Roofing Week in Chicago
January 18-20, 2023

Low-slope technical update

Mark S. Graham
Vice President, Technical Services
National Roofing Contractors Association

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Topics

- Market condition update
- Ignition temperature testing
- Moisture in concrete roof decks
  - Vapor retarder adhesion testing
- Code development and adoptions
- Contractor-reported problems
- Questions… and other topics

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Market condition update

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ARMA Releases 2022 Q4 Report on Asphalt Roofing Product Shipments

Asphalt Roofing Product Shipments

Shipments (squares)	Q4 2022	Q4 2021	% Change	YTD 2022	YTD 2021	% Change
Shingles – U.S. (including individual shingles)	29,865,538	37,014,634	-19.3%	157,749,481	169,188,143	-6.8%
BUR base, ply, and mineral cap sheets – U.S. (not including saturated felts)	1,398,161	1,344,956	4.0%	7,055,363	6,587,255	7.1%
Modified Bitumen – U.S.	8,040,453	8,930,779	-10.0%	38,996,142	39,805,747	-2.0%
Shingles – Canada (including Individual shingles)	1,569,610	2,917,763	-46.2%	12,109,765	14,215,825	-14.8%

About ARMA:
The Asphalt Roofing Manufacturers Association (ARMA) is a trade association representing North America's asphalt roofing manufacturing companies and their raw material suppliers. The association includes the majority of North American manufacturers of asphalt shingles and asphalt low slope roof membrane systems. Committed to advances in the asphalt roofing industry, ARMA is proud of the role it plays in promoting asphalt roofing to those in the building industry and to the public.

Asphalt. The Roofing Solution.

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What to expect in 2023…

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<u>Ignition temperature testing</u>

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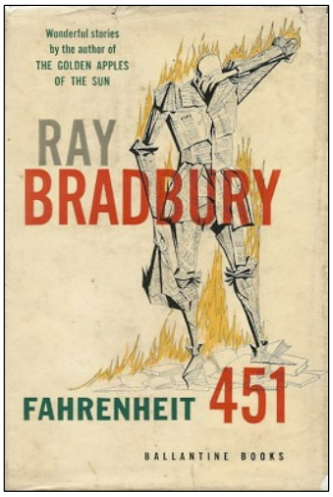
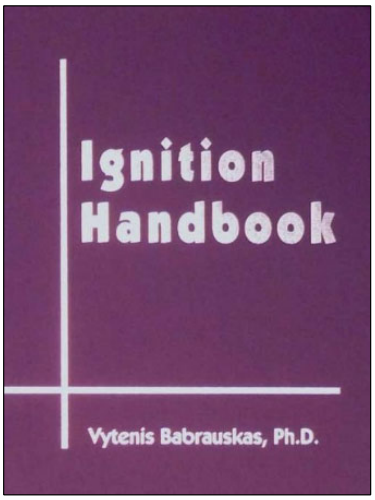


Published in 1953



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Some known roof application temperatures

Mopping bitumen:

- EVT: 375 F to 455 F (typ.)
- Flash point: 525 F (min.)

Hot-air welding:

- Equipment settings up to 600 C (1,112 F)

Torch application:

- Blue flame: 3,596 F
- Yellow/orange flame: 1,800 F

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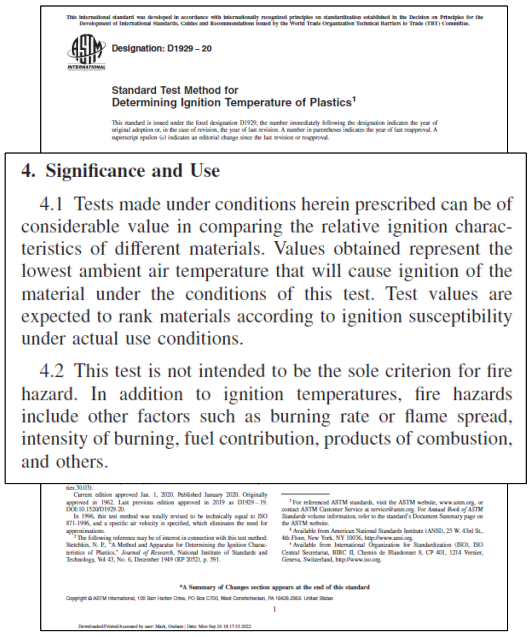

Designation: D1929 – 20

Standard Test Method for
Determining Ignition Temperature of Plastics[1]

4. Significance and Use

4.1 Tests made under conditions herein prescribed can be of considerable value in comparing the relative ignition characteristics of different materials. Values obtained represent the lowest ambient air temperature that will cause ignition of the material under the conditions of this test. Test values are expected to rank materials according to ignition susceptibility under actual use conditions.

