Board of Building Standards

CODE COMMITTEE MEETING
AGENDA

DATE: AUGUST 25, 2022
TIME: 1:00 PM
LOCATION: TRAINING ROOM 3, 6606 TUSSING ROAD, REYNOLDSBURG, OHIO, 43068
Click here to join the meeting

Call to Order

Approval of Minutes
MIN-1 June 23, 2022 Code Committee Meeting Minutes

Petitions
P-1 Petition #22-02 OPC Chapters 2 and 3 - Larry Cormack, Jr., City of Columbus

Recommendations of the Residential Construction Advisory Committee

Old Business
OB-1 OBC Ch 2 - Definition of Registered Design Professional - Landscape Architect
OB-2 2020 NEC Proposed TIAs
OB-3 Commercial Energy Code Review

New Business
NB-1 Zero lot line townhouse buildings - Bill Kaufholz
NB-2 HB 430 Update

Adjourn

File Attachments for Item:

MIN-1 June 23, 2022 Code Committee Meeting Minutes

OHIO BOARD OF BUILDING STANDARDS
CODE COMMITTEE MINUTES
June 23, 2022

The Code Committee met on June 23, 2022 with the following members present: Mr. Denk, Ms. Cromwell, Mr. Johnson, Mr. Miller, Mr. Pavlis, Mr. Samuelson, Mr. Stanbery, Mr. Tyler, and Mr. Yankie. Board Chairman, Tim Galvin, was also present.

The following staff members were present: Debbie Ohler, Robert Johnson, and Jay Richards

Guests present: Matt Setzekorn and John Johnson III
Guests present via Teams: Tim McClintock, Aaron Dearth, Mike Halapy, Luke Ebert, and Jeff Mang.

CALL TO ORDER

The meeting was called to order by Mr. Denk at 1:04 P.M.

APPROVAL OF MINUTES

Mr. Stanbery made the motion to approve the minutes of the Code Committee meeting held on May 12, 2022. Mr. Miller seconded the motion. The motion passed unanimously.

PETITIONS

Petition #22-02 from Larry Cormack, Jr. of the City of Columbus was introduced to the committee. The OPC petition proposes to prohibit dead ends in plumbing systems. Staff will work with the petitioner to clarify the details of his proposal. No action was taken.

RECOMMENDATIONS OF THE RESIDENTIAL CONSTRUCTION ADVISORY COMMITTEE

No items for consideration

OLD BUSINESS

2020 NEC Proposed TIAs

Staff alerted the committee of two proposed TIAs that could impact the rule language decided upon by the BBS for the adoption of the 2020 edition of NFPA 70: TIA 1653 which proposes to expand the GFCI exemption to all HVAC equipment and extend it through September of 2026; and TIA 1656 which proposes to extend the GFCI exemption only for HVAC equipment employing power conversion equipment through September of 2026. The NFPA Standards Council is expected to make a decision on the proposed TIAs in early August. Tim McClintock attended virtually to answer any questions that the committee may have had. Staff will keep the committee informed.

Commercial Energy Code Review

Matt Setzekorn presented the energy modeling work that he performed for the committee. Overall, he confirmed that for most buildings there is a 20% energy savings moving from the 2010 ASHRAE 90.1 to the 2019 edition. Mr. Pavlis had worked with Mr. Setzekorn by providing a sample metal building to model and cost estimates for metal building insulation. Mr. Pavlis was informed that for metal buildings, the big hit occurred in the ASHRAE 90.1-2013 edition. After that edition, there were very few changes to metal building insulation values. Mr. Setzekorn will model an enclosed parking garage, as requested by Ms. Cromwell, and forward those results with the summary presented today.

Mr. Aaron Dearth and Mike Halapy attended the meeting online and shared concerns about the

design and cost impact that newer energy code insulation requirements have on Groups F and S metal buildings.

OBC Draft rule Review (Ch 3 and 4)
Staff reminded the committee of the reasons for the new rule format and presented the draft proposed rules for the OBC Chapters 3 and 4. Staff explained that there is still much coordination work to do and recommended committee action only after all chapters have been presented. No action was taken.

NEW BUSINESS

No items for consideration

ADJOURN

Mr. Johnson made the motion to adjourn at 3:46 P.M. Mr. Stanbery seconded the motion. The motion passed unanimously.

File Attachments for Item:

P-1 Petition #22-02 OPC Chapters 2 and 3 - Larry Cormack, Jr., City of Columbus

APPLICATION
FOR
RULE CHANGE

Pursuant to section 3781.12 of the Revised Code and rules adopted by the Board of Building Standards, application is herewith submitted to adopt, amend, or annul a rule adopted by the Board pursuant to section 3718.10 of the Revised Code.

BOARD OF BUILDING STANDARDS
6606 Tussing Road, P.O. Box 4009
Reynoldsburg, Ohio 43068-9009
(614) 644-2613
bbs@ohio.gov
www.com.state.oh.us/dico/bbs/default.aspx

For BBS use:
Petition #: 22-02
Date Recv'd: June 10, 2022

Submitter: Larry R Cormack Jr (Contact Name) City Of Columbus Building and Zoning (Organization/Company)

Address: 111 N front St (Include Room Number, Suite, etc.)

Columbus (City) Ohio (State) 43215 (Zip)

Telephone Number: 614-645-5771 **Fax Number:**

Date: 4/19/22 **E-mail Address:** lrcormack@columbus.gov

Code Section: 2 (Definitions) and 6 (Water Supply and Distribution)

General Explanation of Proposed Change (attach additional sheets if necessary):

Dead end water lines are currently allowed in the Ohio Plumbing Code. Dead end water lines present a serious hazard due to the lack of flow in these lines which allow the growth of harmful bacteria which could result in illness or death. It is the intent of this proposed change to prohibit Dead End water lines and eliminate the possibility of any future issues.

RECEIVED
JUN 10 2022
BOARD OF BUILDING STANDARDS

Explanation of Cost Impact of Proposed Code Change*: On remodels and repairs there should be no cost change since lines will be capped closer to the main. On new builds it should be cheeper due to lines for future water will not be installed until needed.

*Attach additional cost information as necessary to justify any statement of cost increase or cost decrease.

Information on Submittal (attach additional sheets if necessary):	
1. Sponsor:	Organization sponsoring or requesting the rule change (if any)
2. Rule Title:	DEAD END WATERLINES PROHIBITED. Title of rule change
3. Purpose/ Objective:	Technical justification for the proposed rule change
4. Formatted Rule Language **(Using Strike-out for Deleted Text and Underline for Added Text)**	Chapter 2 DEAD END. A branch leading from a water disribution pipe and terminating at a developed lenght of 1 foot (305mm)or more by means of a plug, cap or other closed fitting. Chapter 6 Dead end water lines shall be prohibited. Use strike-out for deleted text and underline for added text
5. Notes:	1. To encourage uniformity among states using model codes, it is recommended that the submitter first submit any code change directly to ICC and participate in the national model code development process. 2. Please provide a copy of application and documentation. 3. Use a separate form for each code change proposal.

From: Cormack, Larry R.
To: Ohler, Deborah
Subject: Re: [EXTERNAL] BBS Petition #22-02
Date: Thursday, June 30, 2022 8:07:28 AM

I think the definition and language in the upc accomplished what I wanted to see added to the code. If it can be presented as a revised petition let's go that route. As of right now I'm not sure if I will be available on the 25th so I would appreciate it if you presented it for me.
Thank you

Sent from my iPhone

> On Jun 30, 2022, at 7:59 AM, "debbie.ohler@com.ohio.gov" <debbie.ohler@com.ohio.gov> wrote:
>
> Keep in mind that this language is in the 2021 IAPMO Uniform Plumbing Code, not the 2021 ICC International Plumbing Code which is the model code that the BBS will be adopting. That means that we will need to make an Ohio change to the IPC when the board adopts its next OPC.
>
> If you think this definition and language will work, then it can be presented as a revised petition. Or, if you prefer your language, then it can be presented as a back-up proposal. If you would like to present your petition to the BBS Code Committee, or if you would like to be available to the committee for questions, mark your calendar for Thursday, August 25th at 1:00. Otherwise, I'll present it for you.
>
> <image001.jpg>
>
> **Deborah D. Ohler, P.E., Construction Codes Administrator**
> Ohio Board of Building Standards
> PO Box 4009, 6606 Tussing Rd.
> Reynoldsburg, OH 43068-9009
> Office phone: 614-644-2613 Fax: 614-222-2147
> dohler@com.state.oh.us
> https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards
> *Better Codes, Better Buildings, Safer Ohio*
>
>
>
> **From:** Cormack, Larry R. <LRCormack@columbus.gov>
> **Sent:** Wednesday, June 29, 2022 3:52 PM
> **To:** Ohler, Deborah <debbie.ohler@com.ohio.gov>
> **Subject:** Re: [EXTERNAL] BBS Petition #22-02
>
> It sounds like it addresses the issue. Since it's in the 2021 code it would save work on everyone's part. I think it would work.
>
> Sent from my iPhone
>
> > On Jun 29, 2022, at 3:47 PM, "debbie.ohler@com.ohio.gov" <debbie.ohler@com.ohio.gov> wrote:
> >
> > <image001.gif>
> > Good afternoon, Larry.

At the BBS Code Committee meeting last week, I introduced your OPC petition to prohibit dead end piping systems. I shared with the committee that I would be researching the issue in other plumbing publications/papers and ASHRAE standards dealing with Legionella, working with you to finalize code language, and deciding where the language should be located before it is formally presented to the committee.

At first introduction, the committee had some concern about a complete prohibition because sometimes dead ends/dead legs are unintentionally created (simply by not using existing fixtures) and that sometimes there is no access to existing capped piping without tearing up drywall, etc.

I have researched the following publications and all of these publications make strong recommendations to avoid and minimize, but not prohibit, long dead legs:

ASHRAE 12 – Minimizing the Risk of Legionellosis Associated with Building Water Systems
ASHRAE 188 – Legionellosis: Risk Management for Building Water Systems
ICC International Plumbing Code (IPC) – proposed code changes P136-15, P70-18, P78-18 and 2021 Group A proposed IPC changes
The World Health Organization (WHO) Technical Report Series (TRS) 929 (Sept. 25, 2020)
The Center for Disease Control (CDC) Legionella prevention guidelines

While researching, I discovered that the 2021 IAPMO Uniform Plumbing Code (UPC) contains a new Chapter 2 definition of "Dead leg" and contains a new Chapter 3, Section 309.6 that requires a method of flushing for all dead legs. The 2021 UPC can be viewed here: https://epubs.iapmo.org/2021/UPC/

The published 2021 UPC language reads as follows:

Chapter 2 - Definitions

Dead Leg. A section of potable water pipe which contains water that has no flow or does not circulate.

Chapter 3 - General regulations

309.6 Dead legs. Dead legs shall have a method of flushing.

I am of the opinion that this proposal would be a lot more palatable to the committee than a complete prohibition. What do you think?

Debbie

<image002.jpg>
Deborah D. Ohler, P.E., Construction Codes Administrator
Ohio Board of Building Standards
PO Box 4009, 6606 Tussing Rd.
Reynoldsburg, OH 43068-9009
Office phone: 614-644-2613 Fax: 614-222-2147
dohler@com.state.oh.us
https://com.ohio.gov/divisions-and-programs/industrial-compliance/boards/board-of-building-standards
Better Codes, Better Buildings, Safer Ohio

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File Attachments for Item:

OB-1 OBC Ch 2 - Definition of Registered Design Professional - Landscape Architect

REGISTERED DESIGN PROFESSIONAL. *Any architect holding a certificate issued under ~~sections~~ section 4703.10 ~~and~~ of the Revised Code, any landscape architect holding a certificate issued under section 4703.36 of the Revised Code, or any engineer holding a certificate issued under section 4733.14 of the Revised Code.*

File Attachments for Item:

OB-2 2020 NEC Proposed TIAs

NFPA 70®-2020 Edition
National Electrical Code®
TIA Log No.: 1653
Reference: 210.8(F) and Exception No. 2(new)
Comment Closing Date: July 6, 2022
Submitter: William Koffel, Koffel Associates (Representing Leading Builders of America)
www.nfpa.org/70

1. Revise paragraph 210.8(F) to read as follows:

210.8(F) Outdoor Outlets.

