2021 IECC: Submitted Questions and Answers

12.12.2023

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Providing effective energy strategies for buildings and communities

ICC Preferred Provider # 2396

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Presenters:

Shawn Maurer

Ryan Siegel

Learning Objectives

By the end of the presentation, participants will be able to:

1. Describe the process of answering code compliance questions using code language
2. Apply energy code requirements to real world examples
3. Identify complex scenarios involving energy code requirements that may lead to questions
4. Evaluate energy code compliance questions using code language

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Who We Are

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Our mission: Reduce the energy footprint of Illinois and beyond

What We Do

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

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

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

We **educate.**

We **research.**

We **advocate** for a greener future.

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SEDAC is the Illinois Energy Conservation Code Training Provider

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

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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

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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

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SEDAC Energy Code Training Series

Energy Code Webinar Schedule

Archived – Energy Code Basics: How to Use the IECC
Archived – Existing Residential Buildings
Archived – Residential Stretch Code
TODAY – Q&A Review – How We Answer Energy Code Questions
02.20.24 – Commercial Stretch Code
04.09.24 – Simplified Code Compliance
05.21.24 – Existing Commercial Buildings
06.11.24 – Q&A Review – How We Answer Energy Code Questions

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

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SEDAC Energy Code In-person Workshops

Archived – Workshop 1 – Energy Code Basics, Simplifying Code Compliance & Q&A Review – Location: Springfield, IL

03.19.24 – Workshop 2 – Energy Code Basics, Simplifying Code Compliance & Q&A Review – Location: TBD

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

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Illinois Energy Conservation Code

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Illinois Energy Conservation Code

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

New Energy Code Coming to Illinois January 1, 2024

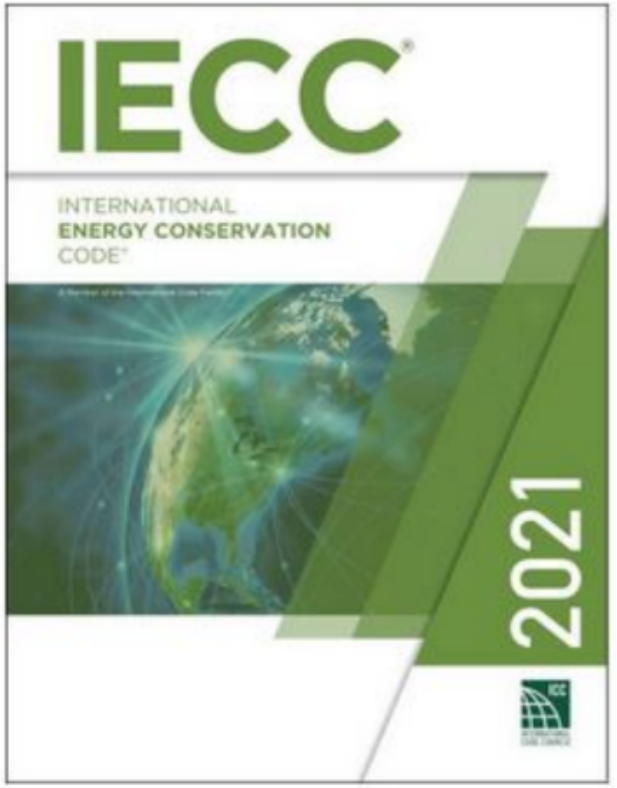
In accordance with the Energy Efficient Building Act, the Capital Development Board (CDB) is req[illegible]view and adopt the most current version of the International Energy Conservation Code (IECC) with[illegible] of its publication date. The Code will then become effective in Illinois within 6 months following [illegible]adoption by the CDB. The CDB, in conjunction with the Illinois Environmental Protection Agency and th[illegible]s Energy Conservation Advisory Council, initiates the cycle for the Illinois Energy Conservation Code to be updated every three years.

At its November 7 meeting, JCAR approved the new rules to update the Illi[illegible]Energy Conservation Code from the 2018 IECC with amendments to the 2021 IECC with amendments. On November 14, the Capital Development Board set the effective date for the changes as Janu[illegible]024. Any projects applying for permit on or after January 1, 2024 will need to comply with the ne[illegible]code.

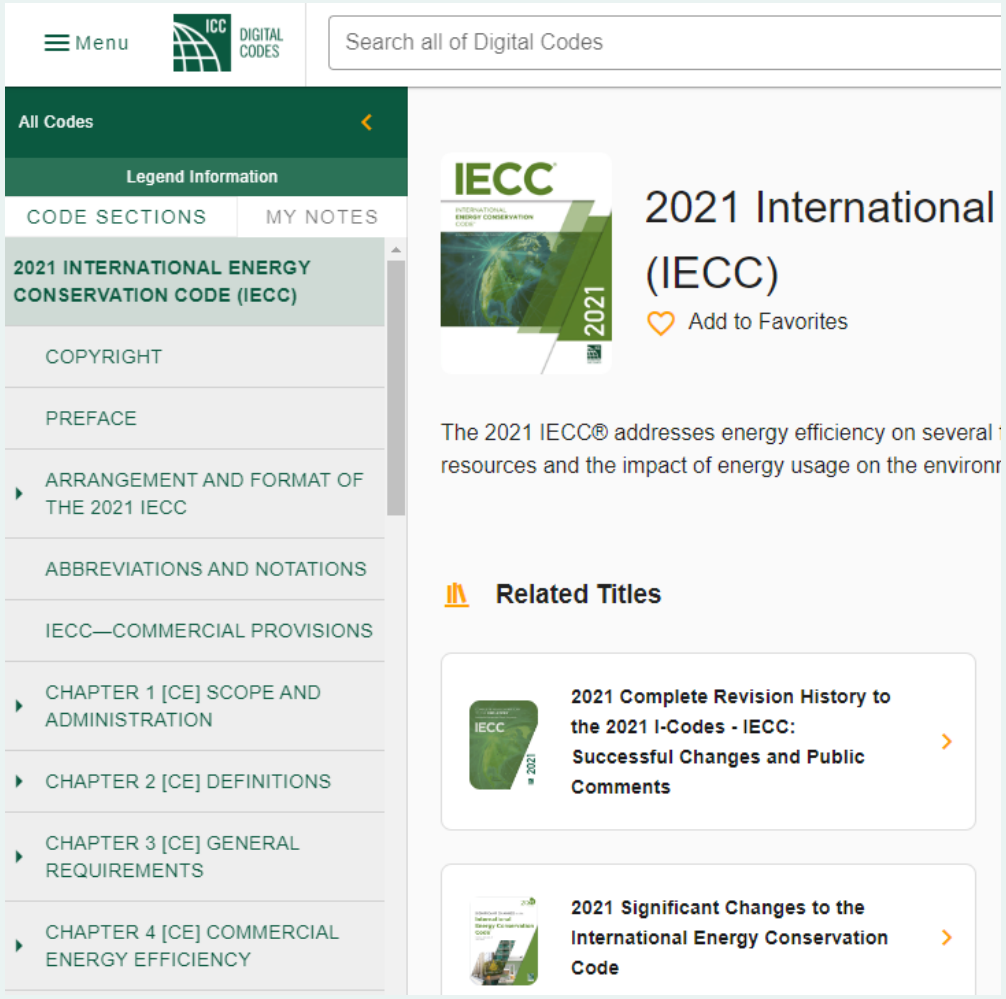
Coming SOON

The 2021 Illinois Energy Conservation Code can be accessed here:

