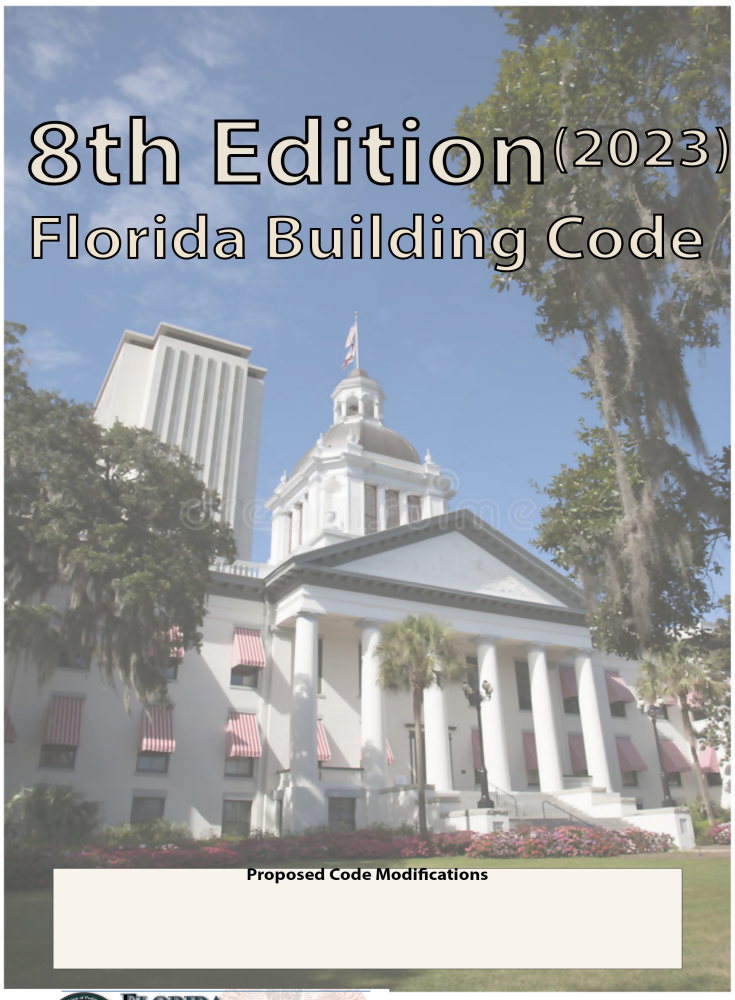

ICC 2021 Code Changes

This document created by the Florida Department of Business and Professional Regulation - 850-487-1824

TAC: Electrical

Total Mods for **Electrical** in **Pending Review: 20**

Total Mods for report: 20

Sub Code: Building

E9274/CCC IBC6-20

1

Date Submitted	2/23/2021	**Section**	421.7	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review			**Staff Classification**	Correlates Directly
Commission Action	Pending Review				

Comments

General Comments **Yes**

Related Modifications

[F] 2702.2.11, [F] 2702.2.12, [F] 2702.2.13, 1203.2.12

Summary of Modification

Adds section 2702.2.12 as a pointer to the IFC to be consistent with Chapter 12 of the IFC

Rationale

: Staff recommends adding section 2702.2.12 as a pointer to the IFC to be consistent with Chapter 12 of the IFC, specifically IFC Section 1203.2.12. IBC Section 421.7 references Section 2702 for standby power but there is currently no section addressing Hydrogen fuel gas rooms in 2702. Language is proposed based upon IFC Section
1203.2.12 which should be found in IBC Section 2702 to be consistent with Chapter 12 of the IFC. Chapter 27 is maintained by the Fire Code Committee. The equivalent section of the 2021 IFC is shown below.

1203.2.12 Hydrogen fuel gas rooms. Standby power shall be provided for hydrogen fuel gas rooms as required by Section 5808.7

Comment Period History

E9274-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA supports adding this requirement to the FBC-B, however, we recommend the section point the Florida Fire Prevention Code (FFPC) in lieu of the IFC, which is not adopted by the Commission. We would recommend: "Hydrogen fuel gas rooms. Standby power shall be provided for hydrogen fuel gas rooms as required by the Florida Fire Prevention Code.

Comment Period History

E9274-G2

Proponent John Hall **Submitted** 6/29/2021 **Attachments** No

Comment:

This modification would be good except that the IFC is not adopted by Florida. Further, there is no corresponding requirement in the adopted Florida Fire Prevention Code to reference. Therefore I disagree with this proposed modification at this time.

E9274 Text Modification

Please see attachment

CCC IBC6-20

Correlation Requested by: ICC Staff

CCC Action AS

2021 International Building Code

Revise as follows:

SECTION 421
HYDROGEN FUEL GAS ROOMS

[F] 421.7 Standby power. Mechanical *ventilation* and gas detection systems shall be provided with a standby power system in accordance with Section 2702.