4.2 This test is not intended to be the sole criterion for fire hazard. In addition to ignition temperatures, fire hazards include other factors such as burning rate or flame spread, intensity of burning, fuel contribution, products of combustion, and others.

ASTM D1929, "Standard Test Method for Determining Ignition Temperature of Plastics"

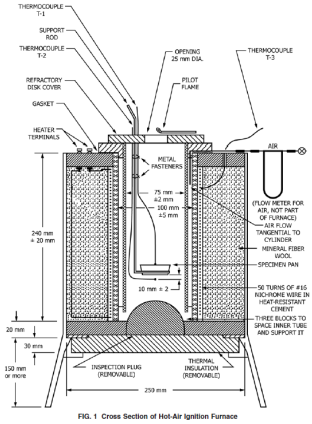

FIG. 1 Cross Section of Hot-Air Ignition Furnace

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ASTM D1929 results

Sample	Test result
Extruded polystyrene	865 F
HD polyiso with glass facer	865 F
Wood fiberboard	875 F
Polyiso with coated glass facer	895 F
Perlite board	905 F
Expanded polystyrene	910 F
Polyiso with cellulose/glass facer	920 F
Cellular glass with facer	965 F
Mineral fiber board	1,040 F
Gypsum-fiber board	Greater than 1,740 F
Gypsum board with coated fiberglass facer	Greater than 1,740 F
Cellular glass (no facer)	Greater than 1,740 F

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Recommendations

- When hot-air welding or torching roofing products, realize the relative differences in ignition temperatures of various insulation substrates
- Share this information/concept with field workers

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Moisture-related issues with concrete roof decks

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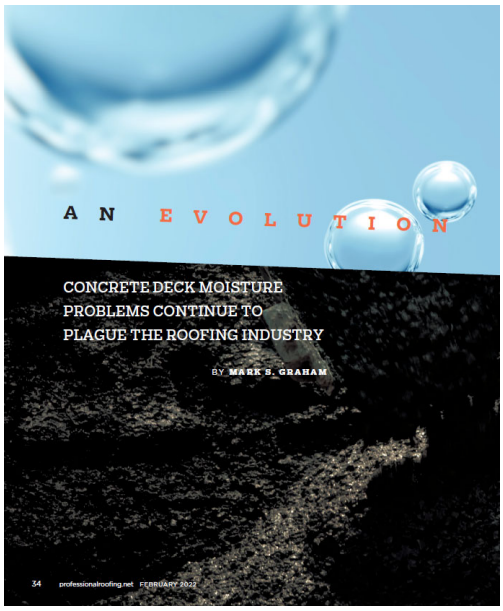

Link

Professional Roofing
February 2022

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NRCA recommends designers specify an adhered vapor retarder… but isn't adhesion of the vapor retarder a concern?

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Vapor retarder adhesion testing

Moisture-related issues with concrete roof decks

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What we tested

Vapor retarder adhesion testing

- 2-ply asphalt BUR membrane
- Manufacturer A-SA vapor retarder
- Manufacturer B-SA vapor retarder
- Manufacturer C-SA vapor retarder
- Manufacturer D-SA vapor retarder