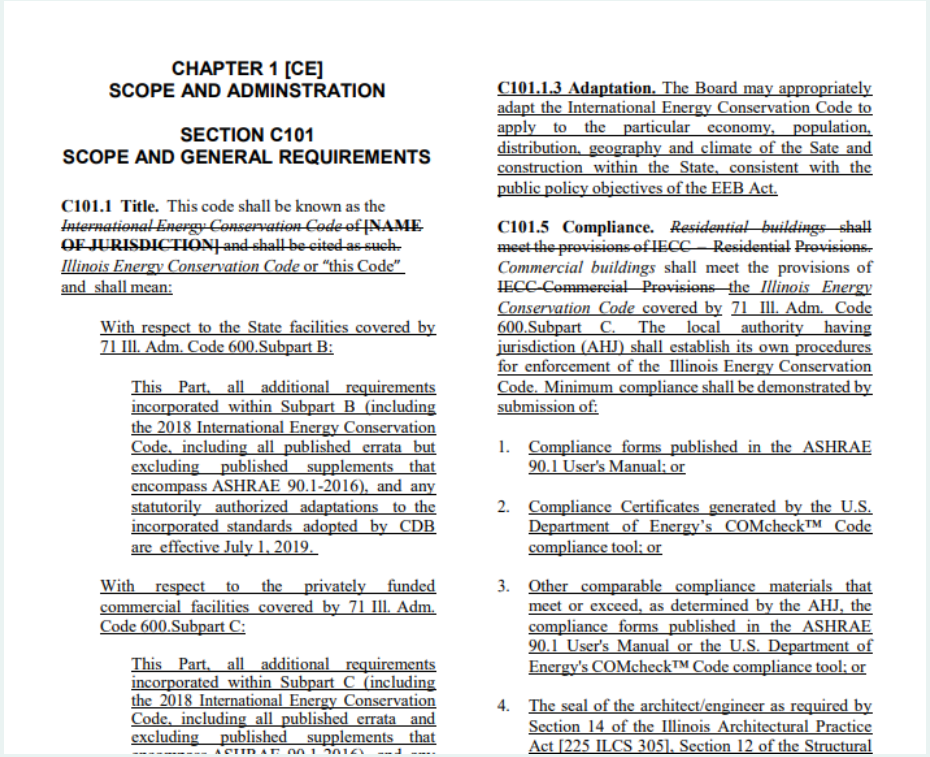
- 2021 IECC
- Illinois Amendments



Access to 2021 IECC & IL Amendments



IL Amendments DRAFT:
CDB May 2023 Board Book
pp 026-069



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

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—Residential Provisions. *Commercial 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

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

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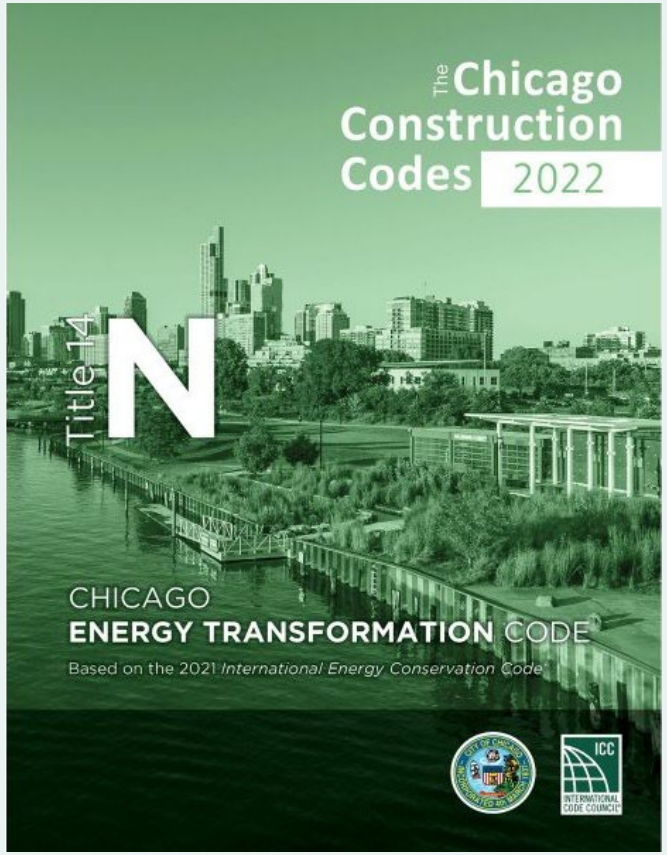
Access to Chicago Energy Transformation Code



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

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.*"

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Todays Presentation

Please DO NOT attempt to read the screenshots of code language in this presentation.

Screenshots will be used to show and explain our method of answering questions.

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Q & A – Lighting & Electrical

