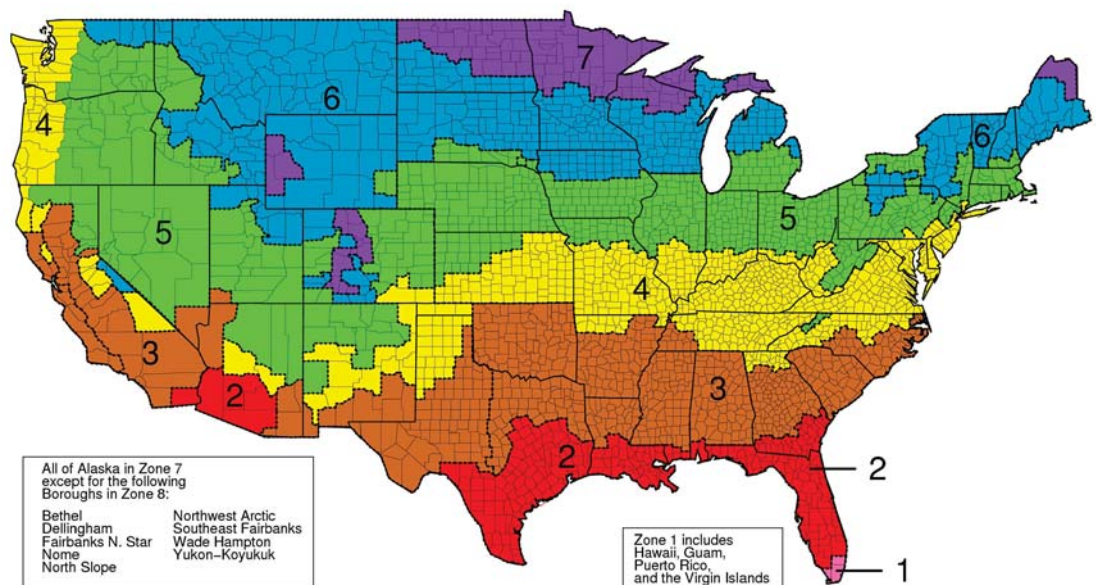
I will begin by explaining the difference among standards, codes, and rating systems. Standards are consensus-based documents, often referred to in codes and ratings, and are considered the current and minimum best-practice policy. They may or may not be adopted as mandatory. Codes are a mandatory consensus and reflect a minimum standard of care of building design and construction. Ratings intentionally exceed the minimum codes to demonstrate leader-

ship and commitment to the profession and usually earn a label of distinction. LEED® is a good example of this.

When it comes to the roofing industry, many of the questions asked are related to the requirements for roofing insulation. The current ASHRAE 90.1-2010 has prescriptive requirement revisions based on the individual climate zones. See *Table 1* and the climate zone map on this page.

These increased thermal requirements and the requirements of cool roofs in climate zones 1, 2, and 3 in ASHRAE 90.1-2010

are just two ways to help meet the 30% entire building energy savings goal established by the Department of Energy (DOE).



Climate zone map.

Climate Zone	ASHRAE 90.1-2004 (Previous)		ASHRAE 90.1-2010* (Current; same values as 2007)	
	Nonresidential/Residential		Nonresidential/Residential	
	R-value	U-Value	R-value	U-Value
Zone 1	15ci	.063	15ci	.063
Zone 2	15ci	.063	20ci	.048
Zone 3	15ci	.063	20ci	.048
Zone 4	15ci	.063	20ci	.048
Zone 5	15ci	.063	20ci	.048
Zone 6	15ci	.063	20ci	.048
Zone 7	15ci	.063	20ci	.048
Zone 8	20ci	.048	20ci	.048

*These numbers are unchanged since the ASHRAE 90.1-2007 version

ci = continuous insulation

Table 1

How do things stand now? ASHRAE Standard 90.1 is continually being updated through the addendum process. There has been an addendum proposed that would increase insulation levels, but it has not yet been approved. After committee review, the addendum will again go through the public review process. For the latest public review drafts and addenda to ASHRAE Standard 90.1, please monitor the ASHRAE standards Web page at www.ashrae.org/standards.

According to Stephen V. Skalko, chair of the standard 90.1 committee, ASHRAE 90.1-2013 aims to have an SSPC goal of 50% improvement of regulated loads and a 40% improvement of all loads relative to

ASHRAE 90.1-2004, so building envelope design will continue to become more energy-restrictive. Increased roof insulation R-values are almost certain to be included. More information can be found at: www.energycodes.gov/events/energycodes/documents/ecodes11/EC2011_model_codes_901-2013_skalko.pdf

GREEN AND SUSTAINABLE REQUIREMENTS

ANSI/ASHRAE/USGBC/IES Standard 189.1-2009, *Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings* is the jurisdictional compliance option for commercial and high-performance buildings of the