SECTION 2702
EMERGENCY AND STANDBY POWER SYSTEMS

[F] 2702.2.11 High-rise buildings. Emergency and standby power shall be provided in high-rise buildings as required in Section 403.4.8.

[F] **2702.2.12 Hydrogen fuel gas rooms.** Standby power shall be provided for hydrogen fuel gas rooms as required by the International Fire Code.

[F] 2702.2.13~~12~~ Laboratory suites. Standby or emergency power shall be provided in accordance with Section 5004.7 where *laboratory suites* are located above the sixth story above grade plane or located in a story below grand plant.

Reason: Staff recommends adding section 2702.2.12 as a pointer to the IFC to be consistent with Chapter 12 of the IFC, specifically IFC Section 1203.2.12. IBC Section 421.7 references Section 2702 for standby power but there is currently no section addressing Hydrogen fuel gas rooms in 2702. Language is proposed based upon IFC Section 1203.2.12 which should be found in IBC Section 2702 to be consistent with Chapter 12 of the IFC. Chapter 27 is maintained by the Fire Code Committee. The equivalent section of the 2021 IFC is shown below.

> **1203.2.12 Hydrogen fuel gas rooms.** Standby power shall be provided for hydrogen fuel gas rooms as required by Section 5808.7

E9778/F45-18

2

Date Submitted 3/19/2021	**Section** 907.2.12.2	**Proponent** Mo Madani
Chapter 9	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		**Staff Classification** Correlates Directly
Commission Action Pending Review		

Comments

General Comments **Yes**

Related Modifications

907.2.12.2, 914.3.6, 1103.2, 1203.2.3; IBC: [F]403.4.5, [F]907.2.12.2, [F]918, [F]918.1, [F]2702.2.3

FBC-B/907.2.13.2 and 917

Summary of Modification

Section 510 in the 2018 IFC uses several different terms to describe the communication system required. This proposal replaces all of these various terms with "emergency communication coverage system".

Rationale

This proposal is editorial in nature. Section 510 in the 2018 IFC uses several different terms to describe the communication system required. It could be:

1. Emergency responder radio coverage system - Section 510.1
2. Emergency responder communication enhancement - Section 510.4.1
3. Emergency communications enhancement system - Section 510.4.1
4. Public safety communications enhancement system - Section 510.4.2.1
5. Radio enhancement system - Section 510.4.2.8
6. Public safety radio coverage system - Section 510.5

This proposal replaces all of these various terms with "emergency communication coverage system".
This will eliminate confusion and provide consistency in understanding the requirements which will improve consistent application of the requirements.
Other minor editorial revisions occur in Section 510.4.2.4 Item 6, Section 510.5.3 Item 8 and Section 510.4.6.1 Item 4.
References to the emergency communication system requirements are correlated in other sections of the IFC and IBC.

Comment Period History

E9778-G1

Proponent Bryan Holland **Submitted** 6/29/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by F45 to the applicable sections of the FBC-B (917.1 and 2702.2.3) and related to Emergency Responder Communications coverage systems.

Comment Period History

E9778-G2

Proponent Joseph Belcher **Submitted** 7/1/2021 **Attachments** No

Comment:

The Florida Home Builders Association (FICAP) requests denial of this code change. Section 907.2.12.2 cited in the change has no bearing on emergency communications (Special amusement meetings). If the change is to be considered, interested parties should submit it for consideration in the Phase II Process.

Approved as Modified

Original Proposal:

2018 International Building Code

Revise as follows:

[F] 403.4.5 Emergency ~~responder radio~~ communication coverage. Emergency ~~responder radio~~ communication coverage shall be provided in accordance with Section 510 of the International Fire Code.

[F] 907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an emergency ~~responder radio~~ communication coverage system in accordance with Section 510 of the International Fire Code, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

SECTION 918
EMERGENCY ~~RESPONDER RADIO~~ COMMUNICATION COVERAGE

[F] 918.1 General. Emergency ~~responder radio~~ communication coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

[F] 2702.2.3 Emergency ~~responder radio~~ communication coverage systems. Standby power shall be provided for emergency ~~responder radio~~ communication coverage systems required in Section 918 and the International Fire Code. The standby power supply shall be capable of operating the emergency ~~responder radio~~ communication coverage system for a duration of not less than 12 hours at 100-percent system operation capacity.

Modified Proposal:

2018 International Building Code

403.4.5 Emergency communication coverage. In-building 2-way emergency responder communication coverage shall be provided in accordance with Section 510 of the International Fire Code.

