Top 10 Requirements You Should Know: 2021 IECC *Commercial Envelope*

10/26/2022

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Providing effective energy strategies for buildings and communities

ICC Preferred Provider # 2396
ICC Course # 33872

SEDAC is a Preferred Education Provider with the International Code Council (ICC). Credits earned on completion of this program will be reported to ICC for ICC members. Certificates of Completion will be issued to all participants.

ICC PREFERRED EDUCATION PROVIDER

This workshop is approved for 1 LU/HSW CES credits from the American Institute of Architects (AIA). Credits earned on completion will be reported for AIA members.

AIA Continuing Education Provider

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Learning Objectives

1. Understand the changes in the updated Illinois Energy Conservation Code (2018 IECC to 2021 IECC)

2. Identify the 10 most important Illinois Energy Conservation Code compliance issues in the commercial envelope provisions

3. Understand how to comply with the updated Illinois Energy Conservation Code for commercial envelope design and construction

4. Identify the proposed Illinois Amendments and their impact on commercial building efficiency.

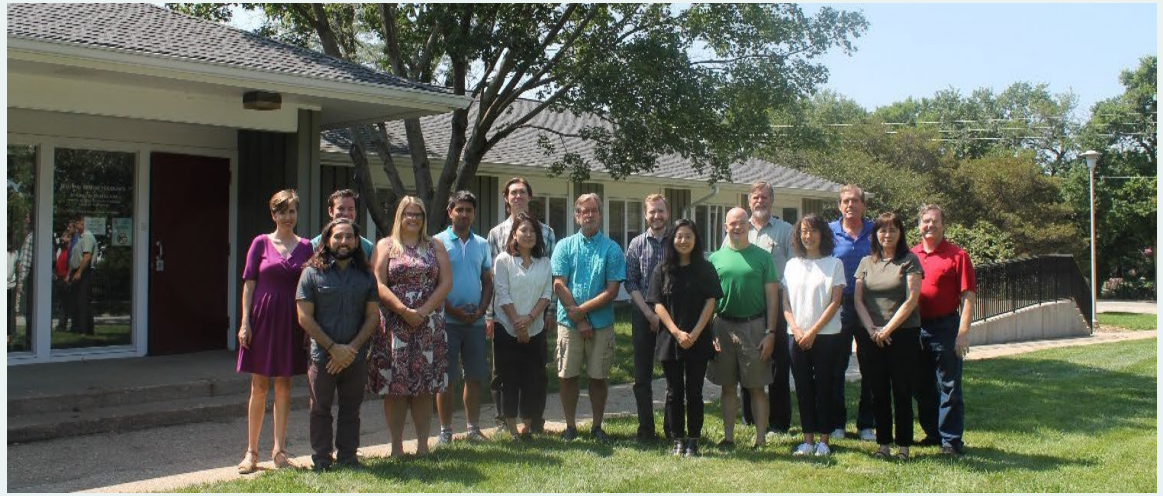
SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Who We Are

We assist buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable.

We are an applied research program at the University of Illinois.

Our mission: Reduce the energy footprint of Illinois and beyond.



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

What We Do

We **help facilities** become more energy efficient.

We **educate.**

We **research.**

We **advocate** for a greener future.

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

SEDAC is the Illinois Energy Conservation Code Training Provider

This training program is sponsored by **Illinois State Energy Office**

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Energy Code Training Program

- Technical support
  energycode@illinois.edu
  800.214.7954

- Online resources at
  smartenergy.illinois.edu/energy-code
- Workshops
- Webinars
- Online on-demand training modules

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

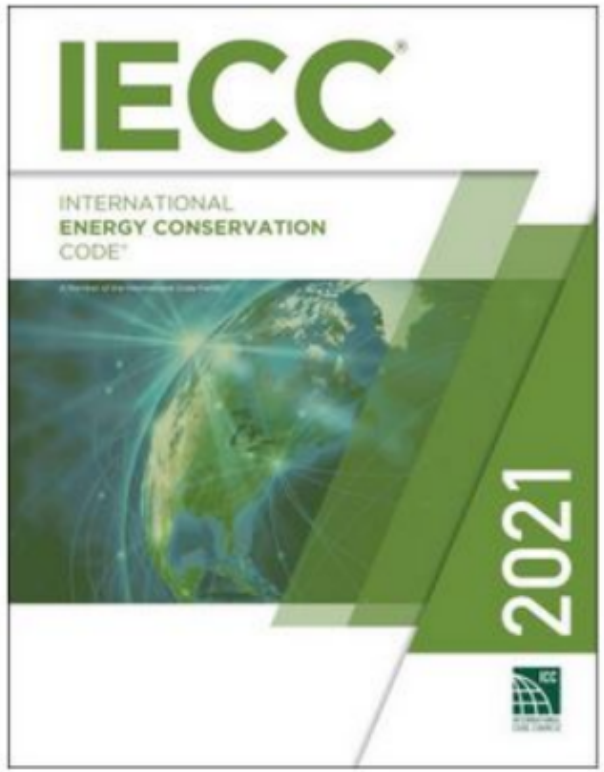
Illinois Energy Conservation Code

SEDAC | I
SMART ENERGY DESIGN ASSISTANCE CENTER

About Programs Who We Serve Resources Blog Contact

Illinois Energy Conservation Code

Click here for the **2022 Chicago Energy Transformation Code**.



Updated Illinois Energy Conservation Code (2021 IECC with IL Amendments) is expected to be effective on October 1, 2022

The updated Illinois Energy Conservation Code, based on the 2021 IECC with Illinois Amendments, is expected to become effective **October 1, 2022** (tentative). This Code will apply for permit applications started on or after October 1, 2022.

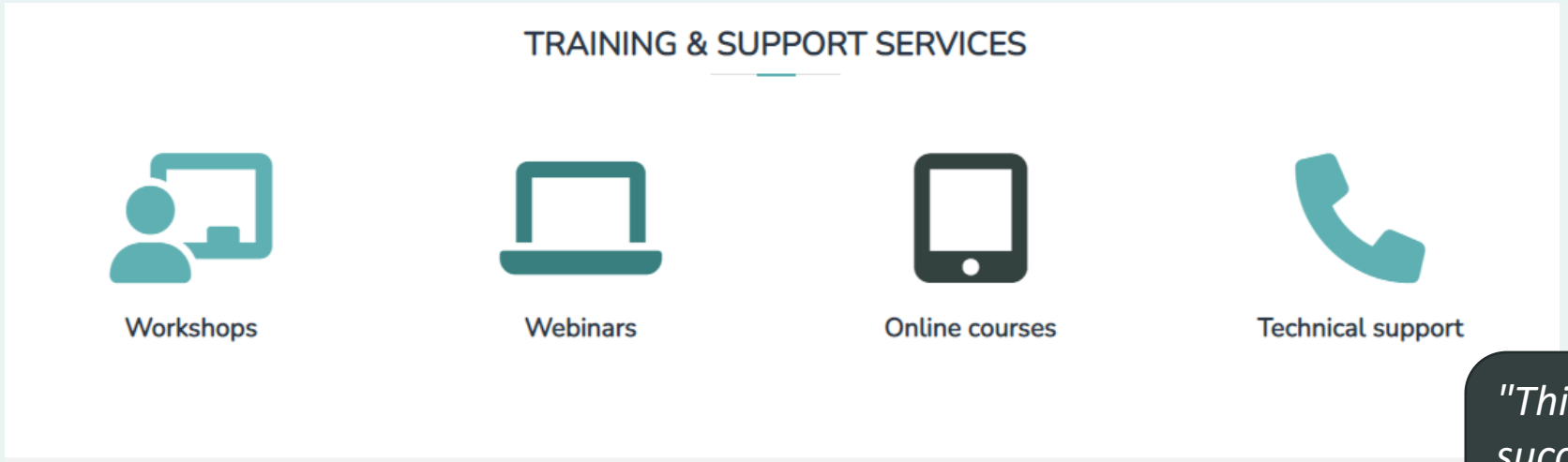
The 2021 IECC can be accessed here:

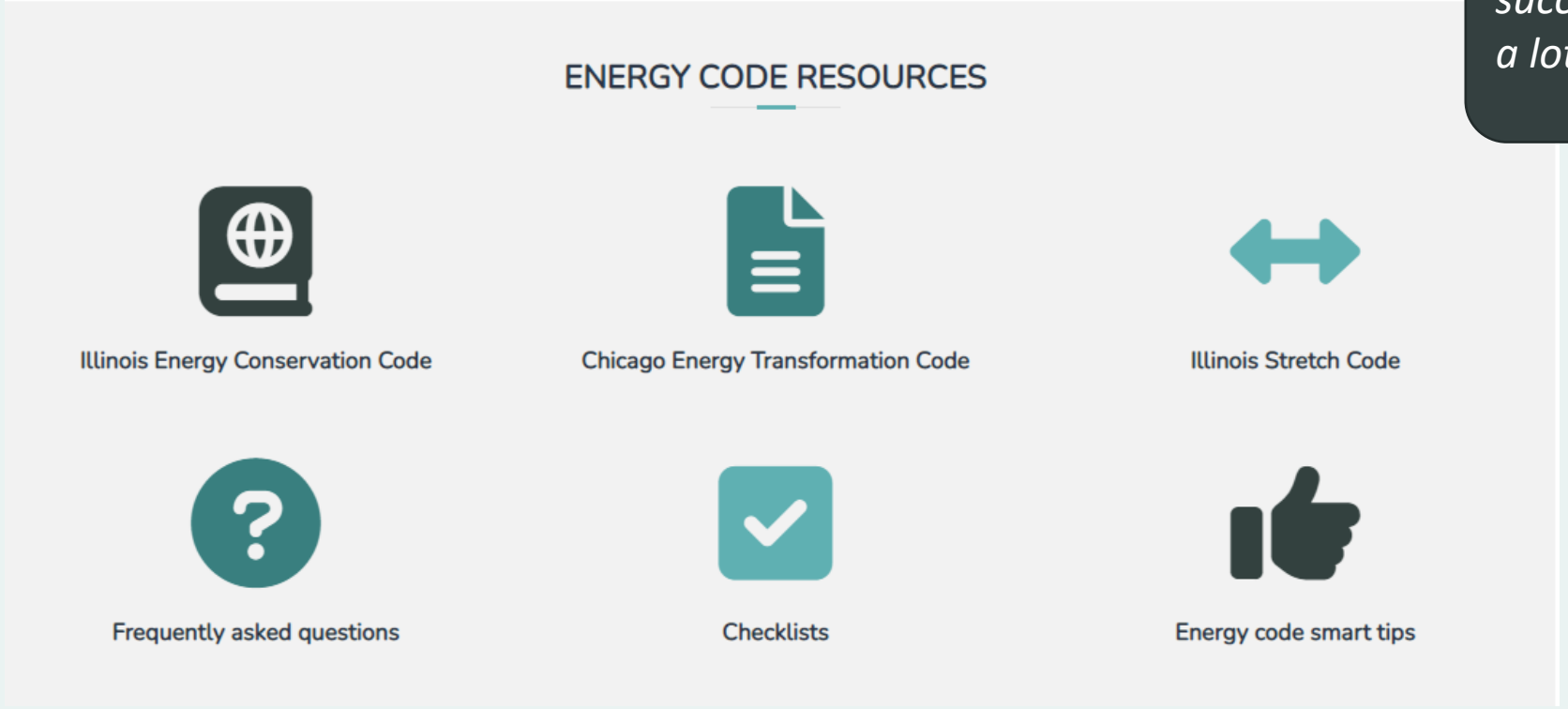
- 2021 IECC
- Illinois Amendments are not yet available

The Illinois Energy Conservation Code Book (2021 IECC with IL Amendments) is expected to be available in April 2023

SEDAC is in the process of coordinating with the International Code Council (ICC) to publish a printed and online version of the Illinois Energy Conservation Code Book (Code Book), which incorporates Illinois Amendments into the 2021 IECC. In the past, to fully understand the Illinois Energy Conservation Code, stakeholders needed to refer to two separate documents – IECC and Illinois Amendments. The newly published Code Book will make the Illinois Energy Conservation Code more accessible and easier to comply with. Architects, engineers, contractors, code officials and other related building professionals throughout Illinois will benefit from this resource. This effort is funded by the Illinois EPA Office of Energy.

www.smartenergy.Illinois.edu/energy-code/





"Thank you. This is a gold mine of energy code info."
Robert, Mechanical Engineer

"This was probably one of the most successful seminars we've had. I got a lot of good feedback from it."
Harold, Plumbing Inspector

"Thank you! That's the most clear explanation I've gotten on this topic. It's greatly appreciated!"
Brett, Energy Modeler

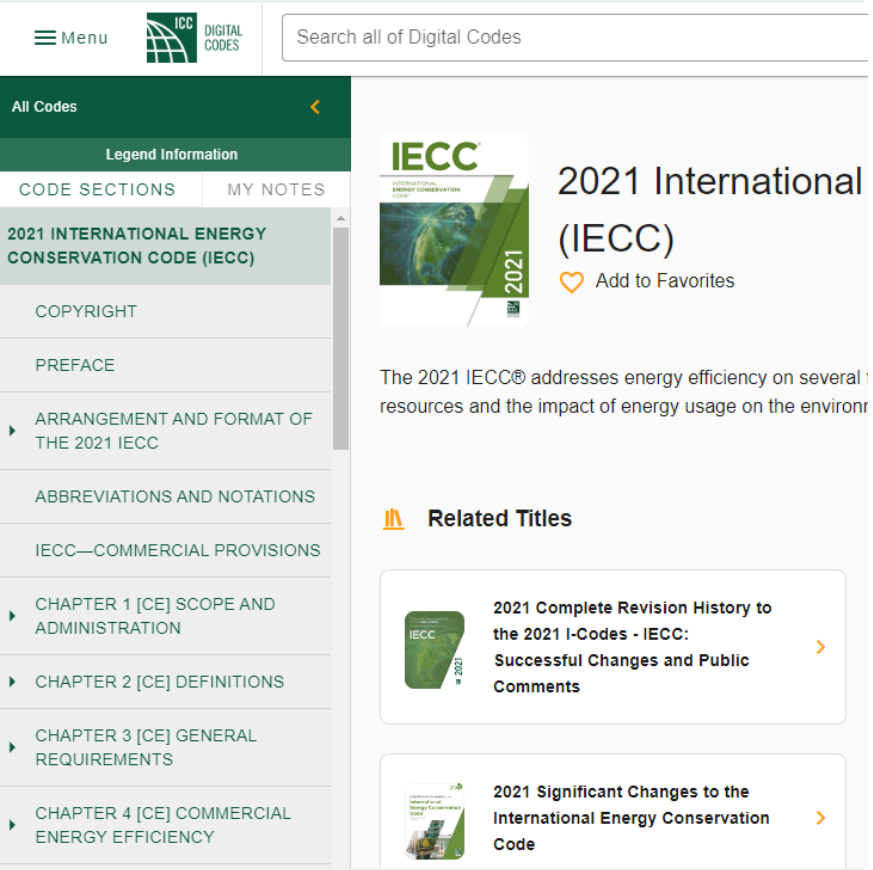
SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

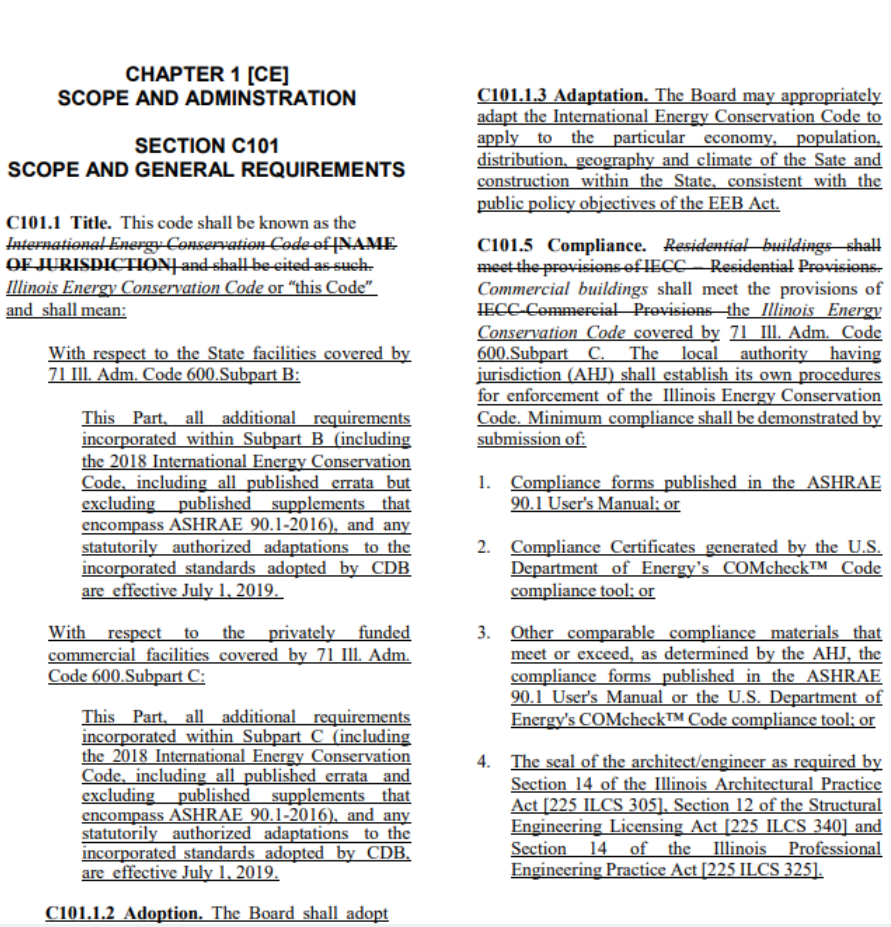
Access to 2021 IECC, IL Amendments & Chicago Energy Code

https://codes.iccsafe.org/content/IECC2021P2

Web Address To Be Determined

https://codes.iccsafe.org/codes/illinois/Chicago





CHAPTER 1 [CE]
SCOPE AND ADMINSTRATION

SECTION C101
SCOPE AND GENERAL REQUIREMENTS

C101.1 Title. This code shall be known as the ~~*International Energy Conservation Code* of [NAME OF JURISDICTION] and shall be cited as such.~~ *Illinois Energy Conservation Code* or "this Code" and shall mean:

With respect to the State facilities covered by 71 Ill. Adm. Code 600.Subpart B:

This Part, all additional requirements incorporated within Subpart B (including the 2018 International Energy Conservation Code, including all published errata but excluding published supplements that encompass ASHRAE 90.1-2016), and any statutorily authorized adaptations to the incorporated standards adopted by CDB are effective July 1, 2019.