Climate Zone	ASHRAE 90.1-2010 (Baseline)		ASHRAE 189.1-2009 (Baseline)			
	Nonresidential/Residential		Nonresidential		Residential	
	R-value	U-Value	R-value	U-Value	R-value	U-Value
Zone 1	15ci	.063	20ci	.048	25ci	.039
Zone 2	20ci	.048	25ci	.039	25ci	.039
Zone 3	20ci	.048	25ci	.039	25ci	.039
Zone 4	20ci	.048	30ci	.032	30ci	.032
Zone 5	20ci	.048	30ci	.032	30ci	.032
Zone 6	20ci	.048	30ci	.032	30ci	.032
Zone 7	20ci	.048	35ci	.028	35ci	.028
Zone 8	20ci	.048	35ci	.028	35ci	.028

Table 2

International Green Construction Code (IgCC). It follows ANSI standards in model code language. It establishes minimum requirements for high-performing green buildings and covers setting design, construction, and plans for operations. Like ASHRAE 90.1, it can be applied to all buildings except low-rise residential. It can be applied to new buildings and their systems, new portions of buildings and their systems, and new systems in existing buildings.

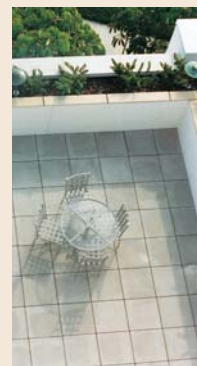
It covers the same topics as LEED® and includes commissioning, operations, and maintenance. Unlike LEED®, the standard is not a design guide or a rating system. Meeting standard 189.1 criteria does not guarantee that one will meet the minimum requirements for LEED®, but LEED® is compliant with both Standards 189.1 and 90.1.



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While there are mandatory requirements for all projects, ASHRAE 189.1 also offers a choice between prescriptive and performance paths to meet compliance. Preliminary figures from the DOE through the National Renewable Energy Laboratory have estimated that the minimum prescriptive recommendations in the standard result in an average site energy savings of 27% over Standard 90.1-2007. On October 27, 2010, Katherine Hammack, assistant secretary of the Army for installations, energy, and the environment (IE&E), issued a policy memorandum that incorporates Standard 189.1-2009. See *Table 2*.

What is the future for standard 189.1? It is tough to know what the future will hold with this standard, but it is like standard 90.1 in that it will be under continuous maintenance with addenda and public reviews. Currently, there is a standard 189.3P, titled “Design, Construction and Operation of Sustainable High Performance Health Care Facilities,” in development. It is designed to specifically address the health-care industry.

And how do these standards fit into code? The ICC International Energy Conservation Code (IECC) is the minimum energy code for commercial and residential buildings and references ASHRAE 90.1 as the equivalent compliance path for commercial buildings. It uses outcome-based performance and covers design, construction, commissioning, occupancy, and use. It is generally in track with 90.1 but with more stringent envelope provisions, including commissioning requirements for accreditation. It addresses the building envelope,

	ASHRAE 90.1-2010 (Baseline)		IECC 2012 (Baseline)	
	Nonresidential/Residential		Nonresidential/Residential	
Climate Zone	R-value	U-Value	R-value	U-Value
Zone 1	15ci	.063	20ci	.048
Zone 2	20ci	.048	20ci	.048
Zone 3	20ci	.048	20ci	.048
Zone 4	20ci	.048	25ci	.039
Zone 5	20ci	.048	25ci	.039
Zone 6	20ci	.048	30ci	.032
Zone 7	20ci	.048	35ci	.028
Zone 8	20ci	.048	35ci	.028

Table 3

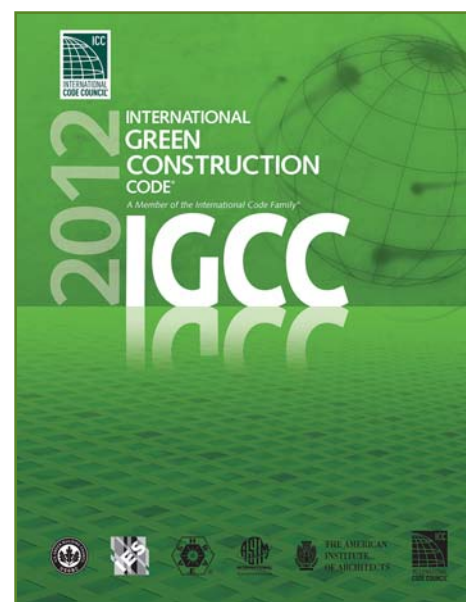
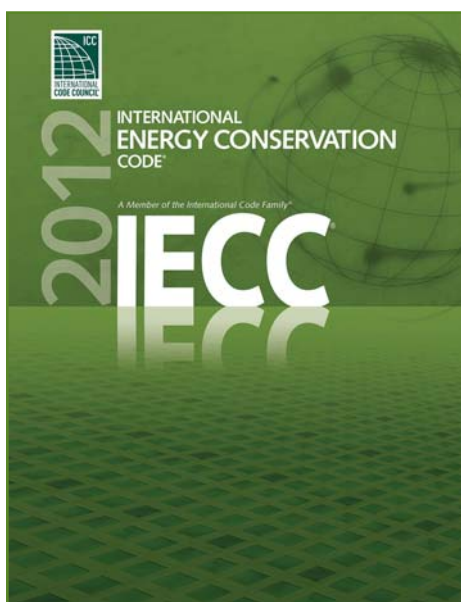
HVAC, and solar hot-water equipment, lighting, and power. Unlike ASHRAE 90.1-2010, it does not address plug-and-process loads.