907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an in-building 2-way emergency responder communication coverage system in accordance with Section 510 of the International Fire Code, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

SECTION 918
EMERGENCY RESPONDER COMMUNICATION COVERAGE

918.1 General. In-building 2-way emergency responder communication coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

2702.2.3 Emergency responder communication coverage systems. Standby power shall be provided for in-building 2-way emergency responder communication coverage systems required in Section 918 and the International Fire Code. The standby power supply shall be

E9778 Text Modification

capable of operating the in-building 2-way emergency responder communication coverage system for a duration of not less than 12 hours at 100-percent system operation capacity.

Code Change No: F45-18

Original Proposal

Section(s): 105.7.6, 510, 510.1, 510.2, 510.3, 510.4, 510.4.1, 510.4.2, 510.4.2.1, 510.4.2.2, 510.4.2.3, 510.4.2.4, 510.4.2.5, 510.4.2.6, 510.4.2.7, 510.4.2.8, 510.5, 510.5.3, 510.5.4, 510.6, 510.6.1, 510.6.2, 510.6.3, 907.2.12.2, 914.3.6, 1103.2, 1203.2.3; IBC: [F]403.4.5, [F]907.2.12.2, [F]918, [F]918.1, [F]2702.2.3

Proponents: Kevin Scott, representing KH Scott & Associates LLC (khscottassoc@gmail.com)

2018 International Fire Code

Revise as follows:

SECTION 510
EMERGENCY ~~RESPONDER RADIO~~ COMMUNICATION COVERAGE

510.1 Emergency ~~responder radio~~ communication coverage in new buildings. ~~New buildings shall have approved radio~~ Emergency communication coverage for emergency responders shall be provided in all new buildings. Emergency communication coverage within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.12.2 shall be permitted to be installed or maintained instead of an approved radio coverage system.
2. Where it is determined by the fire code official that the radio coverage system is not needed.
3. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

510.2 Emergency ~~responder radio~~ communication coverage in existing buildings. Existing buildings shall be provided with approved ~~radio~~ emergency communication coverage for emergency responders as required in Chapter 11.

510.3 Permit required. A construction permit for the installation of or modification to emergency ~~responder radio~~ communication coverage systems and related equipment is required as specified in Section 105.7.6. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.4 Technical requirements. Systems, components and equipment required to provide the emergency ~~responder radio~~ communication coverage system shall comply with Sections 510.4.1 through 510.4.2.8.

510.4.1 Emergency ~~responder~~ communication ~~enhancement~~ coverage system signal strength. The building shall be considered to have acceptable emergency ~~responder communications enhancement~~ communication system coverage when signal strength measurements in 95 percent of all

areas on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

510.4.2 System design. The emergency ~~responder radio~~ communication coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.

510.4.2.1 Amplification systems and components. Buildings and structures that cannot support the required level of ~~radio~~ emergency communication coverage shall be equipped with systems and components to enhance the ~~public safety~~ radio signals and achieve the required level of ~~radio~~ emergency communication coverage specified in Sections 510.4.1 through 510.4.1.3. ~~Public safety communications enhancement~~ Emergency communication systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

510.4.2.2 Technical criteria. The fire code official shall maintain a document providing the specific technical information and requirements for the emergency ~~responder communications~~ communication coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

510.4.2.3 Standby power. Emergency ~~responder radio~~ communication coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the emergency ~~responder radio~~ communication coverage system at 100-percent system capacity for a duration of not less than 12 hours.

510.4.2.4 Signal booster requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.
2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.
3. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.
4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
5. Bi-Directional Amplifiers (BDAs) used in emergency ~~responder radio~~ communication coverage systems shall have oscillation prevention circuitry.
6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any emergency ~~responder radio~~ communication coverage ~~networks~~ network shall be coordinated and approved by the fire code official.

510.4.2.5 System monitoring. The emergency ~~responder radio enhancement~~ communication coverage system shall be monitored by a listed fire alarm control unit, or where approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:

1. Loss of normal AC power supply.
2. System battery charger(s) failure.
3. Malfunction of the donor antenna(s).
4. Failure of active RF-emitting device(s).
5. Low-battery capacity at 70-percent reduction of operating capacity.
6. Failure of critical system components.

7. The communications link between the fire alarm system and the emergency ~~responder radio enhancement~~ communication coverage system.

510.4.2.6 Additional frequencies and change of frequencies. The emergency ~~responder radio~~ communication coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

510.4.2.7 Design documents. The fire code official shall have the authority to require "as built" design documents and specifications for emergency ~~responder communications~~ communication coverage systems. The documents shall be in a format acceptable to the fire code official.

510.4.2.8 Radio communication antenna density. Systems shall be engineered to minimize the near-far effect. ~~Radio enhancement~~ Emergency communication coverage system designs shall include sufficient antenna density to address reduced gain conditions.

Exceptions:

1. Class A narrow band signal booster devices with independent AGC/ALC circuits per channel.
2. Systems where all portable devices within the same band use active power control features.

510.5 Installation requirements. The installation of the ~~public safety radio~~ emergency communication coverage system shall be in accordance with NFPA 1221 and Sections 510.5.1 through 510.5.4.