With respect to the privately funded commercial facilities covered by 71 Ill. Adm. Code 600.Subpart C:

This Part, all additional requirements incorporated within Subpart C (including the 2018 International Energy Conservation Code, including all published errata and excluding published supplements that encompass ASHRAE 90.1-2016), and any statutorily authorized adaptations to the incorporated standards adopted by CDB, are effective July 1, 2019.

C101.1.2 Adoption. The Board shall adopt

C101.1.3 Adaptation. The Board may appropriately adapt the International Energy Conservation Code to apply to the particular economy, population, distribution, geography and climate of the Sate and construction within the State, consistent with the public policy objectives of the EEB Act.

C101.5 Compliance. ~~*Residential buildings* shall meet the provisions of IECC-Commercial Provisions the *Illinois Energy Conservation Code*~~ covered by 71 Ill. Adm. Code 600.Subpart C. The local authority having jurisdiction (AHJ) shall establish its own procedures for enforcement of the Illinois Energy Conservation Code. Minimum compliance shall be demonstrated by submission of:

1. Compliance forms published in the ASHRAE 90.1 User's Manual; or
2. Compliance Certificates generated by the U.S. Department of Energy's COMcheck™ Code compliance tool; or
3. Other comparable compliance materials that meet or exceed, as determined by the AHJ, the compliance forms published in the ASHRAE 90.1 User's Manual or the U.S. Department of Energy's COMcheck™ Code compliance tool; or
4. The seal of the architect/engineer as required by Section 14 of the Illinois Architectural Practice Act [225 ILCS 305], Section 12 of the Structural Engineering Licensing Act [225 ILCS 340] and Section 14 of the Illinois Professional Engineering Practice Act [225 ILCS 325].

ARTICLE XIII.
CHICAGO ENERGY CONSERVATION CODE

SECTION 1. The Municipal Code of Chicago is hereby amended by inserting a new Title 14N, as follows:

TITLE 14N ENERGY CONSERVATION CODE

PART I – COMMERCIAL PROVISIONS

CHAPTER 14N-C1 SCOPE AND PURPOSE

14N-C1-C001 Adoption of the commercial provisions of the International Energy Conservation Code by reference.

The commercial provisions of the *International Energy Conservation Code*, 2018 edition, second printing, and all erratum thereto identified by the publisher (hereinafter referred to as "IECC-CE"), except Appendix CA, are adopted by reference and shall be considered part of the requirements of this title except as modified by the specific provisions of this title.

If a conflict exists between a provision modified by this title and a provision adopted without modification, the modified provision shall control.

14N-C1-C002 Citations.

Provisions of IECC-CE which are incorporated into this title by reference may be cited as follows:

14N-C[IECC-CE chapter number]-[IECC-CE section number]

14N-C1-C003 Global modifications.

The following modifications shall apply to each provision of IECC-CE incorporated into this title:

1. Replace each occurrence of "*International Codes*" with "*Chicago Construction Codes.*"
2. Replace each occurrence of "*International Building Code*" with "*Chicago Building Code.*"
3. Replace each occurrence of "ASME A17.1" or "ASME A17.1/CSA B44" with "the *Chicago Conveyance Device Code.*"
4. Replace each occurrence of "NFPA 70" with "the *Chicago Electrical Code.*"

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

SEDAC Top 40 & Other Workshops

Top 40 Requirements You Should Know: 2021 IECC

- Jun 13, 2023 (DuPage County) - in person!

Other workshops

- Nov 10, 2022: Importance of Mechanical Insulation: Safety & Efficiency - online

Registration: https://smartenergy.illinois.edu/events

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

SEDAC Top 10 Series Webinars

Top 10 Requirements You Should Know: 2021 IECC

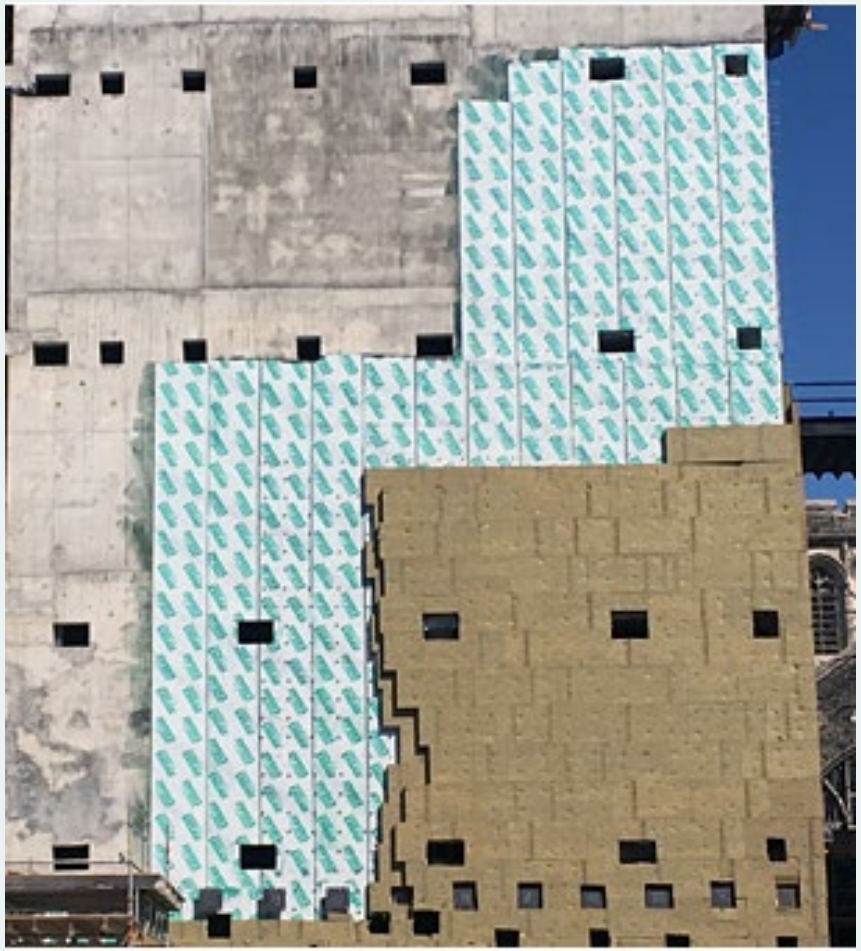
- Residential: Archived
- Commercial Envelope: Today
- Commercial Lighting: Feb 22, 2023
- Commercial HVAC: Mar 22, 2023

Registration: https://smartenergy.illinois.edu/events

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Top 10 Requirements: 2021 IECC Commercial Envelope

1. Building Exemptions from IL Energy Code [600.310]
2. Thermal Envelope Certificate [C401.3]
3. Equipment Buildings [C402.1.2]
4. Envelope Insulation Minimums [C402.1.3]
5. Doors [C402.4.5]
6. Tapered Insulation [C402.2.1]
7. Fenestration [C402.4]
8. Air Barrier Compliance [C402.5.1.2]
9. Operable Openings Interlock [C402.5.11]
10. Additional Efficiency Measures [C406]



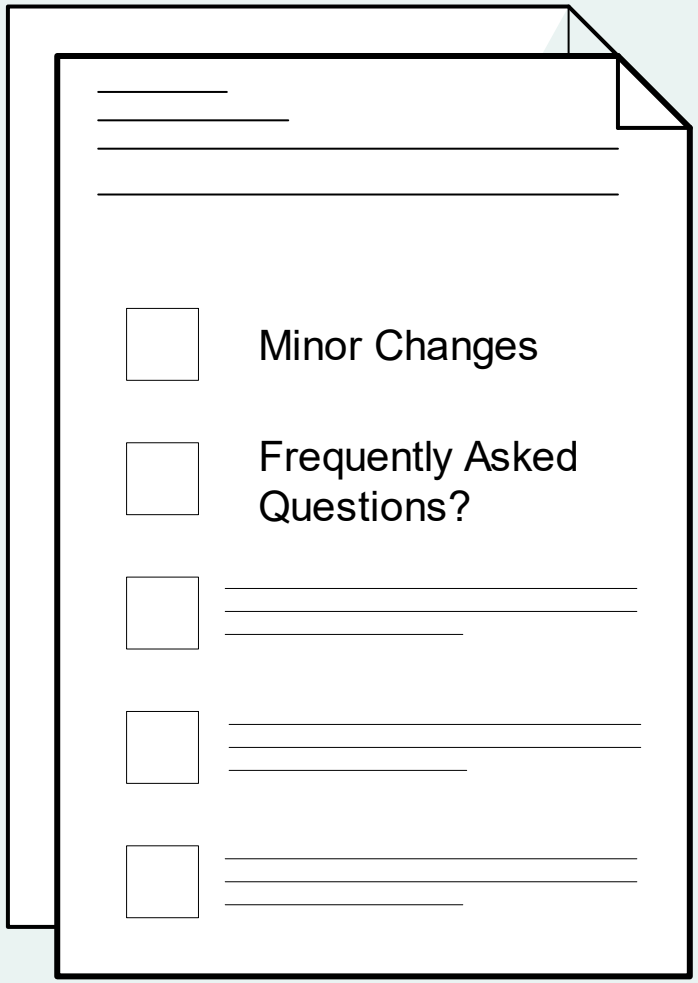
www.wbdg.org/resources

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Commercial Envelope

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#1. Building Exemptions from IL Energy Code [600.310]



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Building Exemptions from Illinois Energy Code

- Exempt from locally adopted building code
    - Generally, applies to agriculture facilities in IL

Image source: https://www2.illinois.gov/sites/agr/Pages/default.aspx

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Building Exemptions from Illinois Energy Code

- Don’t contain conditioned space
    - Unconditioned storage facilities
    - Sports viewing/press stands..etc (exempt from energy codes)
- However, if conditioned status ever changes the building will need to be brought up to most recent code requirements.