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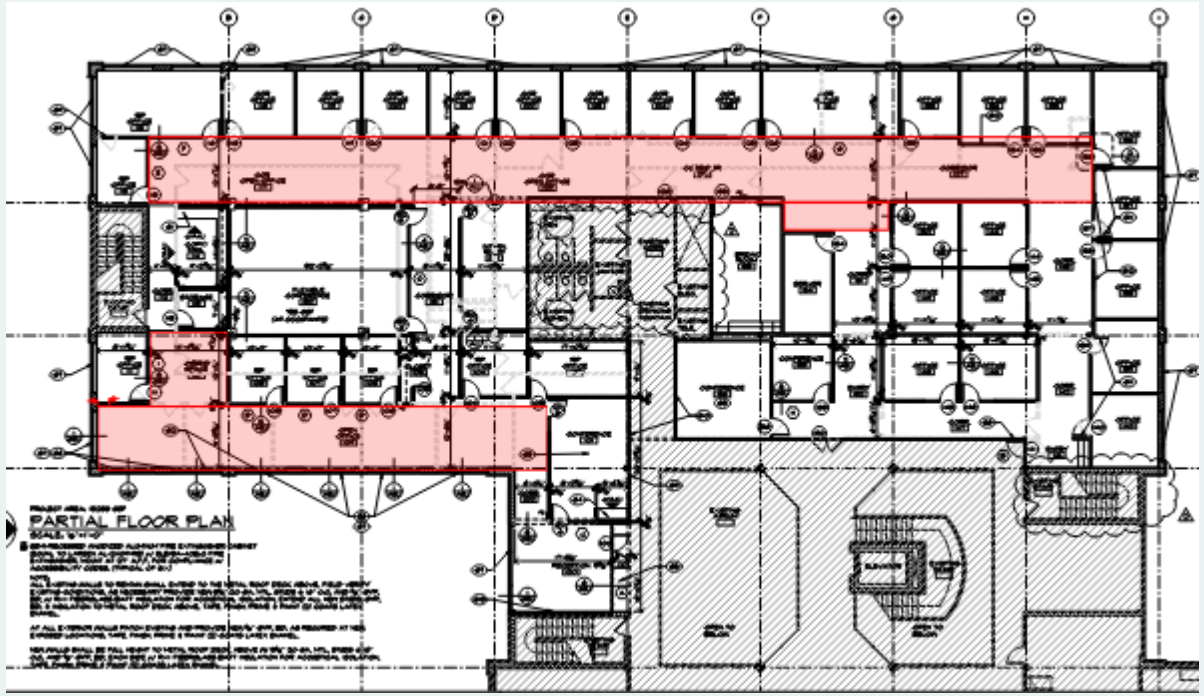
Question & Answer: Lighting Controls

Highlighted Area labeled Open Office, What controls are needed?

May depend on if *all* open office or partial corridor.

Designated Corridors can be exempted from open-office controls.

Work Areas would need to comply with open-office controls.



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Method: Lighting Controls

C405.2.1.1 Occupant sensor control function. P

Occupant sensor controls in warehouses shall comply with Section C405.2.1.2. Occupant sensor controls in open plan office areas shall comply with Section C405.2.1.3. Occupant sensor controls in corridors shall comply with Section C405.2.1.4. Occupant sensor controls for all other spaces specified in Section C405.2.1 shall comply with the following:

C405.2.1.3 Occupant sensor control function in open plan office areas. P

Occupant sensor controls in open plan office spaces less than 300 square feet (28 m^2) in area shall comply with Section C405.2.1.1. Occupant sensor controls in all other open plan office spaces shall comply with all of the following:

1. The controls shall be configured so that general lighting can be controlled separately in control zones with floor areas not greater than 600 square feet (55 m^2) within the open plan office space.
2. General lighting in each control zone shall be permitted to automatically turn on upon occupancy within the control zone. General lighting in other unoccupied zones within the open plan office space shall be permitted to turn on to not more than 20 percent of full power or remain unaffected.
3. The controls shall automatically turn off general lighting in all control zones within 20 minutes after all occupants have left the open plan office space.

   Exception: Where general lighting is turned off by time-switch control complying with Section C405.2.2.1.
4. General lighting in each control zone shall turn off or uniformly reduce lighting power to an unoccupied setpoint of not more than 20 percent of full power within 20 minutes after all occupants have left the control zone.

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Method: Lighting Controls

C405.2.1.1 Occupant sensor control function. P

Occupant sensor controls in warehouses shall comply with Section C405.2.1.2. Occupant sensor controls in open plan office areas shall comply with Section C405.2.1.3. Occupant sensor controls in corridors shall comply with Section C405.2.1.4. Occupant sensor controls for all other spaces specified in Section C405.2.1 shall comply with the following:

C405.2.1.4 Occupant sensor control function in corridors. P E

Occupant sensor controls in corridors shall uniformly reduce lighting power to an occupied setpoint not more than 50 percent of full power within 20 minutes after all occupants have left the space.

Exception: Corridors provided with less than two footcandles of illumination on the floor at the darkest point with all lights on.

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Question & Answer: Receptacle Controls

I have a question about the new section of the 2021 IECC regarding controlled receptacles. If there is an existing building that has a tenant space being renovated and most of the existing receptacles in that space are to remain, do I need to comply with this section of the code and replace receptacles with controlled type?

Existing receptacles don't have to include controls even if modified.

Existing controlled receptacles can't be removed.

Image source: pnnl.gov

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Method: Receptacle Controls

SECTION C503
ALTERATIONS P

C503.5 Lighting systems. P

New lighting systems that are part of the *alteration* shall comply with Sections C405 and C408.

Exception: *Alterations* that replace less than 10 percent of the luminaires in a space, provided that such *alterations* do not increase the installed interior lighting power.

C405.11 Automatic receptacle control. P

The following shall have automatic receptacle control complying with Section C405.11.1:

1. At least 50 percent of all 125V, 15- and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25 percent of branch circuit feeders installed for modular furniture not shown on the construction documents.

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Q & A: Renovating Lighting & Controls

I am doing an upgrade of some lighting. Do I have to upgrade the controls as well?

Just a fixture replacement = Likely no permit needed so full compliance is NOT required

Otherwise, new lighting must comply with C405 and C408

Note there is an exception.

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Method: Lighting Controls

SECTION C503
ALTERATIONS P

C503.5 Lighting systems. P

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Question & Answer: Sleeping Rooms

Do sleeping rooms (hotel rooms) require a "master switch" at entrance/exit door location?

Sleeping units do have their own lighting control requirements (C405.2.5)

A master switch at the entrance is not *required* by this section. *But*…

A master switch is one of the options for compliance

Image source: Pixabay royalty-free images

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Method: Sleeping Rooms

SECTION C405
ELECTRICAL POWER AND LIGHTING SYSTEMS P

C405.1 General. P

Lighting system controls, the maximum lighting power for interior and exterior applications, and electrical energy consumption shall comply with this section. *Sleeping units* shall comply with Section C405.2.5 and with either Section C405.1.1 or C405.3. *General lighting* shall consist of all lighting included when calculating the total connected interior lighting power in accordance with Section C405.3.1 and which does not require specific application controls in accordance with Section C405.2.5.

C405.2.5 Specific application controls.

2. *Sleeping units* shall have control devices or systems that are configured to automatically switch off all permanently installed luminaires and switched receptacles within 20 minutes after all occupants have left the unit.

Exceptions:

1. Lighting and switched receptacles controlled by card key controls.
2. Spaces where patient care is directly provided.

OR

C405.1.1 Lighting for dwelling units. E P E P E P

No less than 90 percent of the permanently installed lighting serving dwelling units, excluding kitchen appliance lighting, shall be provided by lamps with an efficacy of not less than 65 lm/W or luminaires with an efficacy of not less than 45 lm/W, or shall comply with Sections C405.2.4 and C405.3.