510.5.3 Acceptance test procedure. Where an emergency ~~responder radio~~ communication coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the fire code official.
3. Failure of more than one test area shall result in failure of the test.
4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95-percent coverage requirement.
5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and at subsequent annual inspections.
8. Systems incorporating Class B signal-booster devices or Class B broadband fiber remote devices shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from ~~the~~ an indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on

different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

510.5.4 FCC compliance. The emergency ~~responder radio~~ communication coverage system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

510.6 Maintenance. The emergency ~~responder radio~~ communication coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.4.

510.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the emergency ~~responder radio~~ communication coverage system shall be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. In-building coverage test as described in Section 510.5.3.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
4. ~~Other~~ All active components shall be checked to verify operation within the manufacturer's specifications. ~~5.~~

At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the fire code official.

510.6.2 Additional frequencies. The building owner shall modify or expand the emergency ~~responder radio~~ communication coverage system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of ~~a public safety radio~~ an emergency communication coverage system on previous frequencies does not exempt this section.

510.6.3 Nonpublic safety system. Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the emergency ~~responder communications~~ communication coverage system, the nonpublic safety amplification system shall be corrected or removed.

[A] 105.7.6 Emergency ~~responder radio~~ communication coverage system. A construction permit is required for installation of or modification to emergency ~~responder radio~~ communication coverage systems and related equipment. Maintenance performed in accordance with this code is not considered to be a modification and does not require a construction permit.

907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an emergency ~~responder radio~~ communication coverage system in accordance with Section 510, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 508, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

914.3.6 Emergency ~~responder radio~~ communication coverage. Emergency ~~responder radio~~ communication coverage shall be provided in accordance with Section 510.

1103.2 Emergency ~~responder radio~~ communication coverage in existing buildings. Existing buildings other than Group R-3, that do not have approved ~~radio~~ communication coverage for emergency responders in the building based on existing coverage levels of the public safety communication systems, shall be equipped with such coverage according to one of the following:

1. Where an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1.
2. Within a time frame established by the adopting authority.

Exception: Where it is determined by the fire code official that the ~~radio~~ emergency communication coverage system is not needed.

1203.2.3 Emergency ~~responder radio~~ communication coverage systems. Standby power shall be provided for emergency ~~responder radio~~ communication coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the emergency ~~responder radio~~ communication coverage system for a duration of not less than 24 hours.

2018 International Building Code

Revise as follows:

[F] 403.4.5 Emergency ~~responder radio~~ communication coverage. Emergency ~~responder radio~~ communication coverage shall be provided in accordance with Section 510 of the International Fire Code.

[F] 907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an emergency ~~responder radio~~ communication coverage system in accordance with Section 510 of the International Fire Code, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

SECTION 918
EMERGENCY ~~RESPONDER RADIO~~ COMMUNICATION COVERAGE

[F] 918.1 General. Emergency ~~responder radio~~ communication coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

[F] 2702.2.3 Emergency ~~responder radio~~ communication coverage systems. Standby power shall be provided for emergency ~~responder radio~~ communication coverage systems required in Section 918 and the International Fire Code. The standby power supply shall be capable of operating the emergency ~~responder radio~~ communication coverage system for a duration of not less than 12 hours at 100-percent system operation capacity.

Reason: This proposal is editorial in nature. Section 510 in the 2018 IFC uses several different terms to describe the communication system required. It could be:

1. Emergency responder radio coverage system - Section 510.1
2. Emergency responder communication enhancement - Section 510.4.1
3. Emergency communications enhancement system - Section 510.4.1
4. Public safety communications enhancement system - Section 510.4.2.1
5. Radio enhancement system - Section 510.4.2.8
6. Public safety radio coverage system - Section 510.5

This proposal replaces all of these various terms with "emergency communication coverage system".

This will eliminate confusion and provide consistency in understanding the requirements which will improve consistent application of the requirements.

Other minor editorial revisions occur in Section 510.4.2.4 Item 6, Section 510.5.3 Item 8 and Section 510.4.6.1 Item 4.

References to the emergency communication system requirements are correlated in other sections of the IFC and IBC.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is editorial and will not change application of the requirements.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

510 EMERGENCY RESPONDER COMMUNICATION COVERAGE

510.1 Emergency responder communication coverage in new buildings. Approved in-building 2-way emergency responder communication coverage for emergency responders shall be provided in all new buildings. In-building 2 way emergency responder communication coverage within the building shall be based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction, measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.12.2 shall be permitted to be installed or maintained instead of an approved radio coverage system.
2. Where it is determined by the fire code official that the radio coverage system is not needed.
3. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

510.2 Emergency responder communication coverage in existing buildings. Existing buildings shall be provided with approved in-building 2-way emergency responder communication coverage for emergency responders as required in Chapter 11.