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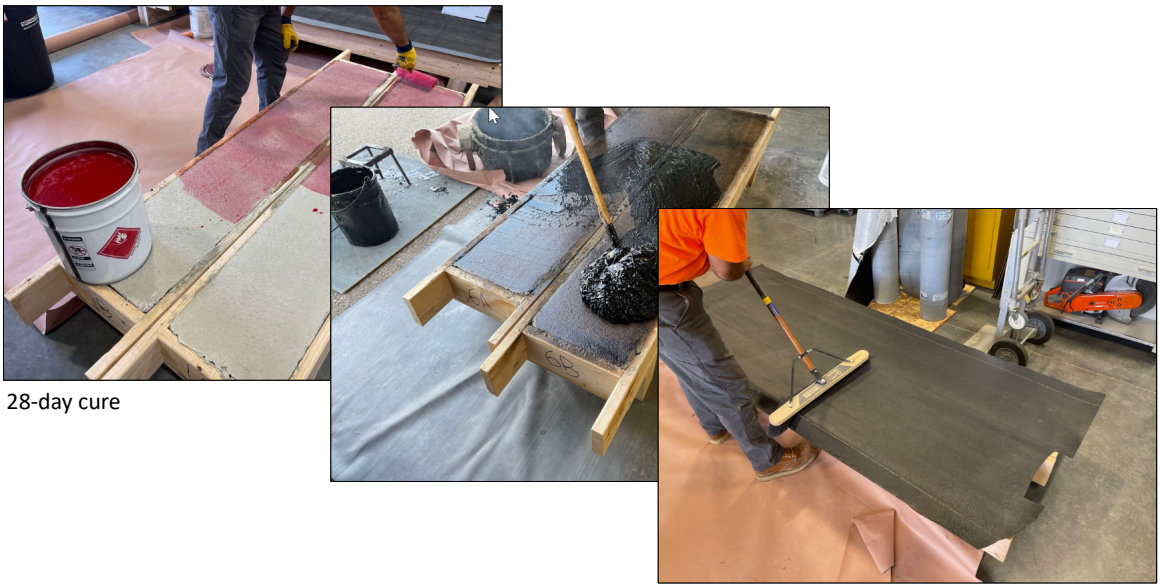

28-day cure

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Sample conditioning

After vapor retarder application

- Conditioned for 60-days
- One set of each at standard laboratory conditions
- Other set of each at a 30 F temperature differential
  - The temperature differential creates an upward vapor pressure drive

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Test results

Vapor retarder adhesion

Sample	Tested pull resistance		Difference	
	Lab. conditions 60-day conditioning (Average of 5 specimens)	Vapor drive 60-day conditioning (Average of 5 specimens)	Differential	Percent differential
2-ply built-up membrane	1,421 psf	833 psf	-588 psf	-41%

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Conclusions

Vapor retarder adhesion

- Results vary
- For 4 of 5 samples, vapor drive conditioning resulted in lower values, but Manufacture 3-SA VR is higher
- All results greater than 90 psf (i.e., FM 1-90)

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"Preliminary" recommendations

Vapor retarder adhesion

- Designers should specify vapor retarders after considering vapor retarder adhesion both at the time of application and in-service.
- Manufacturers should incorporate some form of vapor drive conditioning assessment in their product development and assessment and make that information available to specifiers.
- The vapor drive conditioning used in this testing is one possible assessment method.

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Code development and adoptions

- 2021 I-codes published
  - Adoptions beginning
- Development of 2024 I-codes complete, except 2024 IECC
  - Q3 2023 publication planned, except 2024 IECC
- New Chicago Energy Code
- Development of updated IL energy code and “stretch code”