C405.3 Interior lighting power requirements. P P P

A building complies with this section where its total connected interior lighting power calculated under Section C405.3.1 is not greater than the interior lighting power allowance calculated under Section C405.3.2.

Question & Answer: Exterior Sign Controls

I have an internally-lit exterior sign and want to know what controls it needs. Is it 'façade', 'decorative', something else?

Signage lighting falls into the "other" category

Signage lighting does require controls per C405.2.7 (does not meet exceptions)

Can be included in 50% setback required by C405.2.7.3

OR

Can be included in 50% that remain on

Image source: Pixabay royalty-free images.

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Method: Exterior Sign Controls

C405.2.7 Exterior lighting controls. P

Exterior lighting systems shall be provided with controls that comply with Sections C405.2.7.1 through C405.2.7.4.

Exceptions:

~~1. Lighting for covered vehicle entrances and exits from buildings and parking structures where required for eye adaptation.~~

~~2. Lighting controlled from within dwelling units.~~

C405.2.7.1 Daylight shutoff.

Lights shall be automatically turned off when daylight is present and satisfies the lighting needs.

C405.2.7.2 Building facade and landscape lighting. P

C405.2.7.3 Lighting setback. P

Lighting that is not controlled in accordance with Section C405.2.7.2 shall comply with the following:

1. Be controlled so that the total wattage of such lighting is automatically reduced by not less than 50 percent by selectively switching off or dimming luminaires at one of the following times:
   1.1. From not later than midnight to not earlier than 6 a.m.
   1.2. From not later than one hour after business closing to not earlier than one hour before business opening.
   1.3. During any time where activity has not been detected for 15 minutes or more.
2. Luminaires serving outdoor parking areas and having a rated input wattage of greater than 78 watts and a mounting height of 24 feet (7315 mm) or less above the ground shall be controlled so that the total wattage of such lighting is automatically reduced by not less than 50 percent during any time where activity has not been detected for 15 minutes or more. Not more than 1,500 watts of lighting power shall be controlled together.

Q&A – Mechanical & Service Water

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Q & A: Comm. Kitchen Hot Water

I have an existing space with a restroom changing to a pretzel shop adding a 3-pan sink, mop sink, and handwash sink. Do I need to add a circulation system?

Yes, new sinks will likely require a circulation system to be installed due to the limitations on length/volume of piping between fixture connection and hot water source.

Image source:
SEDAC site visit

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Method: Comm. Kitchen Hot Water

SECTION C503
ALTERATIONS P

C503.4 Service hot water systems. P

New service hot water systems that are part of the *alteration* shall comply with Sections C404 and C408.

C404.5.1 Maximum allowable pipe length method.

The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the following. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

1. For a public lavatory faucet, use the "Public lavatory faucets" column in Table C404.5.1.
2. For all other plumbing fixtures and plumbing appliances, use the "Other fixtures and appliances" column in Table C404.5.1.

C404.6 Heated-water circulating and temperature maintenance systems.

Heated-water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Controls for hot water storage shall be in accordance with Section C404.6.3. Automatic controls, temperature sensors and pumps shall be in a location with *access*. Manual controls shall be in a location with *ready access*.

Question & Answer: HVAC Sizing

I have a condenser replacement permit in which the heat loss according to Manual J is 18,811 Btu's and they are specifying 2.5 ton or 30,000 Btu's. This may be correctly sized, but wouldn't they need to give me a reason for why it is oversized?

Yes, some justification of unit sizing is required.

Manual S prohibits cooling equipment larger than 115% of the calculated load.

Manual S prohibits heating equipment larger than 140% of the calculated load.

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HVAC Sizing

SECTION R503
ALTERATIONS

R503.1 General. P

Alterations to any building or structure shall comply with the requirements of the code for new construction, without requiring the unaltered portions of the existing building or building system to comply with this code. *Alterations* shall be such that the existing building or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*.

R503.1.2 Heating and cooling systems.

HVAC ducts newly installed as part of an *alteration* shall comply with Section R403.

Exception: Where ducts from an existing heating and cooling system are extended to an *addition*.

R403.7 Equipment sizing and efficiency rating. P

Heating and cooling *equipment* shall be sized in accordance with ACCA Manual S based on *building* loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies. New or replacement heating and cooling *equipment* shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the *equipment* is installed.

3	Equipment Performance	Equipment selected satisfies Total Btus (for cooling the Sensible and **Latent** load)	Is the total heating capacity of the selected equipment ≤140% of the designed total heating load? (If not reduce equipment size) F
			Is the total cooling capacity of the selected equipment ≤115% of the designed total cooling load ? (If not reduce equipment size) F
			Does the "Sensible" and/or "Latent" capacities of the selected equipment meet the load's requirements? G

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Question & Answer: Sunroom Fireplace

I would like to install a gas fireplace in my sunroom, but I am being told that I can't. Why?

The answer depends on if the sunroom is currently conditioned or not.

Unconditioned Sunroom: Adding a fireplace means the space is now conditioned and must meet requirements in R502.2.

Conditioned Sunroom: Adding a fireplace does not trigger further requirements.

Image source: Pixabay royalty-free images.

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Method: Sunroom Fireplace

SECTION R202
GENERAL DEFINITIONS P E

CONDITIONED SPACE. An area, room or space that is enclosed within the *building thermal envelope* and that is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with conditioned spaces, where they are separated from conditioned spaces by uninsulated walls, floors or ceilings, or where they contain uninsulated ducts, piping or other sources of heating or cooling.

R402.2.12 Sunroom and heated garage insulation. P

Sunrooms enclosing *conditioned space* and heated garages shall meet the insulation requirements of this code.

Exception: For *sunrooms* and heated garages provided *thermal isolation*, and enclosed *conditioned space*, the following exceptions to the insulation requirements of this code shall apply:

1. The minimum ceiling insulation *R*-values shall be R-19 in *Climate Zones* 0 through 4 and R-24 in *Climate Zones* 5 through 8.
2. The minimum wall insulation *R*-value shall be R-13 in all *climate zones*. Walls separating a *sunroom* or heated garage with *thermal isolation* from *conditioned space* shall comply with the *building thermal envelope* requirements of this code.

R402.3.5 Sunroom and heated garage fenestration. P

Sunrooms and heated garages enclosing *conditioned space* shall comply with the fenestration requirements of this code.

Exception: In Climate Zones 2 through 8, for *sunrooms* and heated garages with *thermal isolation* and enclosing *conditioned space*, the fenestration *U*-factor shall not exceed 0.45 and the skylight *U*-factor shall not exceed 0.70.

w fenestration separating a *sunroom* or heated garage with *thermal isolation* from *conditioned space* shall comply with the *building thermal envelope* requirements of this code.