All outdoor outlets for dwellings, other than those covered in 210.8(A)(3), Exception to (3), that are supplied by single-phase branch circuits rated 150 volts to ground or less, 50 amperes or less, shall have ground-fault circuit-interrupter protection for personnel. ~~This requirement shall become effective on January 1, 2023, for mini-split-type heating/ventilating/air-conditioning (HVAC) equipment and other HVAC units employing power conversion equipment as a means to control compressor speed.~~

~~Informational Note: *Power conversion equipment* is the term used to describe the components used in HVAC equipment that is commonly referred to as a variable speed drive. The use of power conversion equipment to control compressor speed differs from multistage compressor speed control.~~

Exception No. 1: Ground-fault circuit-interrupter protection shall not be required on lighting outlets other than those covered in 210.8(C).
Exception No. 2: Ground-fault circuit-interrupter protection shall not be required for listed HVAC equipment. This exception shall expire September 1, 2026.

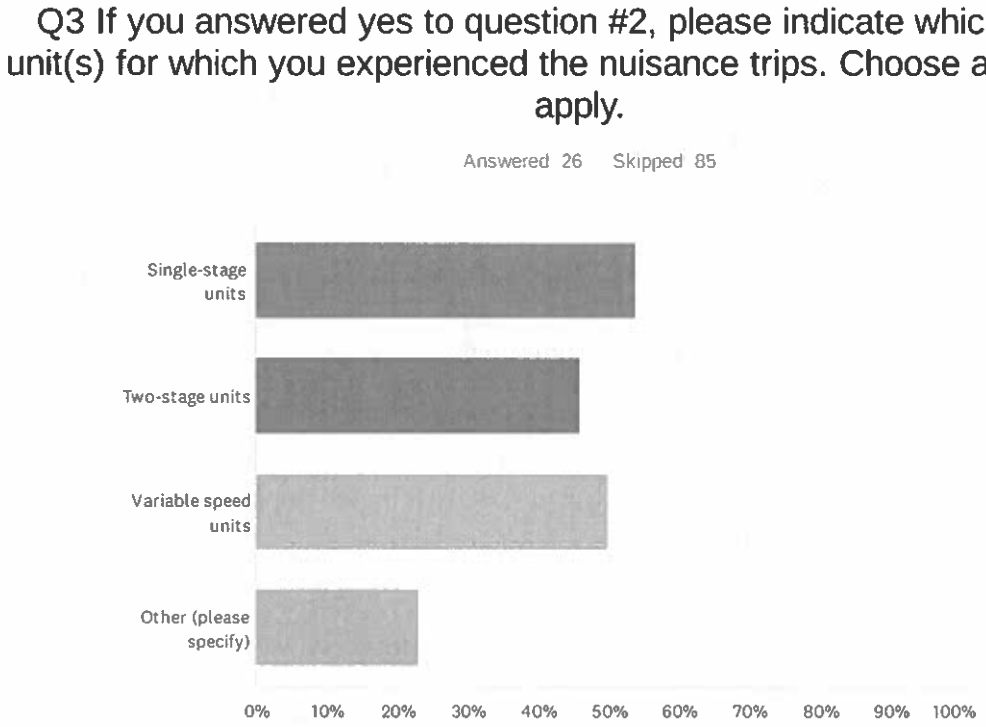
Substantiation: When the Standards Council issued TIA 1593, the Council acknowledged "the concerted and sustained effort by numerous stakeholders to find a mutually agreeable solution to the technical issues at hand." The Council directed that a Task Group of affected stakeholders be formed to evaluate and reach an informed, technically substantiated resolution to the issues raised. The Council further encouraged the Task Group to submit a TIA for processing to the current edition and in parallel to the work being done within the next edition of the NEC, if appropriate. This TIA is in response to the direction given to the Task Group. The Task Group consisted of representatives from home builder organizations, contractors, HVAC manufacturers, GFCI manufacturers, CMP2, electrical inspectors, CPSC, and testing laboratories.

Based upon the information submitted to and reviewed by the Task Group, the proposed TIA extends the date when the requirement for GFCI protection will be required and expands the application of the exemption for GFCI protection to all listed HVAC equipment. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. The issue of GFCI protection not being compatible with listed HVAC equipment was known at the time SR 7676-NFPA 70-2018 was approved by CMP-2. Three of the four negative ballots specifically

AHRI has developed a testing program to identify the cause of interoperability issues. The study is scheduled to be completed by November 2023. The causes need to be defined before solutions can be proposed and tested. Product design and testing must follow. Industry standard revisions and related standardized test procedures are needed. Production tooling and supply chain modifications require additional time after the earlier steps are completed.

With respect to the expansion to all listed HVAC equipment, industry standards for power conversion equipment allow leakage currents above the trip current of Class A GFCI's. Residential air-conditioning (AC) and heat pump (HP) power conversion equipment for compressors have demonstrated leakage currents above Class A GFCI trip currents in lab measurements. Residential AC and HP electronically commutated outdoor fan motors have demonstrated leakage currents above the trip current of Class A GFCI's in lab measurements. Data was submitted based upon actual nuisance trips and a survey of air-conditioning contractors indicating that nuisance trips also occur with single-stage units. (Also see Source 3 listed below)

Figure 1: Texas Air Conditioning Contractor Association (TACCA) Survey (From Reference 5 below)



There are multiple reports of interoperability issues ('nuisance tripping') from AC and HP units that do not have power conversion equipment for the unit compressor which is the only current TIA exception. The cause(s) of this nuisance tripping remain unknown at this time. Furthermore, the presence of electronically commutated motors (ECM) is not currently documented on AC and HP nameplates or consumer/installer documents readily available to the code official. Therefore, an exception limited to ECM motors and/or other power conversion is not practical for the code official, builder or electrical contractor.

justification of the action.

Almost every state that has adopted the 2020 Edition of the NEC have modified or deleted Section 210.8(F). NFPA is aware of at least six states that have deleted Section 210.8(F) in its entirety and two have delayed enforcement until January 1, 2023. In those eight states, GFCI protection has been deleted for outdoor outlets that do not serve listed HVAC equipment. As such, GFCI protection for equipment for which there is not a compatibility issue is lost (see Reference 1 above). It should also be noted that at the time the TIA was developed several other states were in the midst of adopting the 2020 Edition of the NEC with various amendments to Section 210.8(F) being proposed, some of which include deletion or delayed implementation.

The equipment incompatibility issues identified above will not be resolved by January 1, 2023. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. Data was submitted to the task group showing that listed HVAC equipment typically can have a leakage current higher than what would trip a Class A GFCI but the touch current is well below levels that would injure or harm an individual.

Anyone may submit a comment by the closing date indicated above. Please identify the TIA number and forward to the Secretary, Standards Council. SUBMIT A COMMENT

NFPA 70®-Proposed 2023 Edition
National Electrical Code®
TIA Log No.: 1654
Reference: 210.8(F) Exception No. 2 (new)
Comment Closing Date: July 6, 2022
Submitter: William Koffel, Koffel Associates (Representing Leading Builders of America)

www.nfpa.org/70

1. Revise paragraph 210.8(F) to read as follows:

210.8(F) Outdoor Outlets.

For dwellings, all outdoor outlets, other than those covered in 210.8(A), Exception No. 1, including outlets installed in the following locations, and supplied by single-phase branch circuits rated 150 volts or less to ground, 50 amperes or less, shall be provided with GFCI protection:

(1) Garages that have floors located at or below grade level
(2) Accessory buildings
(3) Boathouses

If equipment supplied by an outlet covered under the requirements of this section is replaced, the outlet shall be supplied with GFCI protection.

Exception No. 1: GFCI protection shall not be required on lighting outlets other than those covered in 210.8(C).

Exception No. 2: GFCI protection shall not be required for listed HVAC equipment. This exception shall expire September 1, 2026.

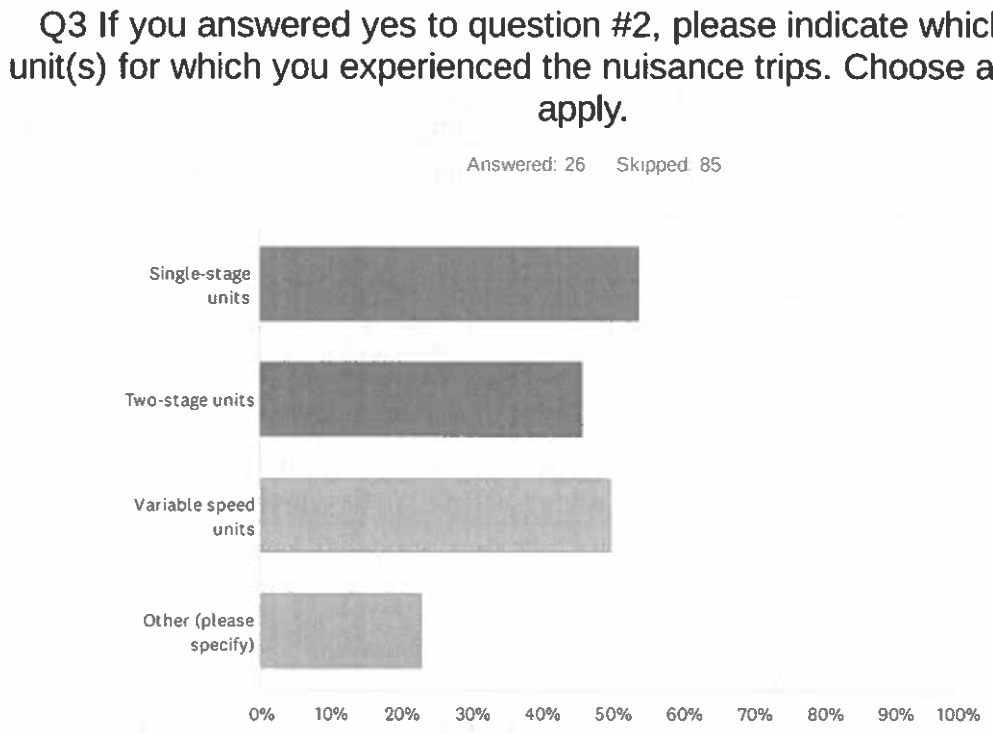
Substantiation: When the Standards Council issued TIA 1593, the Council acknowledged "the concerted and sustained effort by numerous stakeholders to find a mutually agreeable solution to the technical issues at hand." The Council directed that a Task Group of affected stakeholders be formed to evaluate and reach an informed, technically substantiated resolution to the issues raised. The Council further encouraged the Task Group to submit a TIA for processing to the current edition and in parallel to the work being done within the next edition of the NEC, if appropriate. This TIA is in response to the direction given to the Task Group. The Task Group consisted of representatives from home builder organizations, contractors, HVAC manufacturers, GFCI manufacturers, CMP2, electrical inspectors, CPSC, and testing laboratories.

Based upon the information submitted to and reviewed by the Task Group, the proposed TIA extends the date when the requirement for GFCI protection will be required and expands the application of the exemption for GFCI protection to all listed HVAC equipment. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. The issue of GFCI protection not being compatible with listed HVAC equipment was known at the time SR 7676-NFPA 70-2018 was approved by CMP-2. Three of the four negative ballots specifically mentioned the concern with incompatibility associated with requiring GFCI protection for listed HVAC equipment.

can be proposed and tested. Product design and testing must follow. Industry standard revisions and related standardized test procedures are needed. Production tooling and supply chain modifications require additional time after the earlier steps are completed.