Source: bleachers.net

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Building Exemptions from Illinois Energy Code

- No comfort conditioning
- Admin Code presumes no conditioning if electric service <!00 amps
- Code official needs to make determination if >100 amps service

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Building Exemptions from Illinois Energy Code

- Historic Buildings
    - Listed on National Historic Register, IL register, or designated by authorized personnel as historically significant.
- Can apply to parts of buildings that are historically significant

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Building Exemptions from Illinois Energy Code

- Specified in IECC
  - C501.6 Historic Buildings. Provisions of this code…shall not be mandatory for historic buildings provided a report has been submitted…demonstrating that compliance with the provision would threaten, degrade, or destroy the historic form, fabric, or function of the building.

- A report with specific reasoning must be provided to exempt a historic building from code compliance

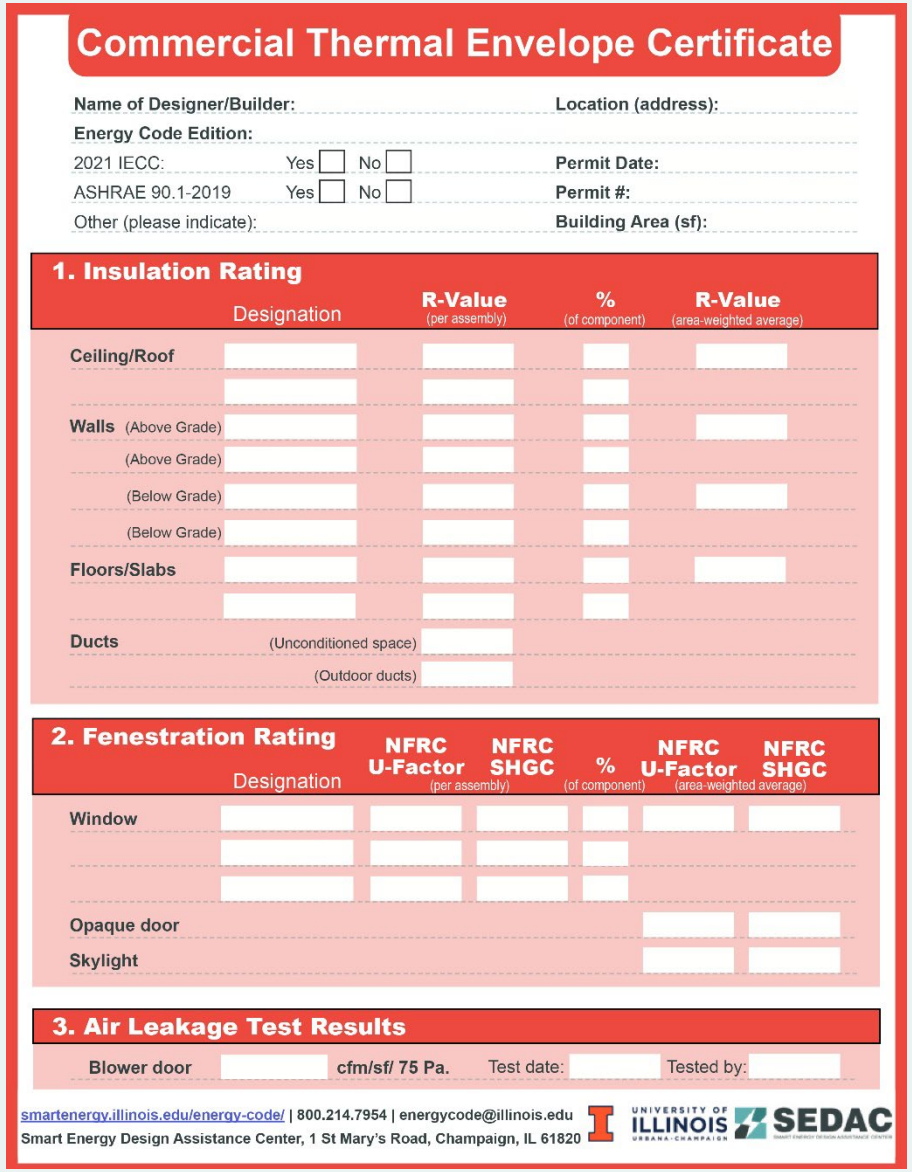
SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#2. Thermal Envelope Certificate [C401.3]

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C401.3

Certificate Requirements



Commercial Thermal Envelope Certificate

Name of Designer/Builder: Location (address):

Energy Code Edition:

2021 IECC: Yes ☐ No ☐ Permit Date:

ASHRAE 90.1-2019 Yes ☐ No ☐ Permit #:

Other (please indicate): Building Area (sf):

1. Insulation Rating

	Designation	R-Value (per assembly)	% (of component)	R-Value (area-weighted average)
Ceiling/Roof				
Walls (Above Grade)				
(Above Grade)				
(Below Grade)				
(Below Grade)				
Floors/Slabs				
Ducts	(Unconditioned space)			
	(Outdoor ducts)			

2. Fenestration Rating

	Designation	NFRC U-Factor (per assembly)	NFRC SHGC (per assembly)	% (of component)	NFRC U-Factor (area-weighted average)	NFRC SHGC (area-weighted average)
Window						
Opaque door						
Skylight						

3. Air Leakage Test Results

Blower door cfm/sf/ 75 Pa. Test date: Tested by:

smartenergy.illinois.edu/energy-code/ | 800.214.7954 | energycode@illinois.edu

Smart Energy Design Assistance Center, 1 St Mary's Road, Champaign, IL 61820

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN SEDAC

- R-values of insulation for: roofs, walls, foundations and slabs, basement walls, crawlspace walls and floors, and ducts outside conditioned space
- U-factors and SHGC of fenestration
- Results from building envelope air leakage testing

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Compliance Resources

SEDAC | I
SMART ENERGY DESIGN ASSISTANCE CENTER

About Programs Who We Serve Resources Blog Contact

Energy Code Checklists

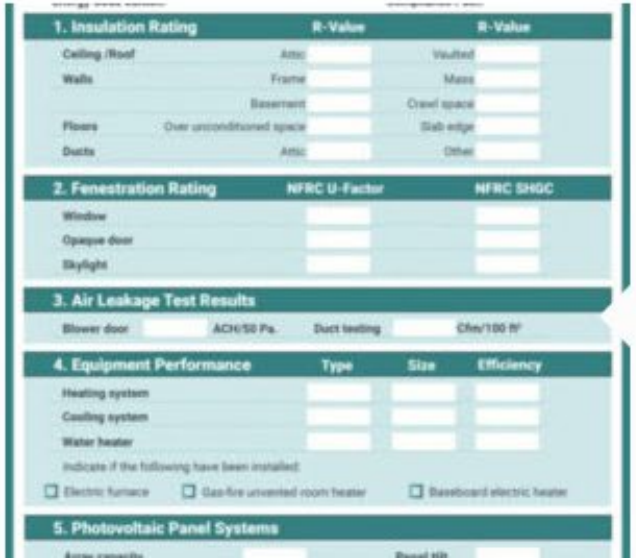
Home > Energy Code Checklists

Check out our checklists to help with energy code site inspection and compliance!

Commercial Thermal Envelope Certificate

September 8, 2022

2021 IECC requires all new commercial buildings to complete and post a permanent Thermal Envelope Certificate. This certificate template can [...]