510.3 Permit required. A construction permit for the installation of or modification to in-building 2-way emergency responder communication coverage systems and related equipment is required as specified in Section 105.7.6. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.4 Technical requirements. Systems, components and equipment required to provide the in-building 2-way emergency responder communication coverage system shall comply with Sections 510.4.1 through 510.4.2.8.

510.4.1 Emergency responder communication coverage system signal strength. The building shall be considered to have acceptable in-building 2-way emergency responder communication system coverage when signal strength measurements in 95 percent of all areas on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

510.4.2 System design. The in-building 2-way emergency responder communication coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.

510.4.2.1 Amplification systems and components. Buildings and structures that cannot support the required level of in-building 2-way emergency responder communication coverage shall be equipped with systems and components to enhance the radio signals and achieve the required level of in-building 2-way emergency responder communication coverage specified in Sections 510.4.1 through 510.4.1.3. In-building 2-way emergency responder communication systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

510.4.2.2 Technical criteria. The fire code official shall maintain a document providing the specific technical information and requirements for the in-building 2-way emergency responder communication coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.

510.4.2.3 Standby power. In-building 2-way emergency responder communication coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the in-building 2-way emergency responder communication coverage system at 100-percent system capacity for a duration of not less than 12 hours.

510.4.2.4 Signal booster requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.

2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.
3. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.
4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
5. Bi-Directional Amplifiers (BDAs) used in in-building 2-way emergency responder communication coverage systems shall have oscillation prevention circuitry.
6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building 2-way emergency responder communication coverage network shall be coordinated and approved by the fire code official.

510.4.2.5 System monitoring. The in-building 2-way emergency responder communication coverage system shall be monitored by a listed fire alarm control unit, or where approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:

1. Loss of normal AC power supply.
2. System battery charger(s) failure.
3. Malfunction of the donor antenna(s).
4. Failure of active RF-emitting device(s).
5. Low-battery capacity at 70-percent reduction of operating capacity.
6. Failure of critical system components.
7. The communications link between the fire alarm system and the in-building 2-way emergency responder communication coverage system.

510.4.2.6 Additional frequencies and change of frequencies. The in-building 2-way emergency responder communication coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

510.4.2.7 Design documents. The fire code official shall have the authority to require "as built" design documents and specifications for in-building 2-way emergency responder communication coverage systems. The documents shall be in a format acceptable to the fire code official.

510.4.2.8 Radio communication antenna density. Systems shall be engineered to minimize the near-far effect. In-building 2-way emergency responder communication coverage system designs shall include sufficient antenna density to address reduced gain conditions.

Exceptions:

1. Class A narrow band signal booster devices with independent AGC/ALC circuits per channel.
2. Systems where all portable devices within the same band use active power control features.

510.5 Installation requirements. The installation of the in-building 2-way emergency responder communication coverage system shall be in accordance with NFPA 1221 and Sections 510.5.1 through 510.5.4.

510.5.3 Acceptance test procedure. Where an in-building 2-way emergency responder communication coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the fire code official.
3. Failure of more than one test area shall result in failure of the test.
4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95-percent coverage requirement.
5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and at subsequent annual inspections.
8. Systems incorporating Class B signal-booster devices or Class B broadband fiber remote devices shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from an indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different

frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

510.5.4 FCC compliance. The in-building 2-way emergency responder communication coverage system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

510.6 Maintenance. The in-building 2-way emergency responder communication coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.4.

510.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the in-building 2-way emergency responder communication coverage system shall be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. In-building coverage test as described in Section 510.5.3.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
4. All active components shall be checked to verify operation within the manufacturer's specifications.

At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the fire code official.

510.6.2 Additional frequencies. The building owner shall modify or expand the in-building 2-way emergency responder communication coverage system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of an in-building 2-way emergency responder communication coverage system on previous frequencies does not exempt this section.

510.6.3 Nonpublic safety system. Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the in-building 2-way emergency responder communication coverage system, the nonpublic safety amplification system shall be corrected or removed.

105.7.6 Emergency responder communication coverage system. A construction permit is required for installation of or modification to in-building 2-way emergency responder communication coverage systems and related equipment. Maintenance performed in accordance with this code is not considered to be a modification and does not require a construction permit.

907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an in-building 2-way emergency responder communication coverage system in accordance with Section 510, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 508, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

914.3.6 Emergency responder communication coverage. In-building 2-way emergency responder communication coverage shall be provided in accordance with Section 510.

1103.2 Emergency responder communication coverage in existing buildings. Existing buildings other than Group R-3, that do not have approved communication coverage for emergency responders in the building based on existing coverage levels of the public safety communication systems, shall be equipped with such coverage according to one of the following:

1. Where an existing wired communication system cannot be repaired or is being replaced, or where not approved in accordance with Section 510.1, Exception 1.
2. Within a time frame established by the adopting authority.