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Question & Answer: Ductwork Insulation

I am replacing rooftop units with exposed horizontal ductwork. The new units will require some additional ductwork to connect to the existing. The existing has an internal liner and I am planning to install the same in the new ductwork. How much insulation do I need to install on the new exterior section of ductwork? Can I account for the insulation value of the liner?

C403.12.1 Duct and plenum insulation & sealing:

- R-6 in unconditioned spaces
- R-8 for exterior ductwork and separating interior ducts from exterior conditions in CZ4
- R-12 for exterior ductwork and separating interior ducts from exterior conditions in CZ5

Interior liner can be included but...

Image source: Heat and Frost Insulators Union, Local 17

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Method: Ductwork Insulation

SECTION C503
ALTERATIONS P

C503.3 Heating and cooling systems.

New heating, cooling and duct systems that are part of the *alteration* shall comply with Sections C403 and C408.

C403.12 Construction of HVAC system elements. P

Ducts, plenums, piping and other elements that are part of an HVAC system shall be constructed and insulated in accordance with Sections C403.12.1 through C403.12.3.1.

C403.12.1 Duct and plenum insulation and sealing.

Supply and return air ducts and plenums shall be insulated with not less than R-6 insulation where located in unconditioned spaces and where located outside the building with not less than R-8 insulation in *Climate Zones* 0 through 4 and not less than R-12 insulation in *Climate Zones* 5 through 8. Ducts located underground beneath buildings shall be insulated as required in this section or have an equivalent thermal distribution efficiency. Underground ducts utilizing the thermal distribution efficiency method shall be *listed* and *labeled* to indicate the *R*-value equivalency. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by not less than R-8 insulation in *Climate Zones* 0 through 4 and not less than R-12 insulation in *Climate Zones* 5 through 8.

Exceptions:

1. ~~Where located within equipment.~~
2. ~~Where the design temperature difference between the interior and exterior of the duct or plenum is not greater than 15°F (8°C).~~

Ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

What about the interior liner?

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More: Ductwork Insulation

Do you count the Interior duct liner?

Potential reasons to <u>not</u> count it:

- Liners are often used for acoustical purposes, not necessarily insulation purposes.
- It may be difficult to verify the existing liner's R-value
- Interior duct liners often break down quickly and introduce debris into the supply air flow

Image source: https://fiberglassawareness.com/fiberglass/fiberglassductliners.htm

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Q & A: Do I need Energy Recovery

Climate zone 5A, **34,000CFM** total, 7,700CFM Outside air **(23%)**;

Does this require energy recovery per Table C403.7.4.2(1) or C403.7.4.2(2)?

Energy Recovery requirements are triggered by the airflow rate of the supply fan in relation to the percentage of outside air and unit operating hours.

In this case, Yes, energy recovery is required due to the 34,000cfm design airflow.

Image source:
SEDAC site visit

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Method: Do I need Energy Recovery

SECTION C403

BUILDING MECHANICAL SYSTEMS P

TABLE C403.7.4.2(1) ENERGY RECOVERY REQUIREMENT (Ventilation systems operating less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥ 10% and < 20%	≥ 20% and < 30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	Design Supply Fan Airflow Rate (cfm)							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	NR	NR
0B, 1B, 2B, 5C	NR	NR	NR	NR	≥ 26,000	≥ 12,000	≥ 5,000	≥ 4,000
6B	≥ 28,000	≥ 26,000	≥ 11,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,500	≥ 1,500
0A, 1A, 2A, 3A, 4A, 5A, 6A	≥ 26,000	≥ 16,000	≥ 5,500	≥ 4,500	≥ 3,500	≥ 2,000	≥ 1,000	> 120
7, 8	≥ 4,500	≥ 4,000	≥ 2,500	≥ 1,000	> 140	> 120	> 100	> 80

For SI: 1 cfm = 0.4719 L/s.

NR = Not Required.

TABLE C403.7.4.2(2) ENERGY RECOVERY REQUIREMENT (Ventilation systems operating not less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥ 10% and < 20%	≥ 20% and < 30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	Design Supply Fan Airflow Rate (cfm)							
3C	NR	NR	NR	NR	NR	NR	NR	NR
0B, 1B, 2B, 3B, 4C, 5C	NR	≥ 19,500	≥ 9,000	≥ 5,000	≥ 4,000	≥ 3,000	≥ 1,500	≥ 120
0A, 1A, 2A, 3A, 4B, 5B	≥ 2,500	≥ 2,000	≥ 1,000	≥ 500	≥ 140	≥ 120	≥ 100	≥ 80
4A, 5A, 6A, 6B, 7, 8	≥ 200	≥ 130	≥ 100	≥ 80	≥ 70	≥ 60	≥ 50	≥ 40

Question & Answer: Commissioning

Is 3rd party commissioning mandatory in 2021 IECC?

No, *3rd party* commissioning is not mandatory.

Commissioning can be performed by the registered design professional

Or

An *approved* agency

Image source: Pacific Northwest National Laboratory

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Method: Commissioning

SECTION C408
MAINTENANCE INFORMATION AND SYSTEM COMMISSIONING

C408.2 Mechanical systems and service water-heating systems commissioning and completion requirements.

Prior to the final mechanical and plumbing inspections, the *registered design professional or approved agency* shall provide evidence of mechanical systems *commissioning* and completion in accordance with the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner or owner's authorized agent and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exceptions: The following systems are exempt:

1. Mechanical systems and service water-heating systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140.7 kW) cooling capacity and 600,000 Btu/h (175.8 kW) combined service water-heating and space-heating capacity.
2. Systems included in Section C403.5 that serve individual *dwelling units* and *sleeping units*.

C408.3 Functional testing of lighting controls.

Automatic lighting controls required by this code shall comply with this section.

C408.3.1 Functional testing. P

Prior to passing final inspection, the *registered design professional* or *approved agency* shall provide evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the *construction documents* and manufacturer's instructions. Functional testing shall be in accordance with Sections C408.3.1.1 through C408.3.1.3 for the applicable control type.

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Q&A – Thermal Envelope

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Q&A: Current Insulation Requirements

What are the wall & ceiling insulation requirements?

	R-Values	U-Factors
Commercial	Table C402.1.3	Table C402.1.4
Residential	Table R402.1.3	Table R402.1.2

U-factor provides more flexibility in assembly choices; R-value and U-factor are approximately equivalent

R-value is slightly higher performance accounting for thermal bridges and errors in installation.

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Question & Answer: Roofing Insulation

I have a 3-flat residential building and am to replace the roof. It is a wood-framed flat roof with built-up roofing on the exterior. There is no continuous insulation above the roof decking, and in the past 10-15 years, I have attempted to blow in some insulation in the roof cavities. What insulation do I need to install?