With respect to the expansion to all listed HVAC equipment, industry standards for power conversion equipment allow leakage currents above the trip current of Class A GFCI's. Residential air-conditioning (AC) and heat pump (HP) power conversion equipment for compressors have demonstrated leakage currents above Class A GFCI trip currents in lab measurements. Residential AC and HP electronically commutated outdoor fan motors have demonstrated leakage currents above the trip current of Class A GFCI's in lab measurements. Data was submitted based upon actual nuisance trips and a survey of air-conditioning contractors indicating that nuisance trips also occur with single-stage units. (Also see Source 3 listed below)

Figure 1: Texas Air Conditioning Contractor Association (TACCA) Survey (From Reference 5 below)



There are multiple reports of interoperability issues ('nuisance tripping') from AC and HP units that do not have power conversion equipment for the unit compressor which is the only current TIA exception. The cause(s) of this nuisance tripping remain unknown at this time. Furthermore, the presence of electronically commutated motors (ECM) is not currently documented on AC and HP nameplates or consumer/installer documents readily available to the code official. Therefore, an exception limited to ECM motors and/or other power conversion is not practical for the code official, builder or electrical contractor.

Conditions that affect interoperability include the following issues which have yet to be fully

Almost every state that has adopted the 2020 Edition of the NEC have modified or deleted Section 210.8(F). NFPA is aware of at least six states that have deleted Section 210.8(F) in its entirety and two have delayed enforcement until January 1, 2023. In those eight states, GFCI protection has been deleted for outdoor outlets that do not serve listed HVAC equipment. As such, GFCI protection for equipment for which there is not a compatibility issue is lost (see Reference 1 above). It should also be noted that at the time the TIA was developed several other states were in the midst of adopting the 2020 Edition of the NEC with various amendments to Section 210.8(F) being proposed, some of which include deletion or delayed implementation.

The equipment incompatibility issues identified above will not be resolved by January 1, 2023. If GFCI protection is required while the incompatibility issue remains, there is a higher risk of people being adversely impacted by exposure to extreme temperatures due to nuisance tripping than the risk of people being exposed to a leakage current that could cause injury or harm. Data was submitted to the task group showing that listed HVAC equipment typically can have a leakage current higher than what would trip a Class A GFCI but the touch current is well below levels that would injure or harm an individual.

Anyone may submit a comment by the closing date indicated above. Please identify the TIA number and forward to the Secretary, Standards Council. SUBMIT A COMMENT

61—*17*	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities
70—~~*17*~~ *20*	National Electrical Code *(except that section 210.8(F) does not apply to HVAC units employing power conversion equipment (variable speed drive) as a means to control compressor speed)*
72—*16*	National Fire Alarm and Signaling Code
80—*16*	Standard for Fire Doors and Other Opening Protectives
82—14	Standard on Incinerators and Waste and Linen Handling Systems and Equipment
85—*the edition referenced in rule 4101:4-3-01 of the Administrative Code*	Boiler and Combustion System Hazards Code
92—15	Standard for Smoke Control Systems
99—15	Health Care Facilities Code
101—15	Life Safety Code *(only applies for Section 1029.6.2)*
105—*16*	Standard for Smoke Door Assemblies and Other Opening Protectives
110—*16*	Standard for Emergency and Standby Power Systems
111—*16*	Standard on Stored Electrical Energy Emergency and Standby Power Systems
120—15	Standard for Fire Prevention and Control in Coal Mines
170—15	Standard for Fire Safety and Emergency Symbols
211—*16*	Standard for Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances
221—15	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls
252—12	Standard Methods of Fire Tests of Door Assemblies
253—15	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
257—12	Standard for Fire Test for Window and Glass Block Assemblies

File Attachments for Item:

OB-3 Commercial Energy Code Review

Ohler, Deborah

From: Ned B. Heminger <nbheminger@hawainc.com>
Sent: Tuesday, August 2, 2022 12:31 PM
To: Ohler, Deborah
Subject: Trane publication and DOE changes
Attachments: Trane_Commercial_DOE_2023_Overview.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Debbie
FYI-This came out from Trane (new DOE requirements effective 1/1/23) for manufacturers. Its an example of how dated Ohio's requirements have become on some equipment. Beginning of 2023, manufacturers have to meet a higher efficiency requirement to conform to the new DOE requirements. Saying that, the current requirements of DOE (which were effective 1/1/2016) still exceed Ohio's requirements which are based on 90.1-2010. These new requirements for DOE are address in 90.1-2019.

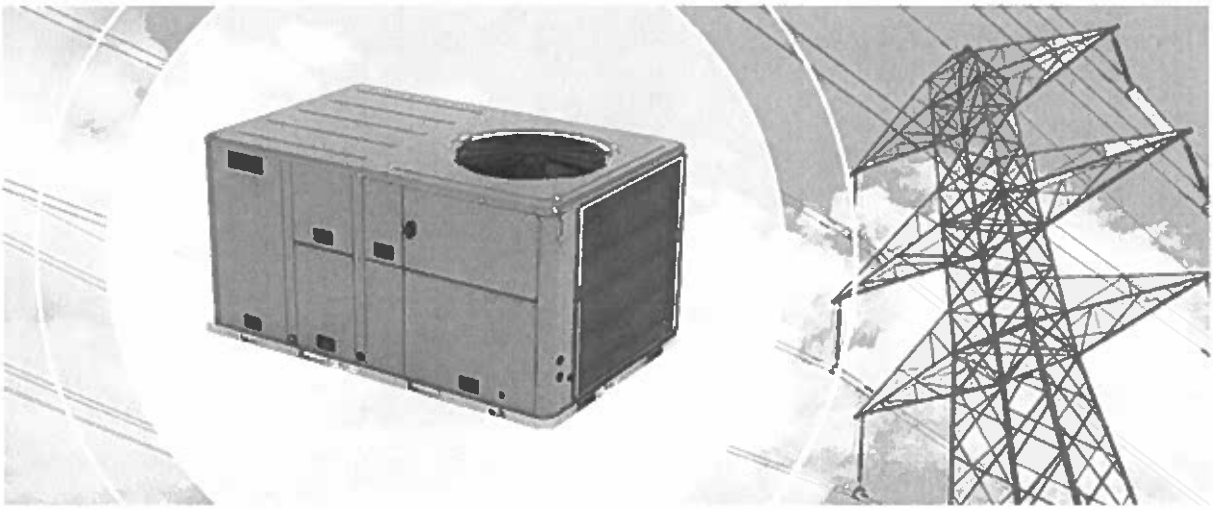
Ned Heminger, PE, LEED AP, HBDP
Vice President
Chief Engineer

HAWA Engineers | 980 Old Henderson Road, Columbus, Ohio 43220 | (O) 614-451-1711 | (C) 614-595-2773 | www.hawainc.com

From: Trane Commercial <hvac@trane.com>
Sent: Tuesday, July 12, 2022 10:02 AM
To: Ned B. Heminger <nbheminger@hawainc.com>
Subject: Are you ready?

Change is coming for HVAC efficiency standards

TRANE



2023 DOE Standards: Start the Countdown

In January 2023, new minimum efficiency standards for many HVAC systems will go into effect. The change, reflective of the U.S. Department of Energy (DOE) initiative to reduce overall energy use in the U.S., increases the minimum efficiency standards for rooftop units by 15%.

Many of today's units will not meet the new requirements. And unfortunately, waiting to complete replacement projects in 2023 will likely mean higher prices and delays due to continued global supply chain challenges.

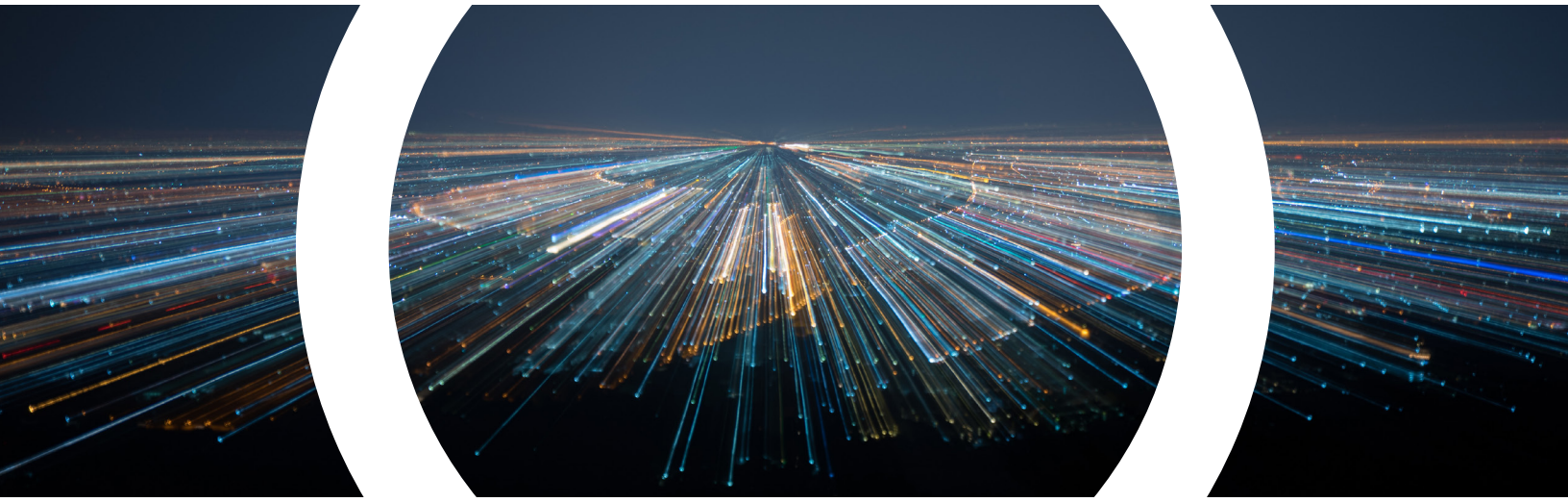
Start now and get ahead of the curve:

- Learn more about the new efficiency standards for your region and share the information with your customers. Trane can help!
- Fast-track some projects into '22. Help your customers assess the age and overall condition of their equipment. Identifying retrofit solutions now may help building owners avoid anticipated 2023 challenges (while still meeting efficiency targets.).
- Research products and design-fit for your customer's new go-to replacement units.

Get ready for the future.

Get Ready for the Future

Overview of Upcoming Regulatory Changes



2023 DOE Regulatory Requirements

On January 1, 2023, the U.S. Department of Energy's new minimum efficiency standards will go into effect. The changes include:

- New minimum cooling efficiencies for newly manufactured residential and commercial HVAC equipment
- Natural gas heating efficiency (> 225,000 btu/h) increases from 80% to 81% steady state efficiency

These changes may present new complexities, but Trane® is committed to leading our industry in compliance and energy intensity reduction and is prepared to support our partners every step of the way. Throughout 2022, we will be updating our products to meet the new 2023 requirements.

Why the Change?

Every six years, the Department of Energy reviews energy use of certain home appliances and mechanical systems in an ongoing effort to reduce overall energy consumption in the United States. If it is determined that an increase in energy efficiency requirements is justified, higher requirements are put into effect.

The changes are expected to save a significant amount of energy and yield environmental benefits. The DOE estimates the new standards will result in a cumulative reduction in CO2 emissions through 2030 amounting to 77 million metric tons (Mt), which is equivalent to the emissions resulting from the annual electricity use of more than 10.6 million homes.*

IEER Ratings

In 2018, the DOE changed its performance metric for commercial air-conditioning and heat pump equipment from EER to IEER (Integrated Energy Efficiency Ratio). IEER is a cooling part load efficiency measurement that takes into account different operating conditions and is the best representation of how a unit will perform over a cooling season.