Exception: Where it is determined by the fire code official that the in-building 2-way emergency responder communication coverage system is not needed.

1203.2.3 Emergency responder communication coverage systems. Standby power shall be provided for in-building 2-way emergency responder communication coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the in-building 2-way emergency responder communication coverage system for a duration of not less than 24 hours.

2018 International Building Code

403.4.5 Emergency communication coverage. In-building 2-way emergency responder communication coverage shall be provided in accordance with Section 510 of the International Fire Code.

907.2.12.2 Fire department communication system. Where a wired communication system is approved in lieu of an in-building 2-way emergency responder communication coverage system in accordance with Section 510 of the International Fire Code, the wired fire department communication system shall be designed and installed in accordance with NFPA 72 and shall operate between a fire command center complying with Section 911, elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, areas of refuge and inside interior exit stairways. The fire department communication device shall be provided at each floor level within the interior exit stairway.

SECTION 918
EMERGENCY RESPONDER COMMUNICATION COVERAGE

918.1 General. In-building 2-way emergency responder communication coverage shall be provided in all new buildings in accordance with Section 510 of the International Fire Code.

2702.2.3 Emergency responder communication coverage systems. Standby power shall be provided for in-building 2-way emergency responder communication coverage systems required in Section 918 and the International Fire Code. The standby power supply shall be capable of operating the in-building 2-way emergency responder communication coverage system for a duration of not less than 12 hours at 100-percent system operation capacity.

Committee Reason: This proposal was approved as the revision throughout Section 510 makes the terminology consistent to one term "emergency communication coverage system." There were two modifications. The first modification makes it clear that this section is focused on "emergency responders" not "emergency communication" in general. This is addressed through the revision throughout to "in-building 2-way emergency responder communication coverage system." The second modification is found in Section 510.1, which retains the fire code official's authority to approve the system. The term "approved" was added back into the beginning of Section 510.1. (Vote: 14-0)

Assembly Action: **None**

Final Action

F45-18 **AM**

E9128/E17-18

Date Submitted 2/18/2021	**Section** 1006.2.2.4	**Proponent** Mo Madani
Chapter 10	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		
Commission Action Pending Review		**Staff Classification** Correlates Directly

Comments

General Comments **Yes**

Related Modifications

1006.2.2.4

Summary of Modification

The requirements for egress for electrical rooms are not currently addressed in this code, except for where panic or fire exit hardware is used in Section 1010.1.10. Proposal to address.

Rationale

Section 1006.2.2 provides the specific requirements for the numbers, types, and locations of exits or access to exits for specific uses. Requirements are already provided in Section 1006.2.2.1 for boiler, incinerator and furnace rooms, which is based on the ASME Boiler and Pressure Vessel Code, and Section 1006.2.2.2 for refrigeration machinery rooms, which is based on ASHRAE 15.

The requirements for egress for electrical rooms are not currently addressed in this code, except for where panic or fire exit hardware is used in Section 1010.1.10, which does not provide direction on how many or where the exits or exit access doorways are to be located.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as w ell as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: https://www.iccsafe.org/codes-tech-support/codes/codedevelopment-process/building-code-actioncommittee-bcac.

Comment Period History

E9128-G1

Proponent Bryan Holland **Submitted** 6/29/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by E17 to 1006 and related to exit and exit access doorways for electrical rooms with proper pointers to the NEC for compliance.

Approved as Submitted

2018 International Building Code

Add new text as follows:

1006.2.2.4 Electrical rooms. The location and number of exit or exit access doorways shall be provided for electrical rooms in accordance with Section 110.26 of NFPA 70 for electrical equipment rated 1000V or less, and Section 110.33 of NFPA 70 for electrical equipment rated over 1000V. Panic hardware shall be provided where required in accordance with Section 1010.1.10.1.

Code Change No: E17-18

Original Proposal

Section(s): 1006.2.2.4 (New)

Proponent: Ed Kulik, Chair, representing ICC Building Code Action Committee (bcac@iccsafe.org)

2018 International Building Code

Add new text as follows:

1006.2.2.4 Electrical rooms. The location and number of exit or exit access doorways shall be provided for electrical rooms in accordance with Section 110.26 of NFPA 70 for electrical equipment rated 1000V or less, and Section 110.33 of NFPA 70 for electrical equipment rated over 1000V. Panic hardware shall be provided where required in accordance with Section 1010.1.10.1.

Reason: Section 1006.2.2 provides the specific requirements for the numbers, types, and locations of exits or access to exits for specific uses. Requirements are already provided in Section 1006.2.2.1 for boiler, incinerator and furnace rooms, which is based on the ASME Boiler and Pressure Vessel Code, and Section 1006.2.2.2 for refrigeration machinery rooms, which is based on ASHRAE 15.