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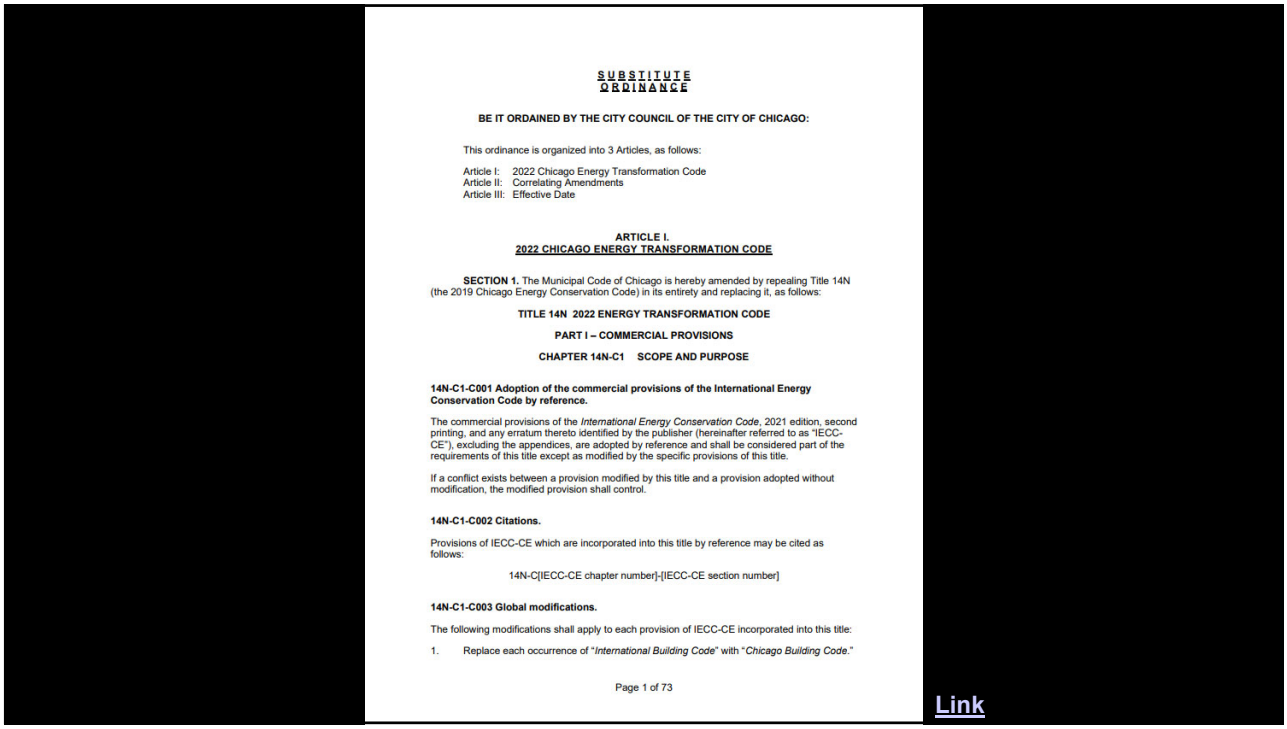

SUBSTITUTE
ORDINANCE

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CHICAGO:

This ordinance is organized into 3 Articles, as follows:

Article I: 2022 Chicago Energy Transformation Code
Article II: Correlating Amendments
Article III: Effective Date

ARTICLE I.
2022 CHICAGO ENERGY TRANSFORMATION CODE

SECTION 1. The Municipal Code of Chicago is hereby amended by repealing Title 14N (the 2019 Chicago Energy Conservation Code) in its entirety and replacing it, as follows:

TITLE 14N 2022 ENERGY TRANSFORMATION 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*, 2021 edition, second printing, and any erratum thereto identified by the publisher (hereinafter referred to as "IECC-CE"), excluding the appendices, 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 Building Code*" with "*Chicago Building Code*."

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State of Illinois-new Energy Code development

- Triggered by the publication of the current edition of IECC
  - IECC 2021 was published in January 2021 (Jan. 29, 2021 first printing)
- CDB established an Energy Code Advisory Council, which sought public input and developed draft Commercial and Residential provisions
- Provision approved by CDB Board on June 14, 2022; filed with the Secretary of State on June 29, 2022.
- First notice to the Joint Committee on Admirative Rules on July 15, 2022 (Link). 45-day review period

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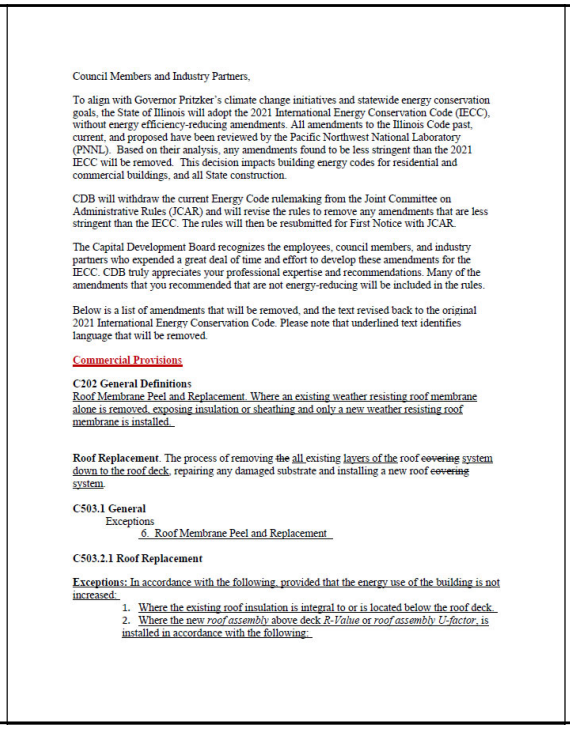

