24: International Energy Conservation Code 2018

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in collaboration with
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DEVIL'S DETAIL

PHILADELPHIA LEADS ENERGY CODE ADOPTION

In big news, Philadelphia has become the first major city in the U.S. to adopt the 2018 International Energy Conservation Code® (IECC®) for commercial buildings. Why is this big news? For one thing, state and local jurisdictions can lag far behind the most current editions of the codes. The regulatory process can move slowly, and it may be years before an update is adopted. Philadelphia's rapid adoption demonstrates the city's commitment to energy conservation and reduced pollution.

While Philadelphia adopted the 2018 IBC for commercial buildings (with an option to use ASHRAE 90.1-2016), residential buildings follow the 2015 IECC. In New Jersey, commercial buildings follow ASHRAE 90.1-2013, while residential buildings must comply with the 2015 IBC. In Delaware, commercial buildings follow the 2012 IECC or ASHRAE 90.1-2010, and residential building requirements are based on the 2012 IECC. Although many of the requirements may be the same, it is important to know the differences from one edition to another in order to determine compliance.

The intents of both the IECC and ASHRAE 90.1 are to establish minimum requirements for energy-efficient buildings using prescriptive or performance-related provisions. The IECC addresses both commercial and residential buildings with separate requirements, while ASHRAE 90.1 addresses commercial buildings only. Many voluntary compliance programs, such as LEED® and Green Globes®, refer to these standards as a means of determining performance beyond the minimum requirements. Designers, builders, facilities managers, and government agencies rely on the IECC and ASHRAE 90.1 to determine their own energy performance goals.

INTERNATIONAL ENERGY CONSERVATION CODE

The International Energy Conservation Code (IECC) was created by the International Code Council in 2000 as a model code. It has been adopted by many states and municipal governments in for the establishment of minimum design and construction requirements for energy efficiency. Learn more at the IECC Resource Page:
https://www.iccsafe.org/advocacy/international-energy-conservation-code-resource-page/

MORE ON THE IECC

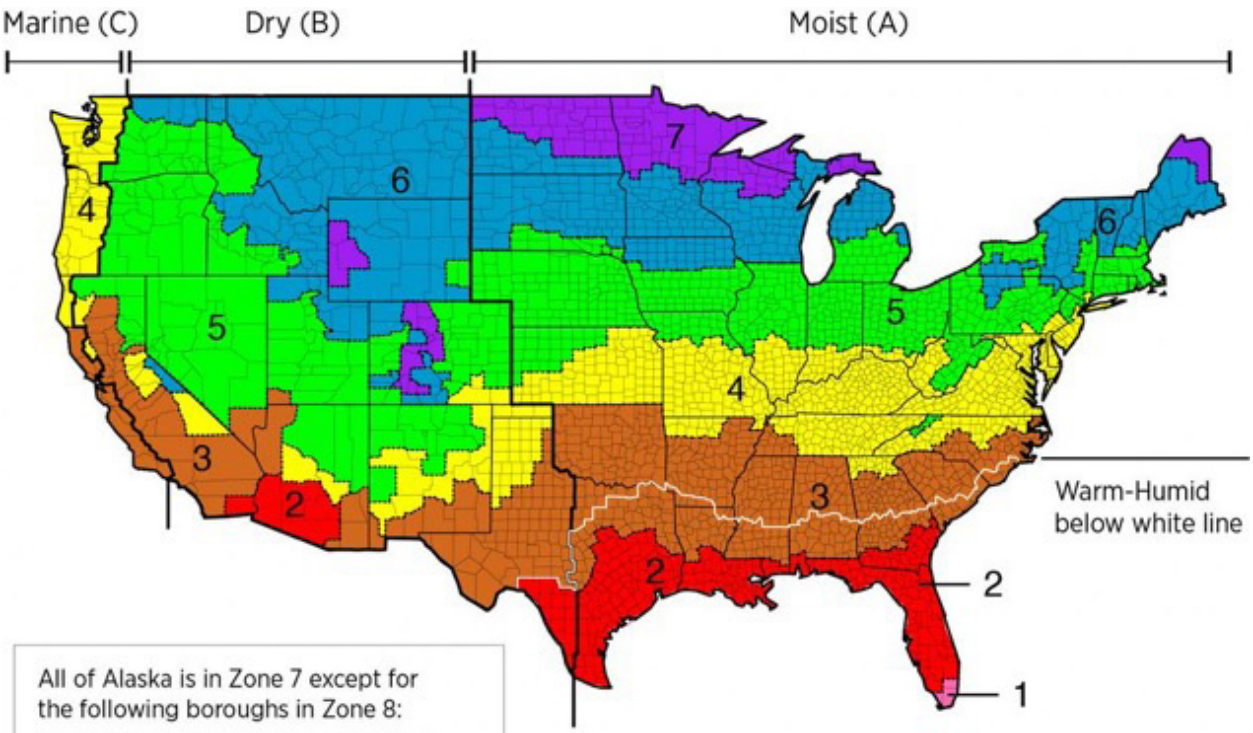
The IECC issues updates on a three-year cycle. Until a state or local jurisdiction adopts the IECC, it remains a voluntary code. Once adopted, however, the adopted requirements become mandatory. In some cases, the jurisdiction will adopt the code as written; in other cases, modifications will be made.