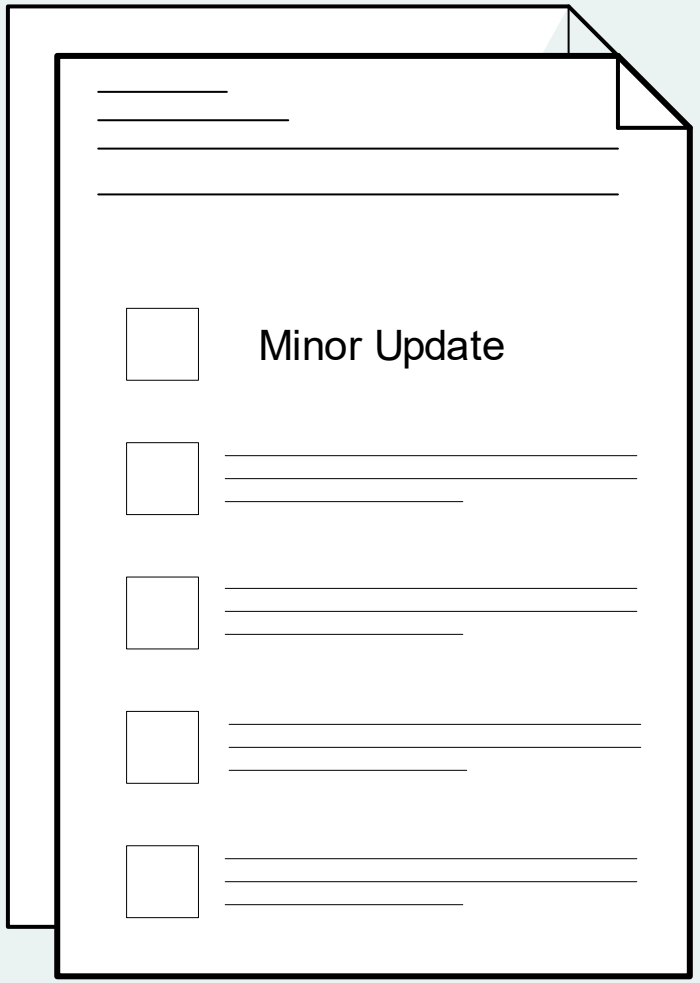


Illinois Home Energy Code Checklist & Energy Certificate

June 16, 2022

For Homeowners and Realtors. Are you interested in buying an energy efficient home? Do you want to learn how to make your home more energy efficient? This checklist can help you quickly assess a home's energy performance and construction.

#3. Equipment Buildings [C402.1.2]

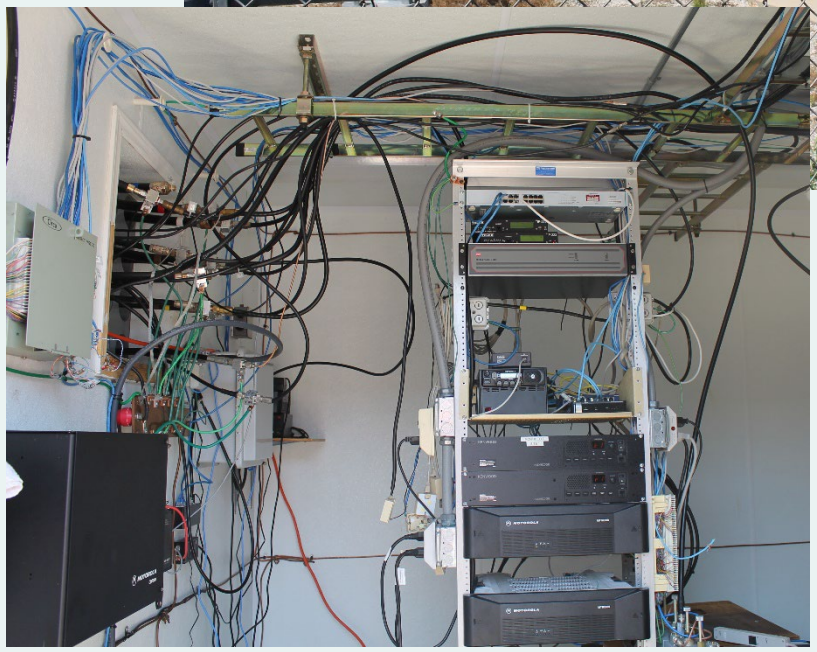


SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.1.2

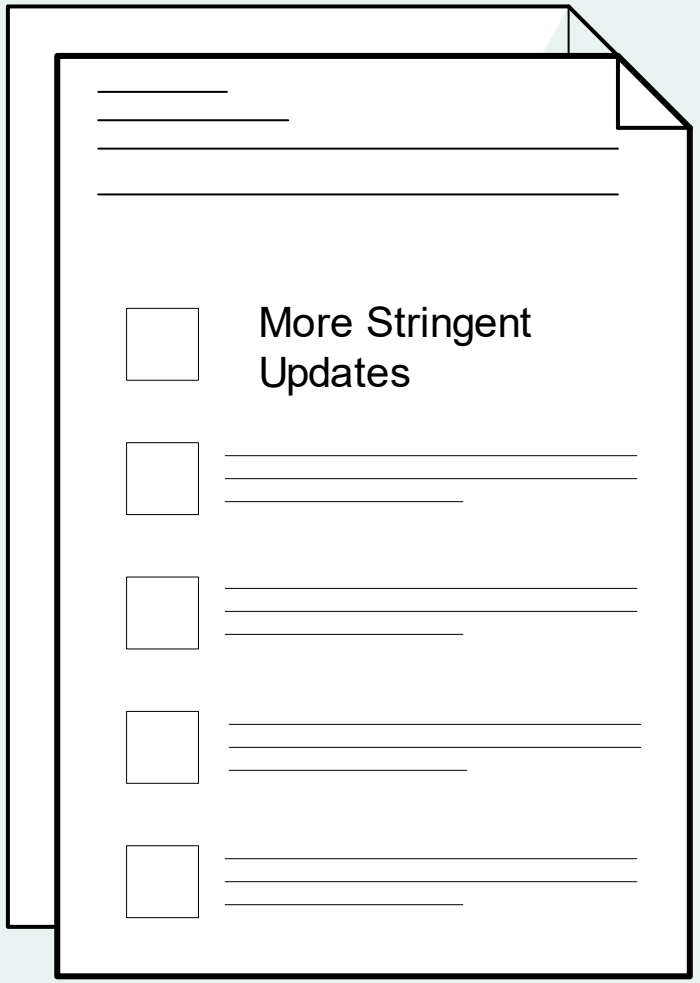
Equipment Buildings

- Floor area not more than **1,200 sf**
- House electric equipment not less than 7 watts per square foot and not intended for human occupancy
- Heating system capacity not greater than 17,000 Btu/hr w/ setpoint restricted to 50F or less
- Average wall and roof U-factor of less than 0.200 in CZ 1-5



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#4. Envelope Insulation Minimums [C402.1.3]



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Table C402.1.3

Excerpts: Insulation Component Min. R-Values

Climate Zone & Group	Roofs			Walls				
	Above Deck	Metal Building	Attic/ Other	Mass	Metal Building	Metal Framed	Wood Framed	Below Grade
CZ 4 Other	R-30 ci	R-19 + R-11 LS	R-49 (R-30)	R-9.5ci	R-13 + R-13ci	R-13 + R-7.5ci	R-13 + R-3.8ci or R-20	R-7.5 ci
CZ 4 Group R	R-30 ci	R-19 + R-11 LS	R-49 (R-30)	R-11.4ci	R-13 + R-14ci (+R-13ci)	R-13 + R-7.5ci	R-13 + R-3.8ci or R-20	R-10ci (R-7.5ci)
CZ 5 Other	R-30 ci	R-19 + R-11 LS	R-49 (R-30)	R-11.4ci	R-13 + R-14ci (+R-13ci)	R-13 + R-10ci (+R-7.5ci)	R-13 + R-7.5ci or R-20 + R-3.8ci (R-13 + R-3.8ci or R-20)	R-7.5 ci
CZ 5 Group R	R-30 ci	R-19 + R-11 LS	R-49	R-13.3ci	R-13 + R-14ci (+R-13ci)	R-13 + R-10ci (+R-7.5ci)	R-13 + R-7.5ci or R-20 + R-3.8ci	R-10 ci (R-7.5ci)

Values are 2021 IECC requirements.

Original 2018 IECC values in white text (R-value)

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Table C402.1.3

Excerpts: Insulation Component Min. R-Values

Climate Zone & Group	Floors			
	Mass	Joist /Framed	Unheated Slab	Heated Slab*
4 Other	R-14.6ci (R-10ci)	R-30	R-15 24” below (R-10 24”)	R-15 24” below grade + R-5 under
4 Group R	R-16.7ci (R-10.4ci)	R-30	R-15 24” below (R-10 24”)	R-15 24” below grade + R-5 under
5 Other	R-14.6ci (R-10ci)	R-30	R-15 24” below (R-10 24”)	R-15 36” below grade + R-5 under
5 Group R	R-16.7ci (R-12.5ci)	R-30	R-20 24” below (R-10 24”)	R-15 36” below grade + R-5 under

*Note that for heated slab-on-grade construction, insulation is permitted to stop at the bottom of the slab edge

Requirements for doors in the 2018 R-value table have been moved to the U-factor table in 2021 IECC

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Table C402.1.4

Excerpts: Insulation Component Max. U-Factors

Climate Zone & Group	Roofs			Walls				
	Above Deck	Metal Building	Attic/ Other	Mass	Metal Building	Metal Framed	Wood Framed	Below Grade
CZ 4 Other	U-0.032	U-0.035	U-0.021 (U-0.027)	U-0.104	U-0.052	U-0.064	U-0.064	C-0.119
CZ 4 Group R	U-0.032	U-0.035	U-0.021 (U-0.027)	U-0.090	U-0.050 (U-0.052)	U-0.064	U-0.064	C-0.092 (C-0.119)
CZ 5 Other	U-0.032	U-0.035	U-0.021 (U-0.027)	U-0.090	U-0.050 (U-0.052)	U-0.055 (U-0.064)	U-0.051 (U-0.064)	C-0.119
CZ 5 Group R	U-0.032	U-0.035	U-0.021	U-0.080	U-0.050 (U-0.052)	U-0.055 (U-0.064)	U-0.051 (U-0.064)	C-0.092 (C-0.119)

Values are 2021 IECC requirements.