Council Members and Industry Partners,

To align with Governor Pritzker's climate change initiatives and statewide energy conservation goals, the State of Illinois will adopt the 2021 International Energy Conservation Code (IECC), without energy efficiency-reducing amendments. All amendments to the Illinois Code past, current, and proposed have been reviewed by the Pacific Northwest National Laboratory (PNNL). Based on their analysis, any amendments found to be less stringent than the 2021 IECC will be removed. This decision impacts building energy codes for residential and commercial buildings, and all State construction.

CDB will withdraw the current Energy Code rulemaking from the Joint Committee on Administrative Rules (JCAR) and will revise the rules to remove any amendments that are less stringent than the IECC. The rules will then be resubmitted for First Notice with JCAR.

The Capital Development Board recognizes the employees, council members, and industry partners who expended a great deal of time and effort to develop these amendments for the IECC. CDB truly appreciates your professional expertise and recommendations. Many of the amendments that you recommended that are not energy-reducing will be included in the rules.

Below is a list of amendments that will be removed, and the text revised back to the original 2021 International Energy Conservation Code. Please note that underlined text identifies language that will be removed.

Commercial Provisions

C202 General Definitions
Roof Membrane Peel and Replacement. Where an existing weather resisting roof membrane alone is removed, exposing insulation or sheathing and only a new weather resisting roof membrane is installed.

Roof Replacement. The process of removing ~~the~~ all existing layers of the roof ~~covering~~ system down to the roof deck, repairing any damaged substrate and installing a new roof ~~covering~~ system.

C503.1 General
Exceptions
6. Roof Membrane Peel and Replacement

C503.2.1 Roof Replacement

Exceptions: In accordance with the following, provided that the energy use of the building is not increased:
1. Where the existing roof insulation is integral to or is located below the roof deck.
2. Where the new *roof assembly* above deck *R-Value* or *roof assembly U-factor*, is installed in accordance with the following:

Email attachment forwarded by CDB's Public Information Officer on December 5, 2022

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Next steps…

- CDB making revisions
- CDB Board meeting in February

Conclusions…

- The process has been "…a bit irregular…"
- Expect Illinois' new Energy Code to be finalized and adopted statewide (except Chicago) in 2023

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Development of Illinois' stretch energy code

- Stretch/reach code concept

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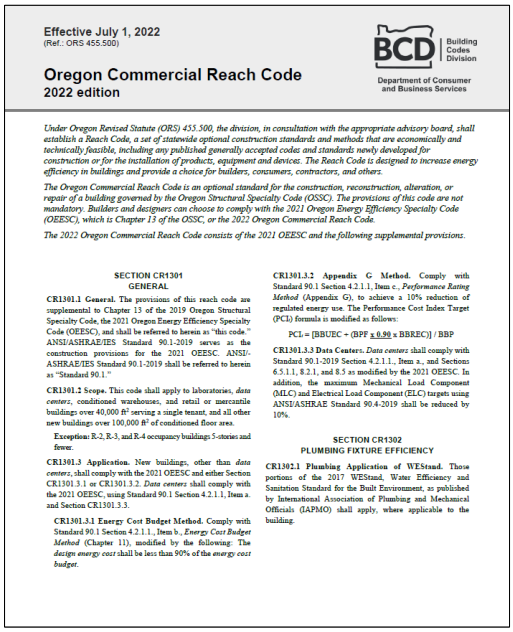

Effective July 1, 2022
(Ref.: ORS 455.500)

Oregon Commercial Reach Code
2022 edition

BCD Building Codes Division
Department of Consumer and Business Services

Under Oregon Revised Statute (ORS) 455.500, the division, in consultation with the appropriate advisory board, shall establish a Reach Code, a set of statewide optional construction standards and methods that are economically and technically feasible, including any published generally accepted code and standards newly developed for construction or for the installation of products, equipment and devices. The Reach Code is designed to increase energy efficiency in buildings and provide a choice for builders, consumers, contractors, and others.