Commercial fenestration is limited to 30 percent according to the prescriptive requirements of the IECC. Skylight area is limited to three percent. When daylight-responsive controls are present and specified conditions are met, the percent of vertical fenestration increases to 40 percent. For skylights, the percentage goes up to six percent. ASHRAE 90.1 sets a maximum prescriptive limit of 40 percent glazed area. In both cases, the performance path can be followed to allow for greater glazing area.

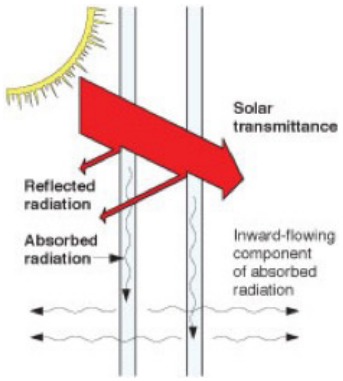
The prescriptive requirements for U-factor and SHGC are presented in Table 1. *Note: Eastern Pennsylvania, New Jersey, and Delaware are located in Climate Zone 4.*

Additional changes in the 2018 IECC include:

- Commercial Renewable Energy Cost Reduction: A maximum on-site renewable energy cost reduction of 5 percent is now a component of the performance-based compliance approach. In addition to limiting the amount of renewable energy offset, this proposal also requires documentation that demonstrates the reduction in energy use associated with on-site renewable energy.
- Heated Slab Insulation: R-5 insulation has been added as a requirement in Table C402.1.3 for heated slabs in all climate zones.
- Garage Door Glazing: A U-factor of 0.31 has been added to table C402.1.4 as a minimum requirement for garage doors with glazing less than 14 percent.
- Airspace Thermal Properties: When the thermal properties of airspaces are calculated as part of the thermal wall assembly, these airspaces must be enclosed in an unvented cavity designed to minimize airflow into and out of the cavity.



VERTICAL FENESTRATION



Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted, or convected into the space. Solar Heat Gain Coefficient (SHGC) – the ratio of the solar heat gain entering the space through the fenestration assembly to the incident solar radiation – is expressed as a number from 0 to 1. The lower a window's SHGC, the less solar heat it transmits. The value varies based on external shading and building orientation. Credit for exterior shading from overhangs and sun shades is based on a Projection Factor (PF), with allowances given for north-facing glazing.

U-Factor is the coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films. The lower the U-Factor, the greater a window's resistance to heat flow and the better its insulating properties. Low U-Factors are most important in heating-dominated climates.

The chart at lower left provides a historic comparison of vertical fenestration U-Factor guidelines per ASHRAE 90.1 2010, 2013, and 2016 as well as IECC guidelines for 2012, 2015, and 2018. Overall requirements are becoming more stringent.

CONCLUSION

In conclusion, it is important to remember that both the IECC and ASHRAE 90.1 are minimum performance standards relative to energy conservation. The glass and glazing industry remains committed to supplying high performance options, including Low E coatings, gas fills, high performance spacers, and dynamic glazing options to meet the needs of architects and building owners interested in going beyond these minimum energy requirements.

About the Author

Valerie Block is an Architectural Marketing Consultant covering the Northeast for Kuraray America, Inc. She lives in Philadelphia and is a frequent presenter at industry events. She can be reached Valerie.Block@kuraray.com or (302) 354-7954.

Top: 2018 IECC Maximum U-Factors

Center: Typical Fenestration Solutions Based on Climate Zone

Bottom: Historical Comparison of Vertical Fenestration U-Factors

courtesy of Dr. Tom Culp, GANA

2018 IECC Building Envelope Fenestration Maximum U-Factor Requirements*

Fixed Fenestration	Operable Fenestration	Entrance Doors
0.38	0.45	0.77

2018 SHGC Requirements

Orientation	SEW	North
PF ,0.2	0.36	0.48
0.2 ≤ PF < 0.5	0.43	0.53
PF > 0.5	0.58	0.58

2018 Skylights

U-Factor	0.50
SHGC	0.40

**Similar requirements are found in ASHRAE 90.1-16*

ROUGHLY WHAT DOES THIS MEAN TO MEET U-FACTOR FOR 90.1-2016?