This is a *cavity insulated* assembly and meets exception #2 under R503.1.1.

The exposed cavity simply needs to be filled with insulation.

Image source: Building America Solutions Center - PNNL

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Method: Roofing Insulation

SECTION R503
ALTERATIONS

R503.1.1 Building envelope.

Building envelope assemblies that are part of the *alteration* shall comply with Section R402.1.2 or R402.1.4, Sections R402.2.1 through R402.2.12, R402.3.1, R402.3.2, R402.4.3 and R402.4.5. ?

Exception: The following alterations shall not be required to comply with the requirements for new construction provided that the energy use of the building is not increased:

1. ~~Storm windows installed over existing fenestration.~~
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Roof recover.
5. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Surface-applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided that the code does not require the glazing or fenestration assembly to be replaced.

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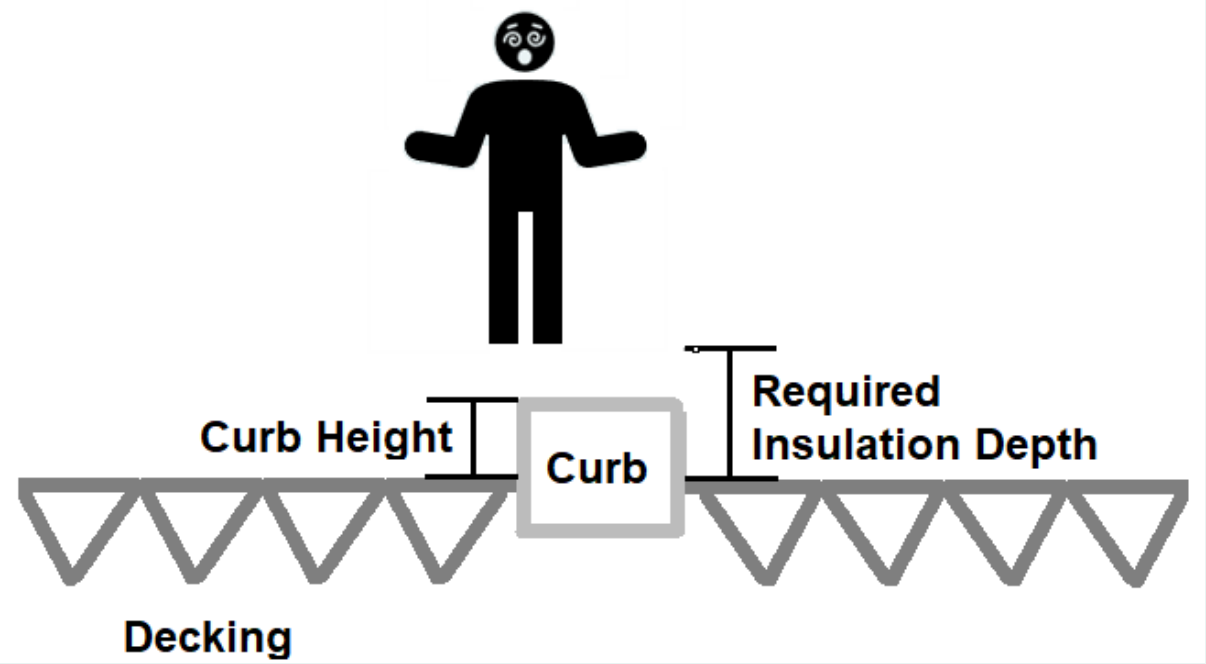
Question & Answer: Roofing Insulation

I am looking for some help on a reroof question. If the old roof insulation is completely removed down to the deck and the existing RTU curbs are not tall enough to allow the R-30 required, do they have to raise the curbs?

In short, *no*, the equipment curbs do not have to be raised but…

You *do* need to install the required insulation.

Recent ICC interpretation has stated the *only* exception to the insulation requirement is a roof structure that can not handle the additional weight.



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Method: Roofing Insulation

SECTION C503

ALTERATIONS P

C503.1 General. P

Alterations to any *building* or structure shall comply with the requirements of Section C503. *Alterations* shall be such that the existing *building* or structure is not less conforming to the provisions of this code than the existing *building* or structure was prior to the *alteration*. *Alterations* to an existing *building*, *building* system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing *building* or *building* system to comply with this code. *Alterations* shall not create an unsafe or hazardous condition or overload existing *building* systems.

Exception: The following *alterations* need not comply with the requirements for new construction, provided that the energy use of the building is not increased:

1. Storm windows installed over existing *fenestration*.
2. Surface-applied window film installed on existing single-pane *fenestration* assemblies reducing solar heat gain, provided that the code does not require the glazing or *fenestration* to be replaced.
3. Existing ceiling, wall or floor cavities exposed during construction, provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. *Roof recover*.
6. *Air barriers* shall not be required for *roof recover* and roof replacement where the *alterations* or renovations to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.

C503.2.1 Roof replacement. P

Roof replacements shall comply with Section C402.1.3, C402.1.4, C402.1.5 or C407 where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck. In no case shall the *R*-value of the roof insulation be reduced or the *U*-factor of the roof assembly be increased as part of the *roof replacement*.

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Q & A: Occupancy Type & Insulation

We're having difficulty interpreting the required R-values for a 2 and a 5 story Residential building in Chicago. I thought it was R= 30 exterior walls and R=42 roofs with all insulation above concrete low-slope roofs?

Occupancy Type (From 2022 CETC):