The Oregon Commercial Reach Code is an optional standard for the construction, reconstruction, alteration, or repair of a building governed by the Oregon Structural Specialty Code (OSSC). The provisions of this code are not mandatory. Builders and designers can choose to comply with the 2021 Oregon Energy Efficiency Specialty Code (OEESC), which is Chapter 13 of the OSSC, or the 2022 Oregon Commercial Reach Code.

The 2022 Oregon Commercial Reach Code consists of the 2021 OEESC and the following supplemental provisions.

SECTION CR1301
GENERAL

CR1301.1 General. The provisions of this reach code are supplemental to Chapter 13 of the 2019 Oregon Structural Specialty Code, the 2021 Oregon Energy Efficiency Specialty Code (OEESC), and shall be referred to herein as "this code." ANSI/ASHRAE/IES Standard 90.1-2019 serves as the construction provisions for the 2021 OEESC. ANSI/-ASHRAE/IES Standard 90.1-2019 shall be referred to herein as "Standard 90.1."

CR1301.2 Scope. This code shall apply to laboratories, *data centers*, conditioned warehouses, and retail or mercantile buildings over 40,000 ft² serving a single tenant, and all other new buildings over 100,000 ft² of conditioned floor area.

Exception: R-2, R-3, and R-4 occupancy buildings 5-stories and fewer.

CR1301.3 Application. New buildings, other than *data centers*, shall comply with the 2021 OEESC and either Section CR1301.3.1 or CR1301.3.2. *Data centers* shall comply with the 2021 OEESC, using Standard 90.1 Section 4.2.1.1, Item a. and Section CR1301.3.3.

CR1301.3.1 Energy Cost Budget Method. Comply with Standard 90.1 Section 4.2.1.1., Item b., *Energy Cost Budget Method* (Chapter 11), modified by the following: The *design energy cost* shall be less than 90% of the *energy cost budget*.

CR1301.3.2 Appendix G Method. Comply with Standard 90.1 Section 4.2.1.1, Item c., *Performance Rating Method* (Appendix G), to achieve a 10% reduction of regulated energy use. The Performance Cost Index Target (PCI) formula is modified as follows:

PCI = [BBUEC + (BPF x 0.90 x BBREC)] / BBP

CR1301.3.3 Data Centers. *Data centers* shall comply with Standard 90.1-2019 Section 4.2.1.1., Item a., and Sections 6.5.1.1., 8.2.1, and 8.5 as modified by the 2021 OEESC. In addition, the maximum Mechanical Load Component (MLC) and Electrical Load Component (ELC) targets using ANSI/ASHRAE Standard 90.4-2019 shall be reduced by 10%.

SECTION CR1302
PLUMBING FIXTURE EFFICIENCY

CR1302.1 Plumbing Application of WEStand. Those portions of the 2017 WEStand, Water Efficiency and Sanitation Standard for the Built Environment, as published by International Association of Plumbing and Mechanical Officials (IAPMO) shall apply, where applicable to the building.

Oregon Commercial Reach Code, 2022 Edition

Link

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Development of Illinois' stretch energy code

- Stretch/reach code concept
- Illinois' Climate and Equitable Jobs Act (CEJA) (Link):
  - CDB to develop a stretch code using the Energy Code Advisory Council, add voting members to the Advisory Council and be complete by July 31, 2023
- CDB has acknowledged they are not technically knowledgeable and have accepted an offer for "free" technical assistance in stretch code development
- An initial draft is currently being developed

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Development of Illinois' stretch energy code—cont.

- Initial public comments:
  - Commercial: January 18 (two days ago)
  - Residential: January 23 (next Monday)
  - Written public comments by Feb. 3
- A first draft should be available in February
- Process beyond that is still somewhat unclear
- After the July 31 "due date", the legislative approval process still needs to take place

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CRCA and NRCA are advocating for the Illinois roofing industry…

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Contractors' recently-reported problems

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Questions… and other topics

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