Original 2018 IECC values in white text (U-factor)

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Table C402.1.4

Excerpts: Insulation Component Max. U-Factors

Climate Zone & Group	Floors				Doors		
	Mass	Joist /Framed	Unheated Slab	Heated Slab*	Non-Swinging**	Swinging	Garage <14% Glazing
4 Other	U-0.057 (U-0.076)	U-0.033	F-0.52 (F-0.54)	F-0.62 (F-0.86 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31
4 Group R	U-0.051 (U-0.074)	U-0.033	F-0.52 (F-0.54)	F-0.62 (F-0.86 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31
5 Other	U-0.057 (U-0.074)	U-0.033	F-0.52 (F-0.54)	F-0.62 (F-0.79 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31
5 Group R	U-0.051 (U-0.064)	U-0.033	F-0.51 (F-0.54)	F-0.62 (F-0.79 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31

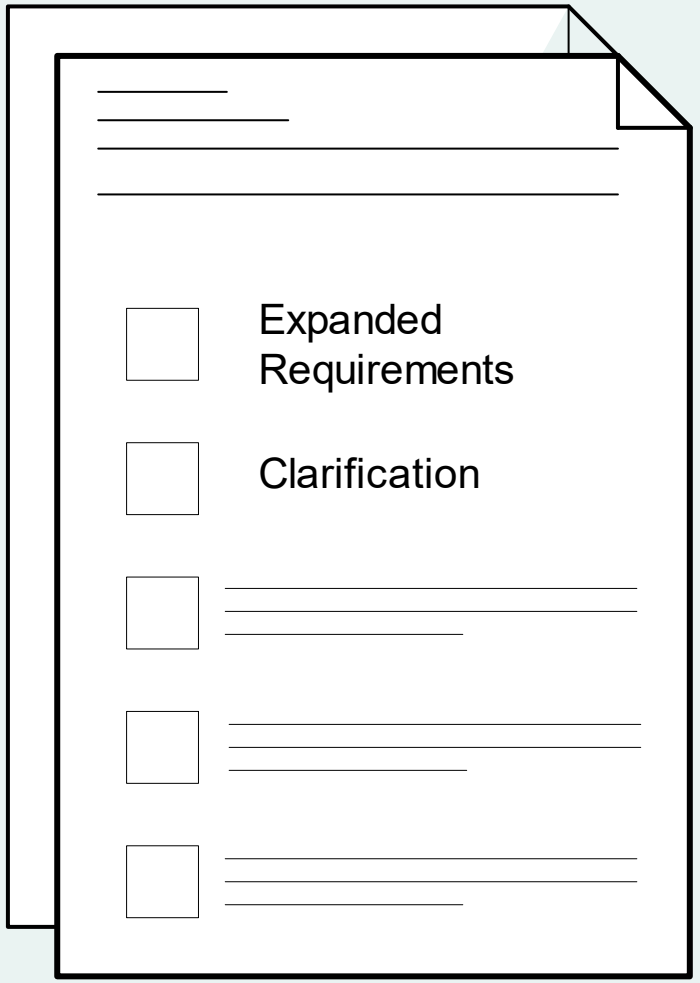
*Corrected 2018 IECC heated slab F-factor listings to match ASHRAE 90.1 Appendix A – not actual heated slab improvement

**Non-swinging doors in the 2018 R-value table have been moved to the U-factor table in 2021 IECC, and requirement relaxed

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#5. Doors

[C402.4.5]



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.4.5

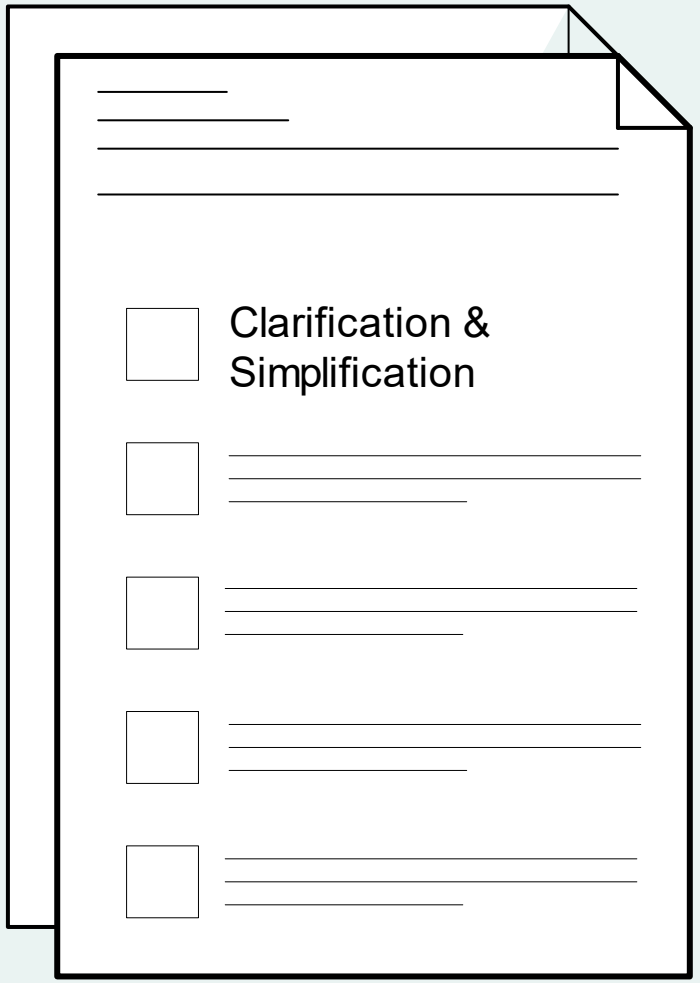
Opaque/Non-swinging Door Requirements

- Opaque Doors (swinging or non-swinging w/ <50% glazing) shall comply with Table C402.1.4 and be considered as part of the gross area of above-grade walls [C402.5.1]
- Opaque Non-swinging Doors
  - Horizontally hinged sectional doors with a single row of fenestration (14%>Fenestration Area<25% of total door area)
    - U-Factor <0.44 CZ 0-6
  - Other doors shall comply with C402.4.3 U-Factor and SHGC requirements

Images courtesy of DOE

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#6. Specific Envelope Insulation [C402.2.1]



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.2.1

Tapered Roof Assembly

- Average R-value can be used for tapered deck insulation [C402.2.1.1]
- Min. thickness shall be 1” [C402.2.1.2]
- Min. of 2 staggered layers except at gutter edge, drain, or scupper [C402.2.1.4]