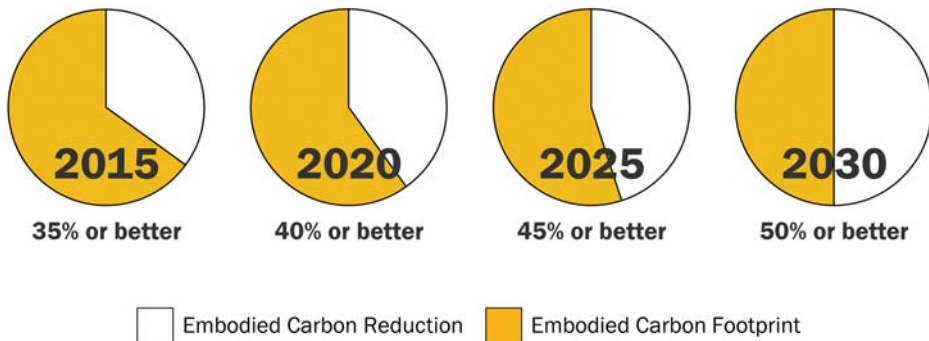
The current 2009 IECC adopted ASHRAE 90.1-2007 by reference when window-to-wall ratio (WWR) is over 40% or skylight-to-roof ratio (SRR) is over 3%. There are a few differences between the 2009 IECC and ASHRAE 90.1-2007. One is that space considered semiheated in ASHRAE 90.1 is considered heated in IECC. This accounts for more rigorous overall thermal envelope provisions. Another is that ASHRAE 90.1 considers some vertical glazing skylights; and, therefore, it has less thermal requirements than if considered vertical fenestrations by 2009 IECC. This impacts the building air-leakage testing. Another item of significance is that 2009 IECC does not have provisions for high-albedo roofs in certain climate zones. It is also important to note that IECC 2012 prescriptive R-values have been increased over 2009. See *Table 3*.

What is the future of IECC? The U.S. DOE submitted 56 code change proposals for the International Code Council’s (ICC) Code Development Cycle that will produce the 2012 I-codes. The 2012 code has an estimated energy savings of 25% over the IECC 2006/ASHRAE 90.1-2007. There are additional changes being considered that may increase this by 5%. There will be more rigorous U-factors for fenestrations and a cap on vertical fenestrations. There are minimum daylighting requirements and a vestibule required for all building entrances. The DOE is interested in keeping

Chapter 5 of the 2012 IECC aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010. There is also a movement toward net-zero measurement and Europe’s Energy Performance of Building Directives (EPBD) measurement. The future focus is on increasing energy efficiency by 50% in minimum codes and more in green/sustainable codes and standards. The adoption of ASHRAE 189.1-09 and ICC are currently in development.

The IgCC is an overlay code that works with or in tandem with administrative requirements of other I-codes. It is not designed to compete with other standards and rating systems. ASHRAE is included as an extension of IgCC. For example, the ASHRAE/USGBC/IES Standard 189.1 is included as a jurisdictional compliance





The 2030 Challenge for Products

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Architecture 2030 challenge graphic.

option. IgCC codifies the minimum tenets of sustainability and acts as a driving force for sustainable practice. It also addresses the Architecture 2030 challenge, which has the following targets:

- All new buildings, developments, and major renovations be designed to meet a fossil-fuel, greenhouse-gas-emitting, energy-consumption performance standard of 50% of the regional (or country) average for that building type.
- At a minimum, an area of existing building equal to that of new construction be renovated annually to meet a fossil-fuel, GHG-emitting, energy-consumption performance standard of 50% of the regional (or country) average for that building type.
- The fossil fuel reduction standard for all new buildings be increased to:
 - 60% in 2010
 - 70% in 2015
 - 80% in 2020
 - 90% in 2025
 - Carbon-neutral by 2030 (zero fossil-fuel, GHG-emitting energy to operate).

This may be accomplished through innovative design strategies, application of renewable technologies, and/or the purchase (maximum of 20%) of renewable energy.

The IgCC is customizable to the geopolitical and economic climates and codes of the locality and has minimum and advanced levels of performance and prescriptive options. Jurisdictions indicate 0 to 14 as the minimum number of project electives with which one must comply to a total of 60 electives, and the owner /designer chooses specific electives for compliance. The IgCC addresses building performance in terms of total net annual energy use, peak demands, and carbon emissions. It is tied to energy performance and has a minimum of a 15% energy-saving requirement over 2012 IECC. The provisions in the new 2012 IgCC were completed during the Final Action Hearing on October 31, 2011, in Phoenix, AZ. This new 2012 code will be available in the spring of 2012.

To see which standards and codes are currently impacting your jurisdiction, the U.S. DOE has an excellent spreadsheet at www.energycodes.gov/states/state_status_full.php.

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