New Commercial Minimum Efficiency Standards

The new 2023 system cooling efficiency minimums are increasing on commercial units above 65K BTU by approximately 15%. The following chart outlines standards for commercial packaged and split systems (air conditioners and heat pumps) and commercial gas furnaces. All products manufactured prior to January 1, 2023, may be installed on or after January 1, 2023.

Equipment Type		Heating Type	Current Standard Efficiency	2023 Standard Efficiency
Small Commercial Split & Packaged (Air Cooled) – ≥65,000 Btu/h and <135,000 Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	12.9 IEER	14.8 IEER
		All Other Types of Heating	12.7 IEER	14.6 IEER
	HP	Electric Resistance Heating or No Heating	12.2 IEER	14.1 IEER
		All Other Types of Heating	12.0 IEER	13.9 IEER
Large Commercial Split & Packaged (Air Cooled) – ≥135,000 Btu/h and <240,000 Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	12.4 IEER	14.2 IEER
		All Other Types of Heating	12.2 IEER	14.0 IEER
	HP	Electric Resistance Heating or No Heating	11.6 IEER	13.5 IEER
		All Other Types of Heating	11.4 IEER	13.3 IEER
Very Large Commercial Packaged (Air Cooled) –≥240,000 Btu/h and <760,000 Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	11.6 IEER	13.2 IEER
		All Other Types of Heating	11.4 IEER	13.0 IEER
	HP	Electric Resistance Heating or No Heating	10.6 IEER	12.5 IEER
		All Other Types of Heating	10.4 IEER	12.3 IEER

Commercial Warm Air Furnaces: New Thermal Efficiency Standards

Equipment Type	Input Capacity	Current Standard	2023 Standard
Gas-Fired Furnaces	≥ 225,000 Btu/h	80%	81%

*Source: CUAC-CUHP CWAF Direct Final Rule

To learn more, contact your Trane Account Manager or local Trane office.

TRANE

Trane – by Trane Technologies (NYSE: TT), a global climate innovator – creates comfortable, energy efficient indoor environments through a broad portfolio of heating, ventilating and air conditioning systems and controls, services, parts and supply. For more information, please visit *trane.com* or *tranetechnologies.com*.

RT-PRC104A-EN
04/29/2022

ASHRAE 90.1-2019

The 2019 edition includes various modifications and clarifications to improve internal consistency and to standardize the structure and language of the document.

Significant changes to requirements include the following

Administration and Enforcement

- New commissioning requirements in accordance with ASHRAE/IES Standard 202 [4.2.5 and Appendix H]

Building Envelope

- Combined categories of “nonmetal framed” and “metal framed” products for vertical fenestration [Tables 5.5-0 through 5.5-8]
- Upgraded minimum criteria for SHGC and U-factor across all climate zones [Tables 5.5-0 through 5.5-8]
- Revised air leakage section to clarify compliance [5.4.3 and 5.9]
- Refined exceptions related to vestibules, added new option and associated criteria for using air curtains [5.4.3.3]

Mechanical

- New requirements to allow the option of using ASHRAE Standard 90.4 instead of ASHRAE Standard 90.1 in computer rooms that have an IT equipment load larger than 10 kW [6.6.1]
- Added pump definitions [3.2], requirements [10.4.7], and efficiency tables [10.8.6] to the standard for the first time
- New equipment efficiency requirement tables and changes to existing tables [Tables 6.8.1-1 to 6.8.1-20]
- Replaced fan efficiency grade (FEG) efficiency metric with fan energy index (FEI) [6.5.3.1.3]
- New requirements for reporting fan power for ceiling fans and updated requirements for fan motor selections to increase design options for load-matching variable-speed fan applications [6.5.3.1.2]
- New energy recovery requirements for high-rise residential building [3.2 and 6.5.6]
- New requirement for condenser heat recovery for acute care inpatient hospitals [6.5.6.3]

Lighting

- Modified lighting power allowances for Space-by-Space Method and the Building Area Method [Tables 9.6.1 and 9.5.1]
- New simplified method for lighting for contractors and designers of renovated office buildings and retail buildings up to 25,000 ft2 (2300 m2). [9.3 and Table 9.3.1-1]
- Updated lighting control requirements for parking garages to account for the use of LEDs [9.4.1.2]
- Updated daylight responsive requirements, added definition for “continuous dimming” based on NEMA LSD-64-2014 [3.2 and 9.4.1.1]
- Clarified side-lighting requirements and associated exceptions [9.4.1.1]

Energy Cost Budget (ECB) Method (Section 11)

- Numerous changes to ensure continuity
- Set baseline for on-site electricity generation systems [11.4.3.1 and 11.4.3.2]

Performance Rating Method (Appendix G)

- Clarified Appendix G rules and corresponding baseline efficiency requirement when combining multiple thermal zones into a single thermal block
- New explicit heating and cooling COPs without fan for baseline packaged cooling equipment
- New rules for modeling impact of automatic receptacle controls [Table G3.1 #12]
- Set more specific baseline rules for infiltration modeling
- Clarified how plant and coil sizing should be performed
- Updated building performance factors

Both Compliance Paths

- Clearer, more specific rules for treatment of renewables [G2.4.1]
- New updates to rules for lighting modeling

Significant changes 2013-2016 ASHRAE 90.1 Commercial Provisions

[Sources: ASHRAE 90.1-2016 and PNNL-SA-127543]

- Standard reformatted for ease of use
- New Climate maps (to align with ASHRAE 169) [5.1.4.1]
    - 16 Ohio counties will change from Zone 5A to Zone 4A [Annex 1]
- Adds a new path to demonstrate compliance – Performance Rating Method [4.2.1.1 (c) and Appendix G]

Building Envelope

- Air Leakage Verification requirements added [5.4.3.1.3 and 5.9.2.2]
    - Whole building pressurization test for air leakage
    - Continuous air barrier installation inspection and verification during construction
- Increased testing requirements for air leakage of overhead coiling doors [A7.1]
- Increased stringency requirements for fenestration and opaque doors [Table 5.5-4, Table 5.5-5, and 5.5.3.6]
- Clarified topics such as building orientation [5.5.4.5], default assumptions for the effective R-value of air spaces [A9.4.2], and calculation procedures for insulating metal building walls [A3.2.2, Table A3.2.3, A9.4.6]

Mechanical

- Increased equipment efficiencies for chillers, heat pumps, computer room AC, Dedicated Outdoor Air Systems (DOAS), Rooftop AC, Cooling Towers, and Variable Refrigerant Flow
- Clarified that control must be “configured to” meet the requirements, not just be “capable of” meeting the requirements [throughout]
- New HVAC set point and fan control requirements for hotel and motels with greater than 50 guest rooms [6.4.3.3.5]
- Adds HVAC control requirements for cooled vestibules [6.4.3.9]
- Large, electric-driven chilled-water plants are required to be monitored for electric energy use and efficiency [6.4.3.11]
- Air-cooled DX cooling units with economizers are required to have a Fault Detection and Diagnostics (FDD) monitoring system to determine that the air economizer is working properly [6.4.3.12]
- Adds control requirements for return and relief fans [6.5.3.2.4]
- Adds control requirements for parallel-flow fan-powered VAV air terminals [6.5.3.4]
- Dedicated outdoor air systems (DOAS) now include both efficiency and rating requirements for compliance [6.5.3.7]
- Adds pump flow control requirements for chilled and hot water hydronic piping distribution systems [6.5.4.2]
- Adds new requirements for the selection of chilled-water cooling coils [6.5.4.7]
- Prescribes motor fan speed controls for heat-rejection devices [6.5.5.2]
- Adds new requirements for transfer air delivered to a space having mechanical exhaust [6.5.7]

Service Water Heating

- Adds a new requirement for insulation of the first 8 ft of branch piping connections to recirculated, heat traced, or impedance heated service hot-water piping systems [7.4.3]

Power

- Limits the combined voltage drop of feeder conductors and branch circuits to 5% [8.4.1]
- Increased three-phase transformer efficiencies [Table 8.4.4]

Lighting

- Interior and exterior lighting power allowance have been modified (reduced) to reflect new lighting levels in the IES lighting handbook and to recognize LED technology [9.2.2.3 and 9.4.2]
- Lighting control requirements have been modified to add additional controls in some space types and options to others to allow easier application of advanced controls [9.4.1]
    - Reduce exterior lighting power by 50% (previously was 30%) during periods of inactivity or after business hours [9.4.1.4]
    - Certain outdoor parking areas required to reduce power by 50% during periods of inactivity [9.4.1.4]
- Adds a requirement that 75% of permanently installed dwelling unit lighting fixtures use high efficacy lamps [9.4.4]

Other Equipment

- Updates electric motor terminology, adds exceptions, and adds efficiency tables consistent with federal regulations [10.4.1]
- Elevator efficiency specifications are required to be provided on design documents, including both usage category and energy efficiency class. While a minimum threshold is not listed, the first step is taken toward including minimum elevator efficiency requirements in a future standard [10.4.3.4]

Energy Cost Budget Method (ECB)

No significant changes

Performance Rating Method (Appendix G)

- Appendix G now can be used as a path for compliance with the standard. Previously, Appendix G was used only to rate beyond-code performance of buildings
- The proposed design requires computation of a new metric, Performance Cost Index (PCI), and demonstration that it is less than that shown in Table 4.2.1.1, based on building type and climate zone
- The baseline design is now fixed at a certain level of performance, the stringency or baseline of which is expected not to change with subsequent versions of the standard. In this way, a building of any era can be rated using the same method
- Other modifications to Appendix G include changes to elevator, motor, and refrigeration baselines; changes to the baseline for existing building projects; and changes to specific opaque assemblies for the baseline envelope model. Modeling rule changes were made to heat pump auxiliary heat, economizer shutoff, lighting controls, humidification systems, cooling towers, and the simulation of preheat coils

Significant changes 2010-2013 ASHRAE 90.1 Commercial Provisions

(Sources: ASHRAE 90.1-2013 and PNNL-SA-107200)

Building Envelope

- Modifies daylighting and several other definitions
- Limits the size of vestibules and adds specific vestibule requirements for large spaces [5.4.3.4]
- Increased stringency requirements for roofs, walls, below grade walls, slab-on-grade floors [Tables 5.5-4 and 5.5-5]
- Lowers fenestration U-factors about 18% [Tables 5.5-4 and 5.5-5]
- Limits skylight area to 3%, except to 6% if daylighting criteria are met [5.5.4.2.2]

Mechanical

- Increased equipment efficiencies for air conditioners, condensing units, heat pumps, water-chillers, boilers, cooling towers, refrigerators, and freezers [6.4.1 & Tables 6.8.1]
- Reduces occupancy threshold for demand-controlled ventilation from 40 people/1000 sq ft to 25 people/1000 sq ft [6.4.3.8]
- Adds vestibule heating controls [6.4.3.9]
- Adds direct digital control (DDC) and graphical display requirements [6.4.3.10 & Table 6.4.3.10.1]
- Adds control requirements for preheat coils [6.5.2.5]
- Adds requirements for fan efficiency and controls [6.5.3]
- Adds requirements for boiler turndown ratio and efficiency [6.5.4.1]
- Reduces system size and outdoor air thresholds for energy recovery [6.5.6]
- Adds requirements for walk-in coolers, freezers and refrigerated display cases [6.4.5 & 6.5.11]
- Adds requirements for Computer room HVAC systems and introduces the Power usage Effectiveness (PUE) [6.6]

Service Water Heating

- Increases efficiency of water-heating equipment 7.5.3 & Table 7.8]