- C402.1.4.1.1 sets comparable requirements for U-factor compliance

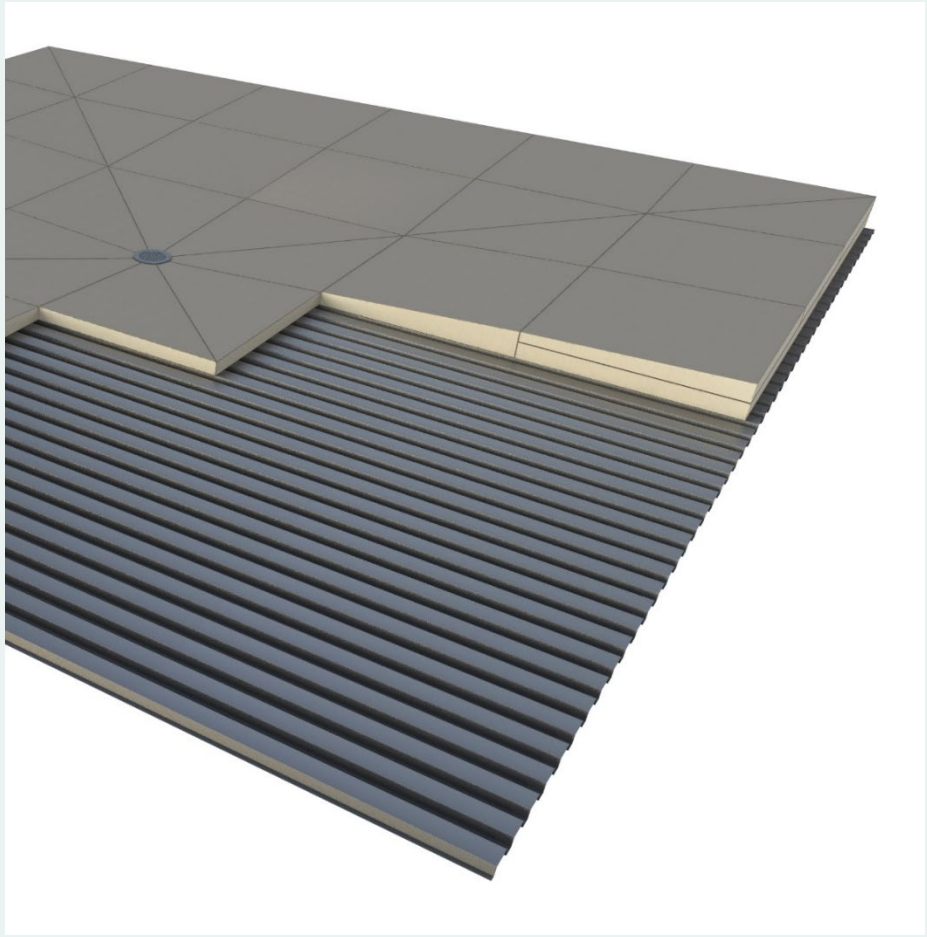
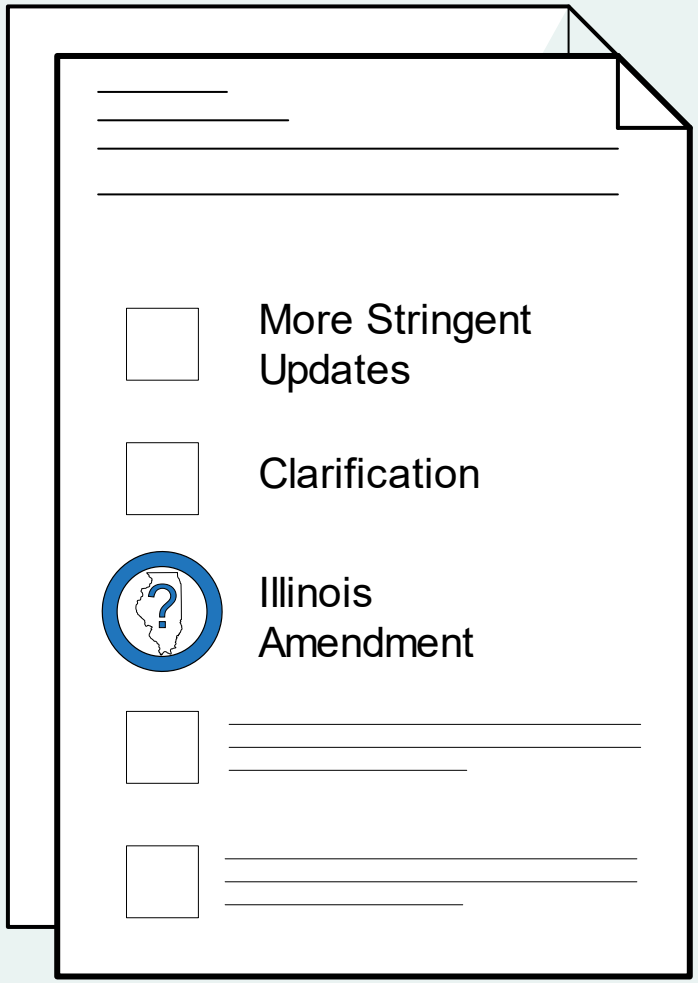


Image courtesy of PIMA

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#7. Fenestration [C402.4]



SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Table C402.4

Fenestration Max. U-Factor & SHGC Requirements

2018 IECC

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4	
Vertical Fenestration				
U-Factors				
Fixed fenestration	0.38		0.38	
Operable fenestration	0.45		0.45	
Entrance doors	0.77		0.77	
SHGC				
Orientation[a]	SEW	N	SEW	N
PF < 0.2	0.36	0.48	0.38	0.51
0.2 ≤ PF < 0.5	0.43	0.53	0.46	0.56
PF ≥ 0.5	0.58	0.58	0.61	0.61
Skylights				
U-factor	0.50		0.50	
SHGC	0.40		0.40	

2021 IECC

CLIMATE ZONE	4 EXCEPT MARINE		5 AND MARINE 4	
Vertical Fenestration				
U-Factors				
Fixed fenestration	0.36		0.36	
Operable fenestration	0.45		0.45	
Entrance doors	0.63		0.63	
SHGC				
	Fixed	Operable	Fixed	Operable
PF < 0.2	0.36	0.33	0.38	0.33
0.2 ≤ PF < 0.5	0.43	0.40	0.46	0.40
PF ≥ 0.5	0.58	0.53	0.61	0.53
Skylights				
U-factor	0.50		0.50	
SHGC	0.40		0.40	

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

IL Amendment Proposal

SHGC/U-Factor Performance Enhancement

Buildings with more east/west fenestration than north/south fenestration have increased performance criteria depending on the ratio

Aw * SHGCw ≤ (At * SHGCc)/5
And
Ae * SHGCe ≤ (At * SHGCc)/5

Area west/east/total
SHGC west/east/code table
C402.4 value

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.4.2

Minimum Skylight Area

Same required toplit areas as 2018, but determination updated:

1. VT not less than 0.40 **OR VT_{annual} not less than 0.26**
2. Effective aperture:
    1. 1% using VT for standard skylights
    2. **0.66% using Tubular Daylight VT_{annual}**

Update accounts for differences in traditional vs tubular daylight systems

Similar minor updates made throughout C402.4 to account for tubular daylight devices

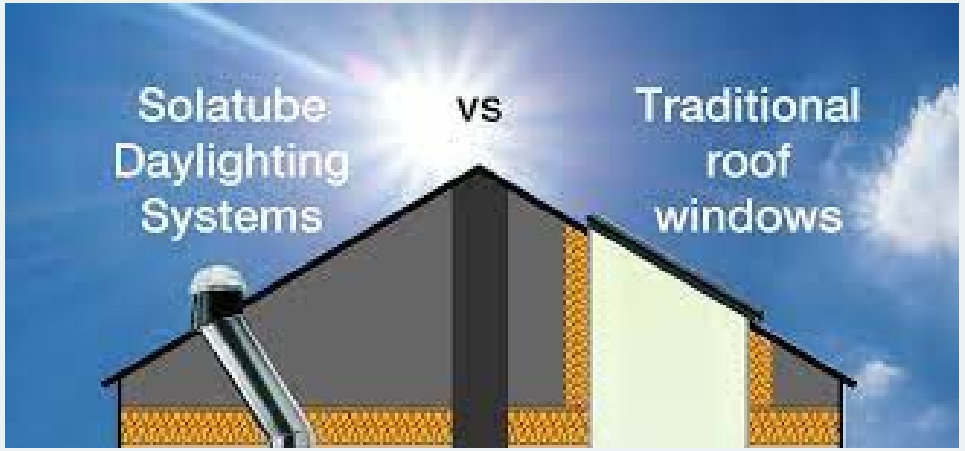


Image source: https://www.solatubesouth.co.uk/solatube-vs-roof-windows/

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#8. Air Barrier Compliance [C402.5.1, C402.5.2, C402.5.3]

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.5

Summary of Air Barrier Requirements

- Air barrier materials must be installed inside, outside, **or** part of envelope assembly [C402.5.1]
  - Note: No AND. Either interior OR exterior OR Integral, **allows for drying**
- Minimizing air leakage through fenestration [C402.5.4]
- Minimize air leakage through purposeful openings/penetrations [C402.5.5 thru .5.11]

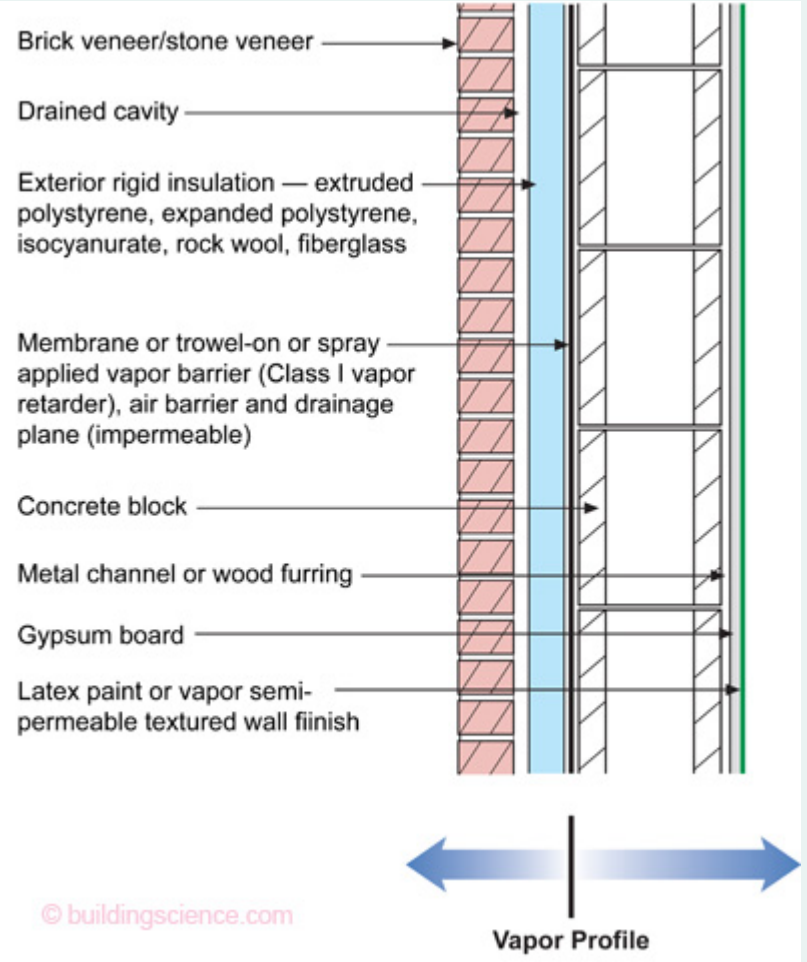


Image source: https://www.buildingscience.com/sites/default/files/migrate/jpg/Masonry_Figure_06.jpg

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.5.1.2

Air Barrier Compliance

- Buildings or spaces including Group R & I occupancies shall meet C402.5.2:
  Dwelling & sleeping unit enclosure testing [C402.5.2]
- Buildings or spaces other than Group R & I occupancies shall meet C402.5.3:
  Building thermal envelope testing [C402.5.3]
- No exceptions for Climate Zones 4A or 5A
- **ALL COMMERCIAL BUILDINGS IN IL MUST BE PRESSURE TESTED**

NEW!