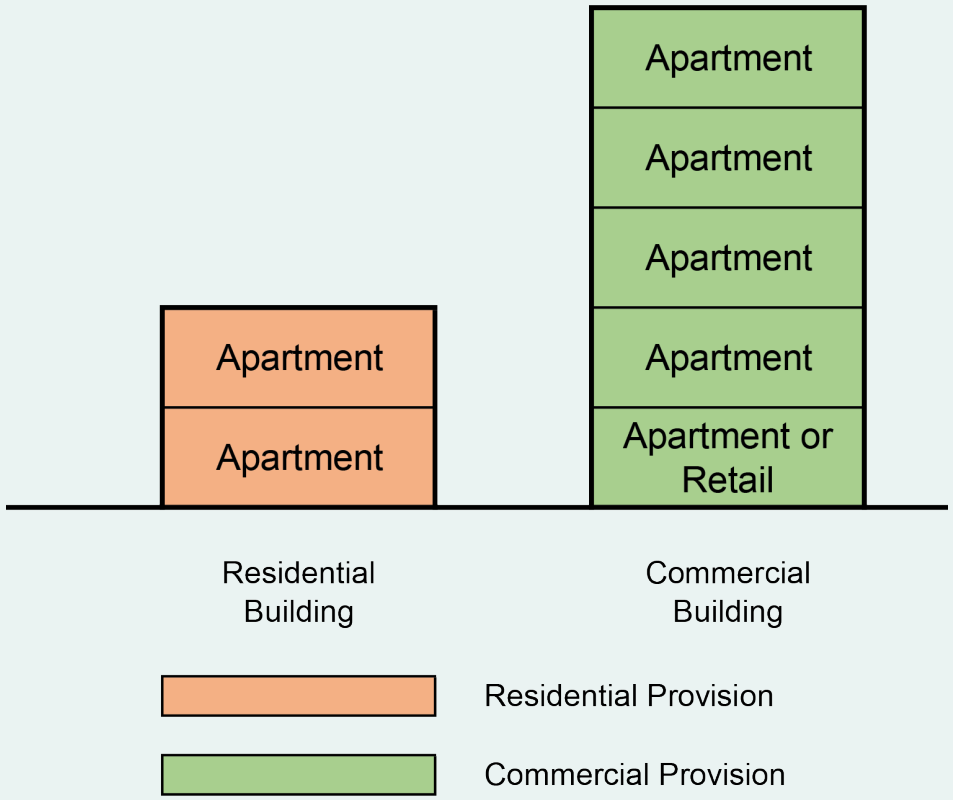
2-story building: Residential provisions

5-story building: Commercial provisions

Insulation (From 2022 CETC):

2-story building: Table R402.1.2 or R402.1.3

5-story building: Table C402.1.3 or C402.1.4



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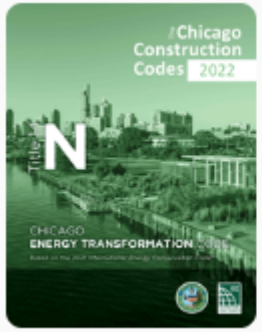
Method: Occupancy Type



2022 Chicago Energy Transformation Code

Add to Favorites

CHAPTER C2
DEFINITIONS

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of "Residential building."

RESIDENTIAL BUILDING (for this code only). Group R-2, R-3, R-4 and R-5 occupancies with no more than four *stories above grade plane.*

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Method: Applicable Insulation

TABLE C402.1.3 OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a]

CLIMATE ZONE	5	
	All other	Group R
Roofs		
Insulation entirely above roof deck	R-30ci	R-30ci
Metal buildings[b]	R-19 + R-11 LS	R-19 + R-11 LS
Attic and other	R-49	R-49
Walls, above grade		
Mass[f]	R-11.4ci	R-13.3ci
Metal building	R-13 + R-14ci	R-13 + R-14ci
Metal framed	R-13 + R-10ci	R-13 + R-10ci
Wood framed and other	R-13 + R-7.5ci or R-20 + R-3.8ci	R-13 + R-7.5ci or R-20 + R-3.8ci

TABLE R402.1.3 INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

FENESTRATION *U*-FACTOR[b, i]	SKYLIGHT *U*-FACTOR[b]	GLAZED FENESTRATION SHGC[b]	WOOD FRAME ROOF/CEILING *R*-VALUE	WOOD FRAME WALL *R*-VALUE[g]	MASS WALL *R*-VALUE[h]	FLOOR *R*-VALUE	BASEMENT WALL *R*-VALUE[c, g]	SLAB *R*-VALUE & DEPTH[d]	CRAWL SPACE WALL *R*-VALUE[c, g]
0.30	0.55	0.40	60	30 or 20&5ci[h, i] or 13&10ci[h] or 0&20ci[h]	13/17	30	15ci or 19 or 13&5ci	10ci, 4 ft	15ci or 19 or 13&5ci[h]

Question & Answer: Roofing Repairs

What are the requirements for roofing repairs?

The IECC defines *a roof repair* in Chapter 2.

This definition is referenced in Section C504: Repairs.

Roof repairs are listed as a repair in this section and are *not* subject to the requirements of the Alteration section.

No requirement to add insulation during a roof repair.

Image source: Building America Solutions Center - PNNL

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Method: Roofing Repairs

CHAPTER 2 [CE] DEFINITIONS

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

SECTION C504
REPAIRS

C504.1 General.

Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered to be part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary *repairs* exempt from *permit* and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1, repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application.

For the purposes of this code, the following shall be considered to be repairs:

1. Glass-only replacements in an existing sash and frame.
2. *Roof repairs.*
3. Air barriers shall not be required for *roof repair* where the repairs to the building do not include *alterations*, renovations or *repairs* to the remainder of the building envelope.
4. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
5. *Repairs* where only the bulb, the ballast or both within the existing luminaires in a space are replaced, provided that the replacement does not increase the installed interior lighting power.

Question & Answer: UA Tradeoff

I received a RESCheck report indicating a UA tradeoff and the walls were 2x4 with R-13 insulation and no continuous insulation which I know doesn't comply with the R-value table. Is the UA tradeoff valid and how does it work?

Yes, UA tradeoff is still a valid compliance path. *However*…

2x4 walls with R-13 insulation are *far* below code compliance. This means performance must be made up in other assemblies.

Walls	Assembly	Gross Area	Orientation	Cavity Insulation R-Value	Continuous Insulation R-Value	U-Factor	
Wall	Wood Frame, 16" o.c.	400	Front side	13	0	0.082	
Wall Copy	Wood Frame, 16" o.c.	400	Right side	13	5	0.057	

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Method: UA Tradeoff

Envelope Assemblies

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Prop. U-Factor	Req. U-Factor	Prop. UA	Req. UA
Ceiling: Flat Ceiling or Scissor Truss	960	23.0	23.0	0.022	0.026	21	25
Wall: Wood Frame, 16" o.c. Orientation: Unspecified	2,418	13.0	0.0	0.082	0.060	157	115
Door: Solid Door (under 50% glazing) Orientation: Unspecified	40			0.300	0.300	12	12
Window 1: Vinyl Frame Orientation: Unspecified	18			0.200	0.300	4	5
Window: Vinyl Frame Orientation: Unspecified	450			0.200	0.300	90	135
Basement Wall: Solid Concrete or Masonry Orientation: Front Wall height: 7.0' Depth below grade: 5.0' Insulation depth: 6.5'	854	0.0	15.0	0.055	0.050	47	43

Compliance: **1.2% Better Than Code** Maximum UA: **335** Your UA: **331**

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Q&A - Administrative

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Question & Answer: Enacting Ordinances

What ordinances does my municipality need to adopt to comply with the state's energy code requirements?

Nothing is specifically required. Best practice would be to specify "current IL Energy Conservation Code" rather than a specific version to avoid conflict between local ordinance and state law.