- **Zone 1:** Low-e, double glazing
- **Zones 2-3:** Low-e double glazing, thermally broken frame
- **Zones 4-5:** Low-e, thermally broken frame and ***pick 1***:
  - argon
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 6:** Low-e, thermally broken frame and ***pick 2***:
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 7:** Low-e, thermally broken frame and ***pick 3***:
  - argon
  - warm edge spacer
  - high performance thermal break
  - two low-e coatings (#2 / #4)
- **Zone 8:** all of the above in double glazing, or more likely, go to triple

VERTICAL FENESTRATION U-FACTORS

Climate Zone	0	1	2	3	4	5	6	7	8	
Nonmetal framing		1.20	0.75	0.65	0.40	0.35	0.35	0.35	0.35	90.1-2010, 2009 IECC
	0.32	0.50	0.40	0.35	0.35	0.32	0.32	0.32	0.32	90.1-2013
	0.32	0.50	0.37	0.33/0.35	0.31	0.31	0.30	0.28	0.25	90.1-2016
		Same as metal framing fixed or operable								2012, '15, '18 IECC
Metal framing, fixed		1.20	0.70	0.60	0.50	0.45	0.45	0.40	0.40	90.1-2010, 2009 IECC
	0.50	0.57	0.57	0.50	0.42	0.42	0.42	0.38	0.38	90.1-2013
	0.50	0.57	0.54	0.45/0.49	0.38	0.38	0.36	0.33	0.29	90.1-2016
		0.50	0.50	0.46	0.38	0.38	0.36	0.29	0.29	2012, '15, '18 IECC
Metal framing, operable		1.20	0.75	0.65	0.55	0.55	0.55	0.45	0.45	90.1-2010, 2009 IECC
	0.65	0.65	0.65	0.60	0.50	0.50	0.50	0.40	0.40	90.1-2013
	0.65	0.65	0.65	0.60	0.46	0.46	0.45	0.40	0.35	90.1-2016
		0.65	0.65	0.60	0.45	0.45	0.43	0.37	0.37	2012, '15, '18 IECC
Metal framing, entrance door		1.20	1.10	0.90	0.85	0.80	0.80	0.80	0.80	90.1-2010, 2009 IECC
	0.83	1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77	90.1-2013
	0.83	1.10	0.83	0.77	0.68	0.68	0.68	0.68	0.68	90.1-2016
		1.10	0.83	0.77	0.77	0.77	0.77	0.77	0.77	2012, '15, '18 IECC

Forum on Architecture + Design

LEARN MORE

Join us at the Forum on Architecture + Design October 2 - 4, 2019 for additional discussions about code compliance in Philadelphia and the impacts on glass building enclosures.

October 3: Breakout Session 1: 9:45 am - 10:45 am

Top Ten Code Lessons to Learn presented by Emma Raymont, MaGrann Associates

Project teams will need to comply with new PA codes to avoid unnecessary first costs and schedule delays. The session will review lessons to help teams successfully navigate their first 2015/2018 code projects, code compliance pathways, packaging permit submissions, field verification, design details and more.

October 3: Breakout Session 2: 11:00 am - 12:00 pm

City of Philadelphia: Code Updates and Process Improvements presented by Elizabeth Baldwin, P.E., Department of L&I

Philadelphia was the second city in the country, and first east of the Mississippi to adopt the 2018 IBC Codes to keep our city safe and prospering. There are impactive changes to both the Energy and Plumbing Codes that will impact design and building in the city. In addition to the new codes, the Department of L&I is revolutionizing the way it does business through the launch of eClipse. The new easy-to-use online portal allows more swift and efficient management of license and permitting needs. This session will provide valuable details on code updates, process changes, and technology resources. 1 AIA LU

October 3: Breakout Session 3: 2:00 pm - 3:30 pm

Impact of New Energy Code Requirements on Glass Building Enclosures

In this panel discussion, hear from industry experts from the fabrication, product manufacturing, design, installation, and legal profession about what designers need to know when designing buildings with glass enclosures. Panelists will include:
Stephanie Staub | AGI | *Moderator*
Valerie Block | Kuraray America, Inc.
Ellis Guiles, PE, LEED AP | Graboyes Commercial Window Co.
Jillian Burgess | RWDI
Richard Davies, Hon. AIA | Milber Makris Plousadis & Seiden, LLP

October 3-4: Exhibit Floor Presentations: 12:00 pm - 2:00 pm

Architectural Glass Wall Systems - Interior Partitions presented by the Architectural Glass Institute

Join AGI on the 14th Floor for 15-minute nano AIA/CES presentations about the myths and realities of interior glass demountable and stick-built partitions. 0.25 AIA HSW LU

The Forum on Architecture + Design is AIA Philadelphia's regional education and expo conference. The Forum focuses on curating multidisciplinary educational content for all the industries that contribute to shaping our built environment.

Learn more or register at https://www.forum-arch-design.org.

About the Devil's Details

The AGI educational series illustrates and describes common glazing challenges as a means to communicate best practices for the design and construction industry, not as a sole source for design guidance. AGI recommends design professionals consult with an AGI contractor regarding specific project challenges. AGI contractor profiles may be accessed at www.theagi.org. To share a devilish detail of your own, contact info@theagi.org.