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.5.1.5

Building Envelope Performance Verification

Air barrier installation verified by code official, registered design professional, or approved agency per:

- **Review of construction documents** & other supporting data
- **Inspection** of continuous air barrier components and & assemblies during construction while air barrier still accessible for inspection and repair
- **Final commissioning** report provided for inspections completed by registered design professional or approved agency
    - To building owner or owner's authorized agent and code official
    - Report to identify deficiencies found during review of construction documents and inspection and details of corrective measures taken

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.5.2

Dwelling & Sleeping Unit Enclosure Testing

- Measured air leakage not to exceed 0.30 cfm/sf of testing unit enclosure area @ 0.2 inch water gauge (50 Pa)
- For multiple dwelling units in single thermal envelope, test individually, and building leakage to be unit envelope area weighted average of leakage rates.
- Units tested separately with unguarded blower door test
  - Buildings w/ **fewer than 8** testing units, **test all units**
  - Buildings w/ **8 or more** testing units, the **greater of 7 units or 20% of units** shall be tested
    - Sample to include a top floor, ground floor, and unit with the largest enclosure area).
    - Each unit not in compliance requires 2 additional units to be tested

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

C402.5.3

Building Thermal Envelope Testing

- Measured air leakage not to exceed 0.40 cfm/sf of thermal envelope area @ 0.3 inch water gauge (75 Pa) for whole building test.
- Alternative sampling approach for larger buildings:
  - Area-weighted average can't exceed the whole building air leakage limit
  - Required testing samples:
    - Entire envelope area of spaces directly under a roof
    - Entire envelope area of spaces with building entrance, exposed floor, loading dock, or below grade
    - 25% or more representative sample of remaining thermal envelope
- If total leakage between 0.40 cfm/sf and 0.60 cfm/sf, allowed to complete diagnostic testing and non-destructive remediation without additional testing.
  - Must submit report of corrective actions

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#9. Air Leakage: Operable Openings Interlock [C402.5.11]

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Operable Interlock

- Conditioned space with a door opening >40 sq ft to the outdoors shall be provided with controls that change HVAC settings when door is opened:

Photo Courtesy of Control By Web

- Disable heating or lower setpoint to 55 F (or lower)
- Disable cooling or raise setpoint to 90 F (or higher)
- within 10 min of door opening

Photo Courtesy of Teutopolis Event Center

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

#10. Additional Efficiency Requirements [C406]

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Additional Efficiency Measures

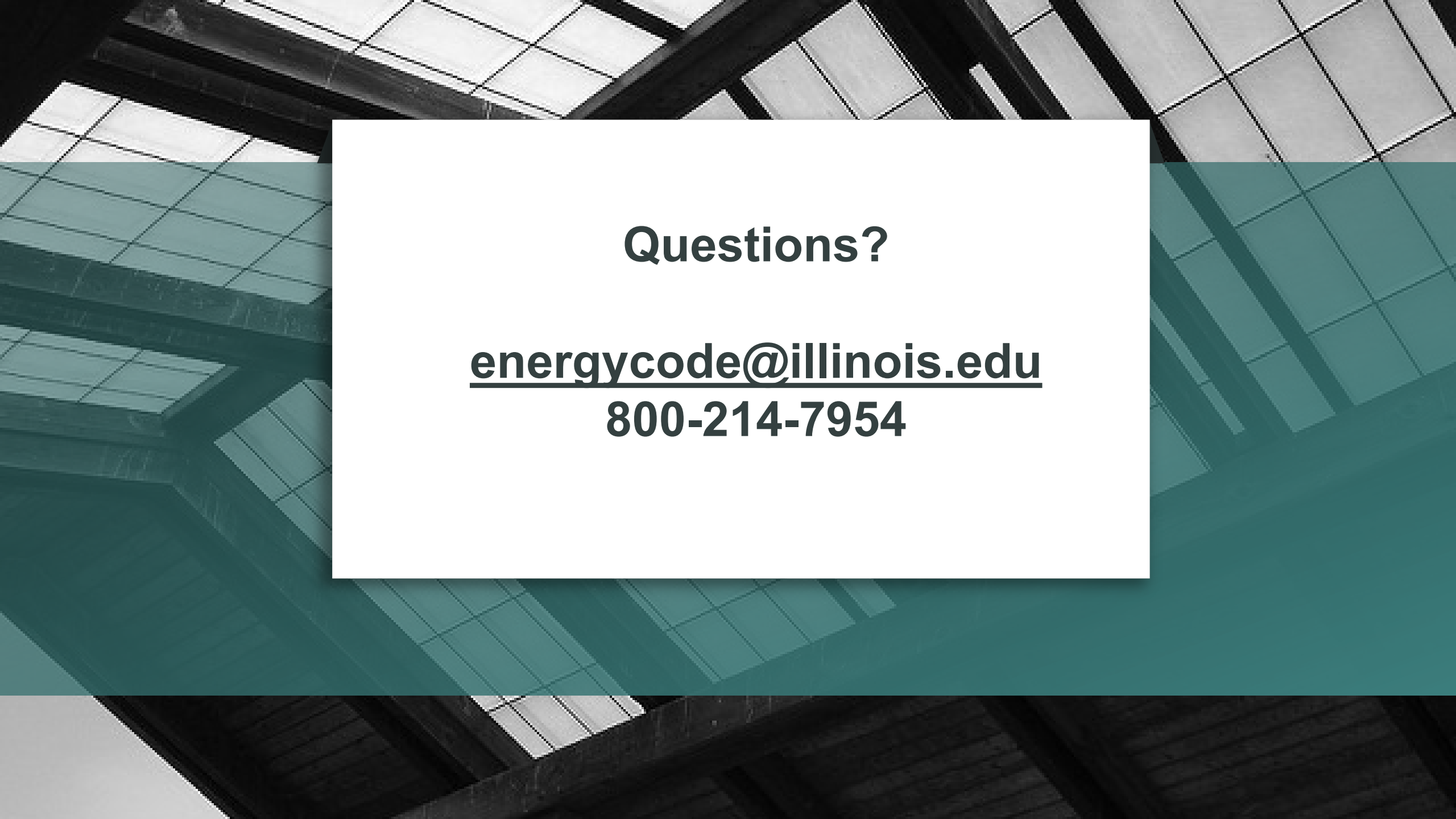
SECTION
C406.2.1: 5% heating efficiency improvement
C406.2.2: 5% cooling efficiency improvement
C406.2.3: 10% heating efficiency improvement
C406.2.4: 10% cooling efficiency improvement
C406.3: Reduced lighting power
C406.4: Enhanced digital lighting controls
C406.5: On-site renewable energy
C406.6: Dedicated outdoor air
C406.7.2: Recovered or renewable water heating
C406.7.3: Efficient fossil fuel water heater
C406.7.4: Heat pump water heater
C406.8: Enhanced envelope performance
C406.9: Reduced air infiltration
C406.10: Energy monitoring
C406.11: Fault detection and diagnostics system

- Formerly (2018), choose 1 measure
- Now (2021), collect 10 points
  (~2.5% savings)
- Point Value Tables based on Occupancy Group

SEDAC
SMART ENERGY DESIGN ASSISTANCE CENTER

Additional Efficiency Measures (need 10 pts)

Section – Climate Zone (Group)	4A (B)	5A (B)	4A (R & I)	5A (R & I)	4A (E)	5A (E)
5% heat improvement	NA	1	1	1	1	1
10% heat improvement +	3	2	1	1	2	1
5% cooling improvement	NA	2	1	2	2	3
10% cooling improvement +	5	4	2	1	4	2
Reduced lighting power +	8	7	2	2	8	8
Enhanced lighting controls	2	2	N/A	N/A	2	2
On-site renewable energy +	9	9	7	7	6	6
Dedicated outdoor air	5	5	6	8	N/A	N/A
Recovered/renewable water heat	N/A	N/A	14	14	1	1
Efficient water heater	N/A	N/A	8	9	2	2
Heat pump water heater	N/A	N/A	5	5	1	1
Enhanced envelope performance	7	10	4	4	1	2
Reduced air infiltration	8	11	7	9	N/A	1
Energy monitoring	3	2	1	1	2	2
Fault detection and diagnostics	1	1	1	1	1	1



Questions?

energycode@illinois.edu
800-214-7954