Power

- Increases the spaces where and reduces the threshold for when plug receptacle shutoff control is required [8.4.2]
- Requires electrical energy monitoring and reporting for total electrical, HVAC systems, lighting, and receptacles [8.4.3]
- Requires separate electrical energy monitoring for buildings with tenants [8.4.3.1]
- Adds specific control requirements for guestroom switched receptacles [9.4.1.3]

Lighting

- Requires the use of certain lighting controls in more space types [9.4.1]
- Increases and clarifies requirements for daylighting and daylighting controls [9.4.1.1]
- Updates and reduces the interior and exterior lighting power densities [Table 9.5.1]
- Adds specific requirements for guest room and task lighting controls [9.4.1.3]
- Adds functional testing requirements for occupant sensors, automatic time switches, and daylight controls [9.4.3]

Other Equipment

- Adds requirements for the efficiency of general-purpose motors having power rating greater than 200 hp, but no more than 500 hp [10.4.1]
- Adds power limitations for elevator cab lighting [10.4.3.1]

- Requires escalators and moving walks to slow to minimum permitted speed when not conveying passengers [10.4.4]
- Requires whole-building energy monitoring and reporting [10.4.5.1]

Energy Cost Budget Method (ECB)

- Allows credit for on-site renewable energy but limits the credit to 5% of the calculated energy cost budget [11.4.3.1]

Appendix C (Envelope tradeoff)

- Completely revamps the methodology for the building envelope trade-off option allowed in Section 5.6

Performance Rating Method (Appendix G)- an above code program

- Numerous clarifications are added for modeling

Significant changes 2018-2021 IECC Commercial Provisions

[Sources: IECC 2021]

- Changes climate zone maps resulting in 15 Ohio counties moving from Climate Zone 5 to Climate Zone 4
- Requires an insulation certificate identifying the installed R-value of insulation when the insulation of the manufacturer is not readily observable upon inspection
- Requires that a Thermal Envelope Certificate be posted in an approved location
- Clarifies and relocates all "Mandatory" and "Prescriptive" labels to a table

Definitions

- Adds or modifies definitions of "Biogas", "Biomass", "Data Center", "Data Center Systems", "Direct Digital Control", "Enthalpy Recovery Ratio", "Embedded Fan", "Fan Array", "Fan Energy Index (FEI)", "Fan Nameplate Electrical Input Power", "Fan System Electrical Input Power", "Fault Detection and Diagnostics (FDD) System", "Information Technology Equipment (ITE)", "Internal Curtain System", "Large Diameter Ceiling Fan", "On-Site Renewable Energy", "Renewable Energy Resources", "Testing Unit Enclosure Area", "Thermal Distribution Efficiency (TDE)", "Vegetative Roof", "Visible Transmittance, Annual", and "Wall, Above-Grade"

Building Envelope

- Increased envelope stringency and clarity for conditioned greenhouses [C402.1.1.1]
- Allows certain electric equipment buildings up to 1200 ft^2 to be exempt from envelope requirements [C402.1.2]
- Recognizes and provides guidance for layered cavity insulation [C402.1.3]
- Increased stringency requirements for attic insulation, above-grade and below-grade walls, and unheated slabs [Tables C402.1.3 and C402.1.4]
- Clarifies U-factor and R-factor insulation requirements at roofs, particularly tapered above-deck insulation [C402.1.4.1 & C402.2.1]
- Adds limit of maximum of 25% glazing area for garage door [Table C402.1.4, note i]
- Increases stringency of U-values and SHGC for fenestration in CZ 4 and CZ 5 [Table C402.4]
- Clarifies skylight requirements [C402.4.2]
- Removes R-values for doors and prescribes maximum U-factors and glazing area for non-swinging doors [C402.4.5]
- Requires either air barrier inspection and commissioning or enclosure testing to verify envelope performance of buildings and provides testing methodologies [C402.5]
- Requires HVAC interlock with operable openings that are greater than 40 ft^2 and provides a few exceptions (separately zoned commercial kitchens, warehouses, and outside vestibule doors) [C402.5.11]

Mechanical

- Exempts data center systems from control and economizer requirements [C403.1]
- Requires that data center systems comply with ASHRAE 90.4 (with a few modifications) [C403.1.2]
- Requires large HVAC systems (serving $\geq$100,000 ft^2) in new buildings to provide a fault detection and diagnostics system [C403.2.3]
- Updates HVAC equipment efficiency tables (some efficiencies to go into effect on January 1, 2023) for air conditioners, heat pumps, furnaces, boilers, chillers, cooling towers, condensers, and computer room AC [Tables C403.3.2(1) - C403.3.2(16)]
- Clarifies heat pump control requirements [C403.4.1.1]

- Clarifies that automatic stop controls are also required for HVAC systems [C403.4.2.3]
- Requires two-position valve for hydronic heat pump systems to be automatic and interlocked [C403.4.3.3.3]
- Adds a Variable Refrigerant Flow (VRF) exception to economizer requirements [C403.5]
- Requires Demand Control Ventilation (DCV) whenever economizers are required [C403.7.1]
- Increases number of enclosed parking garages that will require detection and controls [C403.7.2]
- Prescribes specific enthalpy recovery ratios for dwelling unit energy recovery systems [C403.7.4.1]
- Differentiates control requirements for hotel and motels (Group R-1) based upon occupancy status of rooms and changes time-out time from 30 minutes to 20 minutes [C403.7.6]
- Requires fans and fan arrays to have a Fan Energy Index (FEI) certified IAW AMCA 208 [C403.8.3]
- Prescribes minimum efficiencies of low-capacity residential-type fans [C403.8.5]
- Recognizes Large-diameter ceiling fans [C403.9]
- Adds performance requirements for commercial refrigerators, freezers, walk-in coolers, walk-in refrigerators and refrigeration equipment [C403.11]
- Clarifies insulation requirements for underground ducts [C403.12.1]
- Prescribes control system operation for operable opening interlocks [C403.14]

Service Water Heating

- Increases minimum efficiency for large (1 M Btu/h input) individual water heating equipment to 92% [C404.2.1]

Lighting

- Clarifies what is meant by “general lighting” [C405.1]
- Requires corridor lighting to be reduced to minimum levels (no more than 50% full power) when unoccupied [C405.2.1.1 & C405.2.1.4]
- Adds a section for “warehouse storage areas” and requires occupant sensor controls [C405.2.1.2]
- Clarifies intent of light reduction control requirements [C405.2.3]
- Adds additional control requirements for the secondary side lit daylight zone [C405.2.4.2]
- Adds control requirements for parking lot luminaires [C405.2.7.3]
- Adds control requirements for parking garage lighting [C405.2.8]
- Clarifies lighting power allowance calculations, especially for projects that involve only a portion of a building and for exterior lighting [C405.3.2 & C405.5.2]]
- Interior and exterior lighting power allowance have been modified to reflect new lighting levels in the IES lighting handbook and to recognize LED technology [Tables C405.3.2(1), C405.3.2(2), and C405.4.2(2)]
- Recognizes the high energy use of plant growth lighting and requires 95% of permanent luminaires to have a minimum photon efficiency of 1.6 m mol/J [C405.4]

Power

- Limits the combined voltage drop of customer-owned service conductors, feeder conductors and branch circuits to 5% [C405.10]
- Requires automatic receptacle control of at least 50% of 125V, 15 and 20 amp receptacles in offices, conference rooms, copy/print rooms, breakrooms, classrooms, and modular workstations and 25% of branch circuit feeders for modular furniture not shown on plans [C405.11]
- Requires new buildings with $\geq$ 25,000 ft^2 to be provided with an energy monitoring system [C405.12]

Other Equipment

- Requires that escalators be designed to recover more electrical energy than is consumed when resisting overspeed in the down direction [C405.9.2.1]

Additional Efficiency Requirements [C406]

- Requires at least 10 credits by adding additional energy efficient features to the building. The credits are determined from newly added tables arranged by occupancy classification [C406.1]
- Modifies more efficient HVAC option [C406.2]
- Modifies reduced lighting power option [C406.3]
- Modifies the basic renewable energy option [C406.5]
- Adds options for energy monitoring systems, if not otherwise required [C406.10]
- Adds options for fault detection system, if not otherwise required [C406.11]
- Adds options for efficient kitchen equipment [C406.12]

Total Building Performance

- Provides a new table that outlines the code requirements that must be met when using the Total Building Performance method [Table C407.2]

Commissioning

- Allows an "approved agency" or a qualified commissioning professional to perform the commissioning activities [C408.3.1]

Existing Buildings

- Reorganizes and clarifies requirements
- Clarifies that commissioning is required for new lighting and power systems [C502.3.6]

Significant changes 2015-2018 IECC Commercial Provisions

[Sources: IECC 2018 and PNNL-SA-127543]

- Made several editorial changes to eliminate the use of the word “Accessible” (if not associated with the IBC Chapter 11 meaning of “Accessible”).
- Clarifies that commissioning is mandatory for all mechanical and hot water heating systems
- Adds additional as-built energy code documentation and owner training requirements for all buildings (typically part of the commissioning documents) …these documents must be submitted to the owner within 90 days of receipt of the Certificate of Occupancy
- Enhanced the section for required energy code inspections

Definitions

- Adds or modifies definitions of “Access (to)”, “Air Barrier”, “Captive Key Override”, “Computer Room”, “Demand Recirculation Water System”, “Group R”, “IEC Design H Motor”, “IEC Design N Motor”, “Isolation Devices”, “Luminaire-level Lighting Controls”, “NEMA Design A Motor”, “NEMA Design B Motor”, “NEMA Design C Motor”, “Networked Guestroom Control System”, “Ready Access (to)”, and “Voltage Drop”

Building Envelope

- Increased stringency requirements for heated slabs [Tables C402.1.3 and C402.1.4]
- Adds maximum U-values for garage door glazing [Table C402.1.4]
- Requires 2 staggered layers of insulation board when continuous roof insulation is installed. Also provides a new exceptions for around roof drains [C402.2.1]
- Clarifies requirements for mass walls and mass floors [C402.2.2 and C402.2.3]
- Restores section on below-grade walls [C402.2.5]
- Adds a section on airspaces [C402.2.7]
- Decreases the SHGC for fenestration in Climates zones 4 and 5 [Table C402.4]
- Raises the allowable skylight area from 5% to 6% with daylight controls [C402.4.1.2]
- Clarified topics such as sliding doors [Table C402.5.2], rooms containing fuel-burning appliances [C402.5.3], loading dock weather seals [C402.5.6]

Mechanical

- Section 403 (Building Mechanical Systems) reorganized for ease of use
- Clarifies that HVAC equipment shall not be oversized [C403.3.1]
- Eliminates outdated federal equipment efficiencies for air conditioners, heat pumps, furnaces, boilers, chillers, cooling towers, and computer room AC [Tables C403.3.2(1) - C403.3.2(10)]
- Clarified that control must be “configured to” meet the requirements, not just be “capable of” meeting the requirements [throughout]
- Clarifies that many controls requirements are “Mandatory” [throughout]
- Adds HVAC control requirements for heated or cooled vestibules [C403.4.1.4]
- Adds pump flow control requirements for chilled and hot water hydronic piping distribution systems [C403.4.3.3.2 and C403.4.4]
- Adds exceptions to economizer requirements [C403.5]
- Adds a section requiring VAV with zone controls for multiple-zone systems [C403.6.1]
- Adds control requirements for parallel-flow fan-powered VAV air terminals [C403.6.7]
- Increases the threshold design airflow rate at which energy recovery is required [Table C403.7.4(2)]
- New HVAC set point and fan control requirements for hotel and motels (Group R-1) with greater than 50 guest rooms [C403.7.6]

- Provides an allowable hp exception for fans less than or equal to 5 hp [C403.8.1]
- Prescribes motor fan speed controls for heat-rejection devices [C403.9]
- Adds federal efficiency requirements for walk-in coolers and freezers to be in effect in 2020 [C403.10.2.1]