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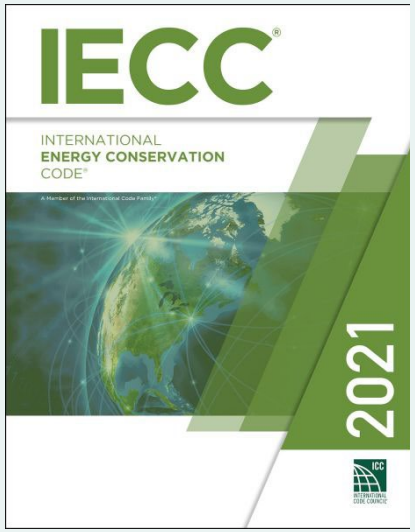
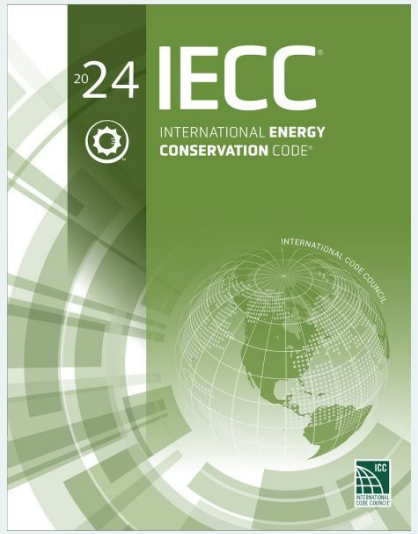
Question & Answer: 2024 IECC Adoption

Are we expecting adoption of the 2024 IECC in 2025?

Yes: in accordance with the Energy Efficient Building Act (20 ILCS 3125), the most recent IECC shall be adopted within 12 months of 1st publication and take effect within 6 months thereafter.

1st publication of 2024 IECC anticipated December 2023, thus adoption is expected to be sometime in June or July of 2025.





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Question & Answer: Code Going Too Far?

Is the energy code still cost effective and resource efficient?

PNNL determined a 30-year life cycle savings of $1,034 to $2,243 per home including added mortgage costs vs. decreased utility costs. Simple payback of improvements between 12.4 and 16.7 years in CZ 4 and 5.

Code specifies performance rather than materials and specific techniques

Table 14. Life-Cycle Cost Savings for the 2021 IECC

Climate Zone	Compared to the 2018 IECC ($/dwelling unit)
1	3,536
2	2,854
3	2,829
4	2,243
5	1,034
6	970
7	3,783
8	6,782
National Average	2,320

Table ES.2. Simple Payback Period for the 2021 IECC

Climate Zone	Compared to the 2018 IECC (Years)
1	4.8
2	7.6
3	8.6
4	12.4
5	16.7
6	11.2
7	9.6
8	7.3
National Average	10.5

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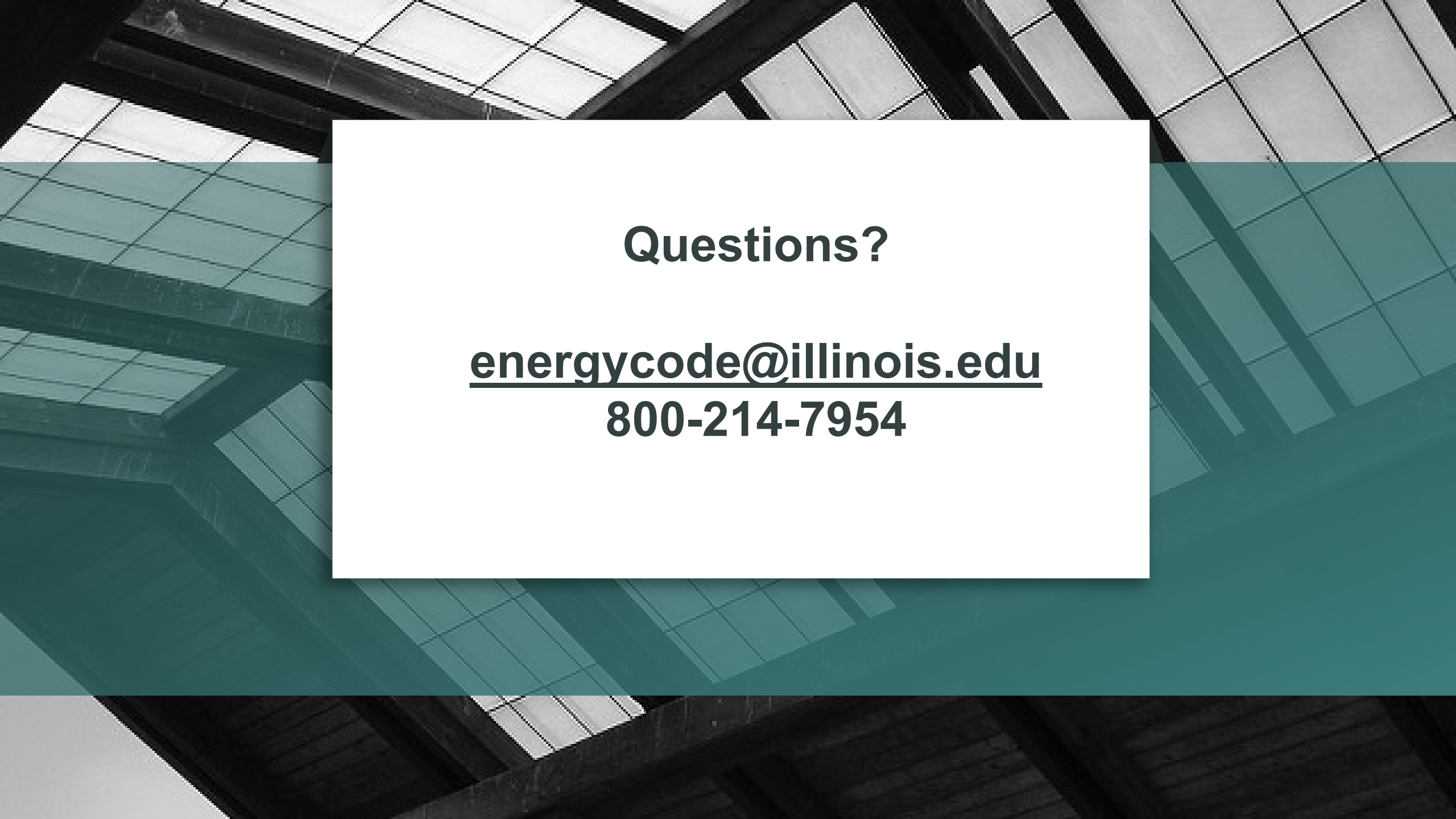

Questions?

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