The requirements for egress for electrical rooms are not currently addressed in this code, except for where panic or fire exit hardware is used in Section 1010.1.10, which does not provide direction on how many or where the exits or exit access doorways are to be located.

This proposal is submitted by the ICC Building Code Action Committee (BCAC). BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2017 the BCAC has held 3 open meetings. In addition, there were numerous Working Group meetings and conference calls for the current code development cycle, which included members of the committee as w ell as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the BCAC website at: https://www.iccsafe.org/codes-tech-support/codes/codedevelopment-process/building-code-actioncommittee-bcac.

Cost Impact: The code change proposal will not increase or decrease the cost of construction.
Chapter 27 of the IBC already requires electrical installations to comply with the provisions of NFPA 70. This proposal specifically directs the code user to the applicable requirements for electrical rooms in NFPA 70.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is an important pointer for electrical room requirements in the National Electrical Code. See also E64 for coordination with this item. (Vote: 14-0)

Assembly Action: **None**

Final Hearing Results

E17-18 **AS**

E9179/E73-18

4

Date Submitted 2/19/2021	**Section** 1013.4	**Proponent** Mo Madani
Chapter 10	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		
Commission Action Pending Review		**Staff Classification** Correlates Directly

Comments

General Comments **No**

Related Modifications

1013.4, (IFC [BE] 1013.4)

Summary of Modification

A greatly enlarged area of refuge is essentially a horizontal exit. Tactile signage should be placed at all such locations where passage through the opening results in a greater level of safety.

Rationale

Horizontal exit" is added to complete the types of locations where tactile exit signs should be provided. A greatly enlarged area of refuge is essentially a horizontal exit. Tactile signage should be placed at all such locations where passage through the opening results in a greater level of safety.

Approved as Submitted

2018 International Building Code

Revise as follows:

1013.4 Raised character and braille exit signs. A sign stating EXIT in visual characters, raised characters and braille and complying with ICC A117.1 shall be provided adjacent to each door to an area of refuge, providing direct access to a stairway, an exterior area for assisted rescue, an exit stairway or ramp, an exit passageway, a horizontal exit and the exit discharge.

Code Change No: E73-18

Original Proposal

Section(s): 1013.4, (IFC [BE] 1013.4)

Proponents: Gene Boecker, representing Code Consultants, Inc. (geneb@codeconsultants.com)

2018 International Building Code

Revise as follows:

1013.4 Raised character and braille exit signs. A sign stating EXIT in visual characters, raised characters and braille and complying with ICC A117.1 shall be provided adjacent to each door to an area of refuge, providing direct access to a stairway, an exterior area for assisted rescue, an exit stairway or ramp, an exit passageway, a horizontal exit and the exit discharge.

Reason: "Horizontal exit" is added to complete the types of locations where tactile exit signs should be provided. A greatly enlarged area of refuge is essentially a horizontal exit. Tactile signage should be placed at all such locations where passage through the opening results in a greater level of safety.

Cost Impact: The code change proposal will increase the cost of construction.
In those cases where a horizontal exit is provided, an additional sign would be required which technically would be an increase in cost.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: A horizontal exit is a type of exit, so tactile signage at this location is appropriate and would be consistent with visual exit signage requirements. (Vote 13-0)

Assembly Action: **None**

Final Hearing Results

E73-18 **AS**

E9806/F149-18

5

Date Submitted 3/22/2021	**Section** 907.5.2.2.5	**Proponent** Mo Madani
Chapter 27	**Affects HVHZ** Yes	**Attachments** Yes

TAC Recommendation Pending Review
Commission Action Pending Review

Staff Classification Correlates Directly

Comments

General Comments **No**

Related Modifications

IBC: 2702.2.4

Summary of Modification

This code change is to provide clarification that the standby power for the EVACs system is to be designed to comply with NFPA 72.

Rationale

This code change is to provide clarification that the standby power for the EVACs system is to be designed to comply with NFPA 72. We are deleting the reference and code section 1203.2.4. This is causing confusion and the standby power requirements for Fire Alarm systems is clearly outlined in NFPA 72.

This section contradicts itself. NFPA 72 10.6.7.2.1.2 requires secondary power for 24 hours under quiescent load but also requires the secondary power to be capable of operating the system for 15 minutes at maximum load after the 24 hours. Deleting the time and simply referencing the standard insures consistency.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/

Approved as Modified

Original Proposal:

2018 International Building Code

Revise as follows:

[F] 2702.2.4 Emergency ~~voice/alarm communication systems.~~ Voice Alarm Communication Systems.Emergency power shall be provided for emergency voice/alarm communication systems as required in ~~Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in~~ NFPA 72.

Modified Proposal:

2018 International Building Code

907.5.2.2.5 Standby ~~Emergency~~ power. Emergency voice/ alarm communications systems shall be provided with ~~emergency~~ standby power in accordance with section 1203 ~~NFPA 72~~.