Service Water Heating

- Increased federal water heater efficiencies [Table C404.2]

Lighting

- Adds a section for "open plan office areas" and requires occupant sensor controls [C405.2.1.3]
- Adds exceptions for lighting controls for dwelling units [C405.2.4 #3] and patient rooms [C 405.2.4 #2]
- Interior and exterior lighting power allowance have been modified (reduced) to reflect new lighting levels in the IES lighting handbook and to recognize LED technology [Tables C405.3.2(1), C405.3.2(2), and C405.4.2(2)]
- Lighting control requirements have been modified to add additional controls in some space types and options to others to allow easier application of advanced controls [C405.2]
    - Reduce exterior lighting power by 30% during periods of inactivity or after business hours [C405.2.6.3]
- Adds a requirement that 90% of permanently installed dwelling unit lighting fixtures use high efficacy lamps [C405.1]

Power

- Limits the combined voltage drop of feeder conductors and branch circuits to 5% [C405.9]

Other Equipment

- Updates electric motor terminology, adds exceptions, and adds efficiency tables consistent with federal regulations [C405.7]
- Adds an exception to allow a variable voltage drive in lieu of automatic speed control for escalators that are not conveying passengers [C405.8.2]

Additional Efficiency Package Options

- Adds options for enhanced envelope performance as determined by UA analysis [C406.8]
- Adds options for reduced air infiltration as determined by whole building air leakage testing [C406.9]

Total Building Performance

- Limits the amount of credit allowed for on-site renewable energy [C407.3]
- Limits the amount of credit allowed for renewable energy purchased from off-site sources [C407.3]

Commissioning

- Requires that building operations and maintenance documents be provided to the owner
- Requires a completed "Commissioning Compliance Checklist" with the "Preliminary Commissioning Report"

Existing Buildings

- Provides exceptions for Changes in Space Conditioning and for Changes of Occupancy

Significant changes 2012→2015 IECC Commercial Provisions

(Sources: PNNL-SA-107200 and ESL-TR-14-11-02 Texas A&M Energy Systems Laboratory)

Definitions

- Adds or modifies definitions of "Air Curtain", "Alteration", "Approved Agency", "Boiler, Modulating", "Boiler System", "Bubble Point", "Circulating Hot Water System", "Computer Room", "Condensing Unit", "Conditioned Space", "Continuous Insulation", "Daylight Responsive Control", "Daylight Zone", "Fan Efficiency Grade", "Fenestration", "Floor Area, Net", "General Purpose Electric Motor", "Greenhouse", "Hight Speed Door", "Historic Building", "Liner System" , "Low Sloped Roof", "Low-voltage Dry-Type Distribution Transformer", "Occupant Sensor Control", "Opaque Door", "Powered Roof/Wall Ventilator", "Radiant Heating System", "Refrigerant Dew Point", "Refrigerated Warehouse Cooler", "Refrigerated Warehouse Freezer", "Refrigeration System", "Repair", "Reroofing", "Roof Recover", "Roof Replacement", "Rooftop Monitor", "Saturated Condensing Temperature", "Small Electric Motor", "Time-Switch Control", "Variable Refrigerant Flow System", "Walk-in Cooler", "Walk-in Freezer", "Wall, Above-grade", "Wall, Below-Grade", "Water Heater"

Building Envelope

- Adds an exception for greenhouses [C402.1.1]
- Increased stringency for roof insulation installed entirely above roof deck [Table C402.1.3]
- Increased stringency for SHGC of vertical fenestration [C402.4.3]
- Expanded requirements to calculate U-factors of walls with cold-formed steel, aged roof reflectance and provisions for rooms containing fuel burning appliances [C402.5]
- Mandatory skylight threshold reduced from 10K to 2.5K square feet [C402.4.2]

Mechanical

- Improved efficiency requirements for HVAC equipment performance [Table C403.2.3(1)-C403.2.3(10)]
- Added efficiency requirements for air-conditioning units serving computer rooms [Table C403.2.3(9)]
- Elaborated and added provisions for HVAC system controls which include: requirement for zone isolation [C403.2.4.4]; and requirement of economizer fault detection [C403.2.4.7]
- Added specifications for hot water boiler outdoor temperature setback control [C403.2.5]
- Updated provisions for energy recovery ventilation systems whose requirements are now based on the number of hour's ventilations systems operate [C403.2.7]
- Introduced specifications for kitchen exhaust systems [C403.2.8]
- Updated requirements for duct and plenum insulation and sealing [C403.2.9]
- Introduced fan efficiency requirements [C403.2.12.3]
- Added specifications for commercial refrigeration equipment [C403.2.15 and C403.5]
- Updated provisions for air and water economizers, which include added requirements for the efficient operation of these systems [C403.3]
- Updated provisions for complex mechanical systems serving multiple zones, which include updated specifications for fan controls, heat rejection equipment and hot gas bypass limitations [C403.4]

Service Water Heating

- Added performance efficiencies for certain categories of service hot water systems [Table C404.2]
- Revises and clarifies the requirements for insulation of piping [C404.4]

- Added information for implementation of efficient heated water supply piping, heated water circulating and temperature maintenance system, demand recirculation controls, drain water heat recovery systems and energy requirements of portable spas [C404.5]
- Improved specifications for energy consumption of pools and permanent spas [C404.9]
- Added commissioning requirements for hot water systems [C404.11]

Lighting and Power

- Additional provisions for lighting controls, which include the added requirement of occupant sensor controls [C405.2.1]
- New exterior and warehouse lighting control requirements [C405.2.1.2]
- Revised daylighting zone controls [C405.2.3]
- New Hotel/motel sleeping and guest suite lighting controls [C405.2.4 #3]
- Updated lighting power densities for different building area types [Tables C405.4.2]
- Specifies non-tradable components of exterior lighting [C405.5.1]
- Requires a separate meter for each Group R-2 dwelling unit [C405.6]
- Adds federal minimum efficiency requirements for electric transformers [C405.7]
- Adds federal minimum efficiency requirements for electric motors [C405.8]
- Regulates elevator cab luminaires, ventilation fans, and controls [C405.9.1]
- Requires automatic speed control and a variable frequency regenerative drive for escalators [C405.9.2]

Other Equipment

Additional Efficiency Package Options

- Adds new options for more efficient HVAC equipment performance, for reduced lighting power densities, for enhanced digital lighting controls, for dedicated outdoor air systems, and for reduced energy use in service water systems [C406.1]

Total Building Performance

- No significant changes made to this section

Commissioning

- Adds commissioning requirements and documentation submittal requirements for lighting control systems including occupant sensor controls, time control switches, and daylight responsive controls [C408.3.1]

Existing Buildings

- Moved all existing building requirements from Chapter [CE] 1 to a new Chapter [CE] 5
- Historic buildings now partially covered [C501.6]
- Replacement fenestration covered [C401.2.1]
- Requires full upgrade of roofing insulation when re-roofing [C503.1]
- Roof replacement exempt from air barrier requirements [C503.1 Exception 6]

File Attachments for Item:

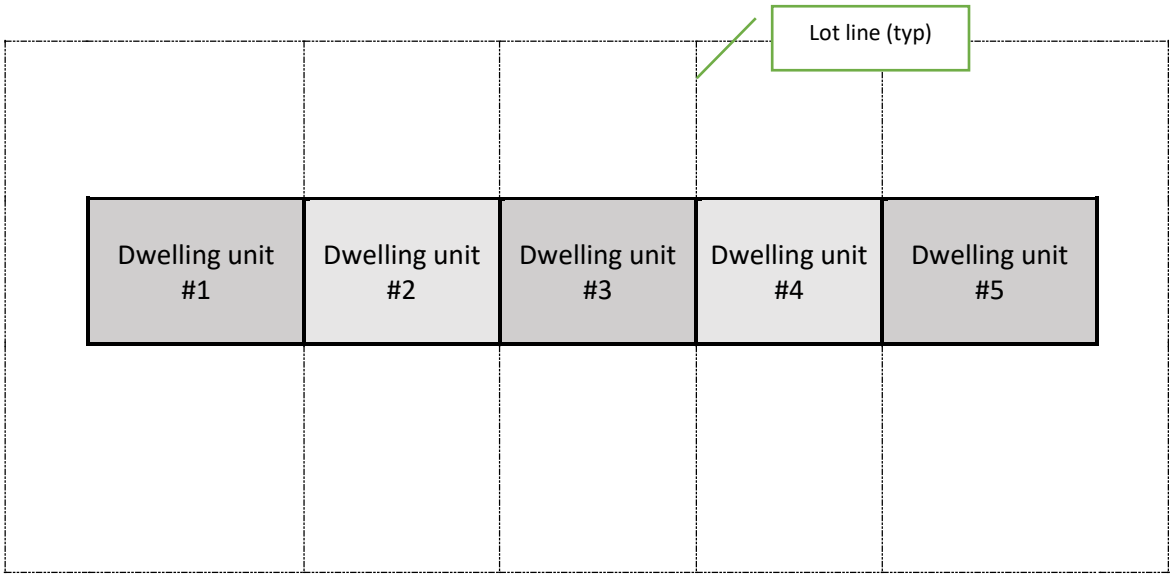
NB-1 Zero lot line townhouse buildings - Bill Kaufholz

Zero Lot Line Residential Buildings

- **Within the scope of the Residential Code of Ohio for 1-, 2-, & 3-Family Dwellings (RCO)?**
  or
  Within the scope of the Ohio Building Code (OBC)?

- **Multiple 1-family dwellings?**
  or
  A multi-family residential building with 5 dwelling units?

- **Are Townhouses within the scope of the RCO or the OBC?**



Why does it matter?

- Residential occupancies are sleeping occupancies which pose an increased risk to the occupants in an emergency.
- When buildings and/or dwelling units are close together, there is a greater risk of spreading fire, heat and smoke to adjacent buildings and/or dwelling units, affecting the safety of all occupants.
- The Ohio law requires that the BBS have two building codes (a residential building code and a nonresidential building code) and defines residential buildings within the scope of the RCO as having up to 3 dwelling units per building, not more. This is distinctly different from the ICC model codes. The IRC scope includes 1- and 2- family dwelling unit buildings less than or equal to 3 stories in height above grade plane and townhouses less than or equal to 3 stories in height. All other residential structures are within the scope of the IBC.
- If within the scope of the RCO, there could potentially be no residential building department and no enforcement of any code requirements
- If within the scope of the OBC, there will always be a building department that enforces the code requirements, no matter how many dwelling units are connected.

Ohio Revised Code

R.C. §3781.02 Exceptions to certain requirements. The provisions prescribing the minimum distance at which buildings or structures shall be located from any lot line or the provisions relating to open courts and fireproof passageways do not apply when Chapters 3781. and 3791. of the Revised Code or the rules and regulations of the board of building standards are, or can be, complied with by or with the use of adjoining property, and when such adjoining property affords the widths and areas as prescribed by such chapters or the rules and regulations of the board of building standards and is available for the purposes intended, and when such adjoining property is so situated, used, dedicated,

or deeded as to preclude the erection of any building or structure or part thereof on the widths and areas so used, during the existence of the building or structure.

R.C. §3781.06 Public buildings to be safe and sanitary - definitions.

(B) Sections 3781.06 to 3781.18, 3781.40, and 3791.04 of the Revised Code do not apply to either of the following:

(2) Existing single-family, two-family, and three-family detached dwelling houses for which applications have been submitted to the director of job and family services pursuant to section 5104.03 of the Revised Code for the purposes of operating type A family day-care homes as defined in section 5104.01 of the Revised Code.

(C) As used in sections 3781.06 to 3781.18 and 3791.04 of the Revised Code:

(9) **"Residential building"** means a one-family, two-family, or three-family dwelling house, and any accessory structure incidental to that dwelling house. "Residential building" includes a one-family, two-family, or three-family dwelling house that is used as a model to promote the sale of a similar dwelling house. "Residential building" does not include an industrialized unit as defined by division (C)(3) of this section, a manufactured home as defined by division (C)(4) of this section, or a mobile home as defined by division (O) of section 4501.01 of the Revised Code.

(10) **"Nonresidential building"** means any building that is not a residential building or a manufactured or mobile home.

(11) **"Accessory structure"** means a structure that is attached to a residential building and serves the principal use of the residential building. "Accessory structure" includes, but is not limited to, a garage, porch, or screened-in patio.

R.C. § 3781.10 Board of Building Standards - powers and duties.

(A)(1) The board of building standards shall formulate and adopt rules governing the erection, construction, repair, alteration, and maintenance of all buildings or classes of buildings specified in section 3781.06 of the Revised Code, including land area incidental to those buildings, the construction of industrialized units, the installation of equipment, and the standards or requirements for materials used in connection with those buildings. The board shall incorporate those rules into separate residential and nonresidential building codes. The standards shall relate to the conservation of energy and the safety and sanitation of those buildings.

Ohio Administrative Code

RCO § 101.2 Scope. The provisions of the "Residential Code of Ohio for One-, Two-, and Three-Family Dwellings" shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every one-, two-, or three-family dwelling, any appurtenances connected or attached to such buildings or structures, or any accessory structure incidental to that dwelling house including electrical equipment associated with bodies of water as defined in article 680 of NFPA 70 as referenced in part IX, chapter 44. This code also applies to a one-family, two-family, or three-family dwelling house that is used as a model to promote the sale of a similar dwelling house. No building or its equipment or accessories, to which the rules of the board apply shall be erected, constructed, or installed, except in conformity with the rules of the board.

This code also applies to such other residential occupancies as referenced and to the extent indicated in section 310 of the "Ohio Building Code" or OBC.

Exceptions:

2. Multiple single-family dwelling structures more than three stories in height and with more than three dwelling units.

a. The structure of one-, two-, and three-family dwellings which are more than three stories in height shall comply with the structural requirements of the OBC or section 106.5 of this code.

3. Residential buildings attached to occupancies that are within the scope of the OBC shall comply with the requirements of the "OBC".

4. Buildings or structures containing two or three dwelling units with a shared exit shall comply with the requirements of the "OBC."

15. The applicable provisions of the OBC shall apply when installing components, equipment, and systems for which there are no provisions in this code.

16. When buildings regulated by the OBC are permitted to use the construction requirements of this code, such buildings remain within the scope of the OBC.

OBC § 101.2 Scope. The provisions of the "Ohio Building Code", the "Ohio Mechanical Code", and the "Ohio Plumbing Code" shall apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures. As provided in division (B) of section 3791.04 of the Revised Code, no plans or specifications shall be approved or inspection approval given unless the building represented by those plans or specifications would, if constructed, repaired, erected, or equipped according to those plans or specifications, comply with Chapters 3781. and 3791. of the Revised Code and any rules adopted by the board. An owner may exceed the requirements of the "Ohio Building Code" in compliance with section 102.9. This code applies to detached one-, two-, and three-family dwellings and structures accessory to those dwellings only to the extent indicated in section 310 of this code.

Exceptions:

1. Detached one-, two-, or three- family dwellings, structures accessory to those dwellings, or those single-family dwellings with five or fewer persons receiving care in a supervised environment but capable of self-preservation with or without limited verbal or physical assistance are within the scope of the "Residential Code of Ohio for One-, Two-, or Three-Family Dwellings".

RCO and OBC definitions:

DWELLING. *Any* building that *exclusively* contains one-, two-, *or three*-dwelling units *each of which may be occupied by a family and no more than five lodgers or boarders,* intended, or designed to be *built,* used, rented, leased, let or hired out to be occupied, *or that is occupied* for living purposes, *physically separated from adjacent structures and with an independent exit from each dwelling unit*.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation. *The dwelling unit may include any accessory space intended for the exclusive use of the occupants of an individual dwelling unit such as a private garage, greenhouse, etc.*

FIRE SEPARATION DISTANCE. The distance measured from the building face to one of the following:
1. To the closest interior lot line.
2. To the centerline of a street, an alley or public way.
3. To an imaginary line between two buildings on the lot.

The distance shall be measured at a right angle from the face of the wall.

LOT. A portion or parcel of land considered as a unit.

LOT LINE. A line dividing one lot from another, or from a street or any public place.

TOWNHOUSE. *Deleted.* [Deleted only from the RCO]

YARD. An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the lot on which a building is situated.

OBC definitions that are not in the RCO:

DWELLING, ONE-, TWO-, OR THREE-FAMILY. *See Dwelling.*

FIRE WALL. A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

TOWNHOUSE. A single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to roof and with open space on at least two sides.

The 2009 IRC definition of "Townhouse" changed "open space" to "a yard or public way".

The 2021 IRC further clarified the definition and added a new definition of "Townhouse unit", clarifying that a "townhouse unit" is not a building, as follows:

> Townhouse. A building that contains 3 or more attached townhouse units.
>
> Townhouse unit. A single-family dwelling unit in a townhouse that extends from the foundation to roof and that has a yard or public way on not less than two sides.

The 2021 IBC definition of townhouse was not coordinated with the IRC, although there was an ICC code change proposal to do so.

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Conclusions

- Fire walls, per OBC **§**706, separate a nonresidential building into separate smaller nonresidential buildings. However, the fire wall concept (a structurally independent wall that will remain standing should there be a fire on either side) is not utilized in the RCO. As such, fire walls cannot be used to separate a nonresidential building (OBC scope) into separate smaller residential buildings (RCO scope). If a designer wishes to have more than 3 connected dwelling units, the building is still within the scope of the OBC, even if the dwelling units are separated by true OBC **§**706 fire walls.
- Lot lines are used as a reference point in the building codes for:
  - Exterior wall fire-resistance ratings - determined by fire separation distance
  - Permitted openings in exterior walls - determined by fire separation distance
  - Vent termination distances
  - Air intake opening locations
- Emergency escape and rescue openings (EERO) are required to open directly into a public way, or to a yard or court that opens to a public way to enable continued egress out of and away from the building to the public way. In addition, access to the public way enables rescue operations to be performed from the public way. Townhouse yards could limit access to public ways. As such, for EEROs on the back side of townhouses that do not have access to a front yard, a deeded special open space on neighboring properties may need to be secured in order to meet the requirements for EEROs.

Comparison of important code requirement differences for Ohio residential buildings and non-residential building residential occupancies of Type VB construction

	RCO		OBC			
	(nontransient, independent exit)		**Group R-3** (Using RCO design criteria per OBC §310.5.5) (nontransient, independent exit)		**Group R-3** (nontransient, independent exit)	
Maximum number of dwelling units in building	3		Unlimited		Unlimited	
Sprinklers required in building?	No		No		Yes	
Type of sprinkler system?	Not required		Not required		NFPA 13 or	
					NFPA 13R (if ≤4 stories above grade plane & floor level is ≤30' above/below fire department vehicle access) or	
					NFPA 13D	
Maximum height above grade plane	11'-7" per story (RCO §301.3)		11'-7" per story (RCO §301.3)		NFPA 13	60'
					NFPA 13R	60'
					NFPA 13D	40'
					No sprinklers (only for existing)	40'
Maximum # stories above grade plane	3 (If >3 stories, OBC structural reqts apply per RCO §101.2)		3		NFPA 13	4
					NFPA 13R	4
					NFPA 13D	3
					No sprinklers (only for existing)	3
Maximum area of building	Not limited		Not limited		Not limited	
Fire separation assembly required between dwelling units in same building?	Yes		Yes		Yes	
Type of fire separation assemblies	Per RCO §§ 302.2 & 302.3		Per RCO §§ 302.2 & 302.3		Fire partition and/or horizontal assembly per OBC §§ 708 & 711	
Fire-resistance-rating of separation assemblies	Between dwelling units	1-hr	Between dwelling units	1-hr	NFPA 13	0.5-hr
	AND		AND			
	Between groups of 2 dwelling units	Two 1-hr OR One 2-hr common wall	Between groups of 2 dwelling units	Two 1-hr OR One 2-hr common wall	NFPA 13R	1-hr
					NFPA 13D	1-hr
Exterior wall rating	For FSD <5'	1-hr (rated for exposure from both sides)	For FSD <5'	1-hr (rated for exposure from both sides)	For FSD <5'	1-hr or 2-hr party wall (if FSD=0)
	For FSD ≥5	0-hr	For FSD ≥5	0-hr	For FSD ≥5'- <10'	1-hr
					For FSD ≥10'	0-hr
Accessibility	Not required per RCO §320		Type B units are required per RCO §320.2, but exceptions exist in RCO §320.4		Type B units are required per OBC §1107.6.3, but exceptions exist in OBC §1107.7	

Comparison of important code requirement differences for ICC IRC buildings and IBC Group R occupancy buildings of Type VB construction having separate means of egress to the outdoors

	IRC (nontransient, independent exit)			**IBC** (nontransient)			
	1-family dwelling unit building	2-family dwelling unit building	Townhouse building (no stacking of units)	**Group R-2** (≥3 dwelling units in building)		**Group R-3** (1- or 2-family dwellings > 3 stories and Townhouses > 3 stories)	
Number of units in building?	1 dwelling unit	2 dwelling units	≥3 townhouse units	≥ 3 dwelling units		1 or 2 dwelling units or ≥ 3 townhouse units	
Sprinklers required in building?	Yes	Yes	Yes	Yes		Yes	
Type of sprinkler system?	NFPA 13D or	NFPA 13D or	NFPA 13D or	NFPA 13 or		NFPA 13 or	
	IRC 2904	IRC 2904	IRC 2904	NFPA 13R (if ≤4 stories above grade plane & floor level is ≤30' above/below fire department vehicle access)		NFPA 13R (if ≤4 stories above grade plane & floor level is ≤30' above/below fire department vehicle access) or NFPA 13D	
Maximum height	11'-7" per story (IRC §301.3)	11'-7" per story (IRC §301.3)	11'-7" per story (IRC §301.3)	NFPA 13	60'	NFPA 13	60'
				NFPA 13R	60'	NFPA 13R	60'
				NFPA 13D (only if existing)	40'	NFPA 13D	40'
				No sprinklers (only if existing)	40'	No sprinklers (only if existing)	40'
Maximum # stories above grade plane	3	3	3	NFPA 13	3	NFPA 13	4
				NFPA 13R	3	NFPA 13R	4
				No sprinklers (only if existing)	2	NFPA 13D	3
						No sprinklers (only if existing)	3
Maximum area of building	Not limited	Not limited	Not limited	Not limited		Not limited	
Fire separation assembly required between units in same building?	N/A	Yes	Yes	Yes		Yes	
Type of fire separation assemblies	N/A	Fire-resistance-rated wall and/or floor assemblies	Two fire-resistance-rated wall assemblies	Fire partition and/or horizontal assembly per OBC §§708 & 711		Fire partition and/or horizontal assembly per OBC §§708 & 711	
			OR				
			One common wall (rated for exposure from both sides)				
Fire-resistance-rating of separation assemblies	N/A	NFPA 13D or IRC §2904	0.5-hr	If two rated walls		NFPA 13	0.5-hr
				NFPA 13D or IRC §2904	1-hr ea		
				If no sprinklers (only if existing)	1-hr ea		
		No sprinklers	1-hr	**OR**		NFPA 13R	1-hr

			(only if existing)		If 1 common wall (rated for exposure from both sides		No sprinklers (only if existing)		1-hr	
					NFPA 13D or IRC §2904	1-hr			NFPA 13D	1-hr
					No sprinklers (only if existing)	2-hr			No sprinklers (only if existing)	1-hr
Exterior wall rating	For FSD <5’	1-hr (from both sides)	For FSD <5’	1-hr (from both sides)	For FSD <5’	1-hr (from both sides)	For FSD <5’	1-hr or 2-hr party wall	For FSD <5’	1-hr or 2-hr party wall (if FSD=0)
	For FSD ≥5’	0-hr	For FSD ≥5’	0-hr	For FSD ≥5’	0-hr	For FSD 5’-10’	1-hr	For FSD 5’-10’	1-hr
Accessibility	Not required per IRC §320		Not required per RCO §320		Not required per IRC §320 unless an elevator is in the building		Required per IBC §1107.6.3, but exceptions exist in IBC §1107.7		Required per IBC §1107.6.3, but exceptions exist in IBC §1107.7	

IRC § 2904 provides for a sprinkler system that is considered to be equivalent to an NFPA 13 D system

NFPA 13D scope: Design and installation of sprinkler systems in 1- and 2-family dwellings and manufactured homes (townhouses added to the 2022 edition)

NFPA 13R scope: Design and installation of sprinkler systems in residential occupancies up to and including 4 stories in height that are located in buildings not exceeding 60 feet above grade plane.

NFPA 13 scope: Design and installation of sprinkler systems.

File Attachments for Item:

NB-2 HB 430 Update

property or of trespass. The money expended for the work and the benefits accruing to any premises so entered upon shall be chargeable against the land and shall mitigate or offset any claim in or any action brought by any owner of any interest in the premises for any alleged damages by virtue of the entry. This provision is not intended to create new rights of action or eliminate existing immunities.

Sec. 3781.06. (A)(1) Any building that may be used as a place of resort, assembly, education, entertainment, lodging, dwelling, trade, manufacture, repair, storage, traffic, or occupancy by the public, any residential building, and all other buildings or parts and appurtenances of those buildings erected within this state, shall be so constructed, erected, equipped, and maintained that they shall be safe and sanitary for their intended use and occupancy.

(2) Nothing in sections 3781.06 to 3781.18, 3781.40, and 3791.04 of the Revised Code shall be construed to limit the power of the division of industrial compliance of the department of commerce to adopt rules of uniform application governing manufactured home parks pursuant to section 4781.26 of the Revised Code.

(B) Sections 3781.06 to 3781.18, 3781.40, and 3791.04 of the Revised Code do not apply to ~~either~~ any of the following:

(1) Buildings or structures that are incident to the use for agricultural purposes of the land on which the buildings or structures are located, provided those buildings or structures are not used in the business of retail trade. For purposes of this division, a building or structure is not considered used in the business of retail trade if fifty per cent or more of the gross income received from sales of products in the building or structure by the owner or operator is from sales of products produced or raised in a normal crop year on farms owned or operated by the seller.

(2) Existing single-family, two-family, and three-family detached dwelling houses for which applications have been submitted to the director of job and family services pursuant to section 5104.03 of the Revised Code for the purposes of operating type A family day-care homes as defined in section 5104.01 of the Revised Code;

(3) A mobile computing unit. As used in this division, "mobile computing unit" means an assembly that meets all of the following criteria:

(a) Its purpose is to house and operate computers as defined in section 2913.01 of the Revised Code.

(b) Its exterior is integral to the protection or cooling, or both, of the computers housed within it.

(c) It is not attached to a permanent foundation.

(d) It is not accessible to the public.

(e) It is not designed for regular occupancy, but rather limited access for service and maintenance.

(f) It can be moved or transported as a single integrated unit.

(C) As used in sections 3781.06 to 3781.18 and 3791.04 of the Revised Code:

(1) "Agricultural purposes" include agriculture, farming, dairying, pasturage, apiculture, algaculture meaning the farming of algae, horticulture, floriculture, viticulture, ornamental horticulture, olericulture, pomiculture, and animal and poultry husbandry.

(2) "Building" means any structure consisting of foundations, walls, columns, girders, beams, floors, and roof, or a combination of any number of these parts, with or without other parts or

appurtenances.

(3) "Industrialized unit" means a building unit or assembly of closed construction fabricated in an off-site facility, that is substantially self-sufficient as a unit or as part of a greater structure, and that requires transportation to the site of intended use. "Industrialized unit" includes units installed on the site as independent units, as part of a group of units, or incorporated with standard construction methods to form a completed structural entity. "Industrialized unit" does not include a manufactured home as defined by division (C)(4) of this section or a mobile home as defined by division (O) of section 4501.01 of the Revised Code.

(4) "Manufactured home" means a building unit or assembly of closed construction that is fabricated in an off-site facility and constructed in conformance with the federal construction and safety standards established by the secretary of housing and urban development pursuant to the "Manufactured Housing Construction and Safety Standards Act of 1974," 88 Stat. 700, 42 U.S.C.A. 5401, 5403, and that has a permanent label or tag affixed to it, as specified in 42 U.S.C.A. 5415, certifying compliance with all applicable federal construction and safety standards.

(5) "Permanent foundation" means permanent masonry, concrete, or a footing or foundation approved by the division of industrial compliance of the department of commerce pursuant to Chapter 4781. of the Revised Code, to which a manufactured or mobile home may be affixed.

(6) "Permanently sited manufactured home" means a manufactured home that meets all of the following criteria:

(a) The structure is affixed to a permanent foundation and is connected to appropriate facilities;

(b) The structure, excluding any addition, has a width of at least twenty-two feet at one point, a length of at least twenty-two feet at one point, and a total living area, excluding garages, porches, or attachments, of at least nine hundred square feet;

(c) The structure has a minimum 3:12 residential roof pitch, conventional residential siding, and a six-inch minimum eave overhang, including appropriate guttering;

(d) The structure was manufactured after January 1, 1995;

(e) The structure is not located in a manufactured home park as defined by section 4781.01 of the Revised Code.

(7) "Safe," with respect to a building, means it is free from danger or hazard to the life, safety, health, or welfare of persons occupying or frequenting it, or of the public and from danger of settlement, movement, disintegration, or collapse, whether such danger arises from the methods or materials of its construction or from equipment installed therein, for the purpose of lighting, heating, the transmission or utilization of electric current, or from its location or otherwise.

(8) "Sanitary," with respect to a building, means it is free from danger or hazard to the health of persons occupying or frequenting it or to that of the public, if such danger arises from the method or materials of its construction or from any equipment installed therein, for the purpose of lighting, heating, ventilating, or plumbing.

(9) "Residential building" means a one-family, two-family, or three-family dwelling house, and any accessory structure incidental to that dwelling house. "Residential building" includes a one-family, two-family, or three-family dwelling house that is used as a model to promote the sale of a similar dwelling house. "Residential building" does not include an industrialized unit as defined by

division (C)(3) of this section, a manufactured home as defined by division (C)(4) of this section, or a mobile home as defined by division (O) of section 4501.01 of the Revised Code.

(10) "Nonresidential building" means any building that is not a residential building or a manufactured or mobile home.

(11) "Accessory structure" means a structure that is attached to a residential building and serves the principal use of the residential building. "Accessory structure" includes, but is not limited to, a garage, porch, or screened-in patio.

Sec. 3781.106. (A) As used in this section:

(1) "Institution of higher education" means a state institution of higher education as defined in section 3345.011 of the Revised Code, a private nonprofit college or university located in this state that possesses a certificate of authorization issued pursuant to Chapter 1713. of the Revised Code, or a school located in this state that possesses a certificate of registration and one or more program authorizations issued by the state board of career colleges and schools under Chapter 3332. of the Revised Code.

(2) "Nonresidential building" means a building or structure, or part of a building or structure, not occupied in whole or in part for the purpose of human habitation, and includes the lands and premises appurtenant and all of the outbuildings, fences, or erections thereon or therein. "Nonresidential building" does not include an institution of higher education, private school, or public school, as defined in this section.

(3) "Owner" means an individual or entity possessing title to a nonresidential building or an authorized agent of the owner.

(4) "Private school" means a chartered nonpublic school or a nonchartered nonpublic school.

(5) "Public school" means any school operated by a school district board of education, any community school established under Chapter 3314. of the Revised Code, any STEM school established under Chapter 3326. of the Revised Code, and any college-preparatory boarding school established under Chapter 3328. of the Revised Code.

(6) "School building" means a structure used for the instruction of students by a public or private school or institution of higher education.

(B)(1) The board of building standards shall adopt rules, in accordance with Chapter 119. of the Revised Code, for the use of a device by a staff member of a public or private school or institution of higher education that prevents both ingress and egress through a door in a school building, for a finite period of time, in an emergency situation, and during active shooter drills. The rules shall provide that the use of a device is permissible only if the device requires minimal steps to remove it after it is engaged.

The rules shall provide that the administrative authority of a building notify the police chief, or equivalent, of the law enforcement agency that has jurisdiction over the building, and the fire chief, or equivalent, of the fire department that serves the political subdivision in which the building is located, prior to the use of such devices in a building.

The rules may require that the device be visible from the exterior of the door.

~~(B)~~ (2) The device described in division ~~(A)~~ (B)(1) of this section shall not be permanently mounted to the door.

~~(C)~~ (3) Each public and private school and institution of higher education shall provide its

staff members in-service training on the use of the device described in division ~~(A)~~ (B)(1) of this section. The school shall maintain a record verifying this training on file.

~~(D)~~ (4) In consultation with the state board of education and the chancellor of higher education, the board shall determine and include in the rules a definition of "emergency situation." These rules shall apply to both existing and new school buildings.

~~(E) As used in this section:~~

~~(1) "Institution of higher education" means a state institution of higher education as defined in section 3345.011 of the Revised Code, a private nonprofit college or university located in this state that possesses a certificate of authorization issued pursuant to Chapter 1713. of the Revised Code, or a school located in this state that possesses a certificate of registration and one or more program authorizations issued by the state board of career colleges and schools under Chapter 3332. of the Revised Code.~~

~~(2) "Private school" means a chartered nonpublic school or a nonchartered nonpublic school.~~

~~(3) "Public school" means any school operated by a school district board of education, any community school established under Chapter 3314. of the Revised Code, any STEM school established under Chapter 3326. of the Revised Code, and any college-preparatory boarding school established under Chapter 3328. of the Revised Code.~~

~~(4) "School building" means a structure used for the instruction of students by a public or private school or institution of higher education.~~

(C)(1) The board of building standards shall adopt rules, in accordance with Chapter 119. of the Revised Code, for the use of a device by the owner, or a person authorized by the owner, of a nonresidential building that prevents both ingress and egress through a door in the building, for a finite period of time, in an emergency situation, and during active shooter drills. The rules shall provide that the use of a device is permissible only if the device requires minimal steps to remove it after it is engaged.

The rules shall require the owner of a building notify the police chief, or equivalent, of the law enforcement agency that has jurisdiction over the building, and the fire chief, or equivalent, of the fire department that serves the political subdivision in which the building is located, prior to the use of such devices in a building.

The rules may require that the device be visible from the exterior of the door.

(2) The device described in division (C)(1) of this section shall not be permanently mounted to the door.

(3) Each owner of a nonresidential building shall provide any person that may use the device described in division (C)(1) of this section training on the use of the device. The owner of the building shall maintain a record verifying this training on file.

(4) The board shall determine and include in the rules a definition of "emergency situation" for purposes of division (C)(1) of this section. These rules shall apply to both existing and new nonresidential buildings.

(D) Any provision of the state fire code that is in conflict with this section or section 3737.84 of the Revised Code is unenforceable.

Sec. 3781.27. (A) In order to ascertain the name of each utility with underground utility facilities located at the proposed excavation site and the types and tolerance zones of those facilities