2702.2.4 Emergency Voice Alarm Communication Systems. Standby ~~Emergency~~ power shall be provided for emergency voice/alarm communication systems ~~as required~~ in accordance with ~~NFPA 72~~ 907.5.2.2.5

Code Change No: F149-18

Original Proposal

Section(s): 907.5.2.2.5 (IBC: [F] 907.5.2.2.5), 1203.2.4; IBC: 2702.2.4

Proponents: Michael O'Brian, Chair, representing FCAC (fcac@iccsafe.org); Jason Webb, representing Automatic Fire Alarm Association Codes & Standards Committee (jwebb608@gmail.com)

2018 International Fire Code

Revise as follows:

907.5.2.2.5 Emergency power. Emergency voice/ alarm communications systems shall be provided with emergency power in accordance with ~~Section 1203. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in~~ NFPA 72.

1203.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in ~~Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in~~ NFPA 72.

2018 International Building Code

Revise as follows:

[F] 2702.2.4 Emergency ~~voice/alarm communication systems.~~ Voice Alarm Communication Systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in ~~Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in~~ NFPA 72.

Reason: This code change is to provide clarification that the standby power for the EVACs system is to be designed to comply with NFPA 72.

We are deleting the reference and code section 1203.2.4. This is causing confusion and the standby power requirements for Fire Alarm systems is clearly outlined in NFPA 72.

This section contradicts itself. NFPA 72 10.6.7.2.1.2 requires secondary power for 24 hours under quiescent load but *also* requires the secondary power to be capable of operating the system for 15 minutes at maximum load after the 24 hours. Deleting the time and simply referencing the standard insures consistency.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2017 the Fire-CAC has held 3 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: https://www.iccsafe.org/codes-tech-support/cs/fire-code-action-committee-fcac/

Cost Impact: The code change proposal will decrease the cost of construction
Depending on interpretation this could reduce the cost of construction. Overall this will provide code clarity and alignment with NFPA 72 and within the IBC-IFC

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

2018 International Fire Code

907.5.2.2.5 Standby ~~Emergency~~ power. Emergency voice/ alarm communications systems shall be provided with ~~emergency~~ standby power in accordance with section 1203 ~~NFPA 72~~.

1203.2.4 Emergency voice/alarm communication systems. ~~Emergency~~ Standby power shall be provided for emergency voice/alarm communication systems ~~as required~~ in accordance with NFPA 72.

2018 International Building Code

2702.2.4 Emergency Voice Alarm Communication Systems. Standby ~~Emergency~~ power shall be provided for emergency voice/alarm communication systems ~~as required~~ in accordance with ~~NFPA 72~~ 907.5.2.2.5.

Committee Reason: Approval of the modification is based on the improvement of the language to clarify that the requirements are for standby power. Approval of the proposal is based upon the proponent's published reason that it is appropriate to the leave the requirements in the NFPA 72 referenced standard. (Vote: 14-0)

Assembly Action: **None**

Final Action

F149-18 **AM**

E9821/F196-18

6

Date Submitted 3/23/2021	**Section** 2702.1.1	**Proponent** Mo Madani
Chapter 27	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		
Commission Action Pending Review		**Staff Classification** Overlap

Comments

General Comments **No**

Related Modifications

Section(s): 1203.1.2, Chapter 80; IBC: [F]403.4.8.2, [F] 2702.1.2; Chapter 35

Original text "section 2702.1.2" of the code change is not consistent with that of the 2020 FBC-B.

Summary of Modification

This proposal is intended to provide a third option for protecting fuel lines supplying a generator set inside a high-rise building.

Rationale

This proposal is intended to provide a third option for protecting fuel lines supplying a generator set inside a high-rise building. The third option is through the use of a fire-resistant pipe-protection system tested to UL 1489, "Fire Resistant Pipe Protection Systems Carrying Combustible Liquids". The system shall be installed as tested and in accordance with the manufacturer's installation instructions.

UL 1489 addresses the fire-resistive performance of fuel lines protected for an hourly rating. UL 1489 compliments the two standards currently referenced in the International Fire Code for establishing fire-resistance ratings: ASTM E119 and UL 263. The standard describes the same test equipment and same time-temperature fire exposure as ASTM E119 and UL 263. However, the sample testing configuration specifically addresses pipe-protection systems. The Conditions of Acceptance follow the intent of ASTM E119 and UL 263, but specifically address the performance requirements for fire-resistant pipe-protection systems. Specifically, the Conditions of Acceptance requires 1) resistance to the fire and hose stream exposure without developing openings in the pipe, and 2) preventing a temperature increase exceeding 325°F at any single point or 250°F at any cross section along the pipe.

Approved as Submitted (AS)

2018 International Fire Code

Revise as follows:

1203.1.2 Fuel line piping protection. Fuel lines supplying a generator set inside a high-rise building shall be separated from areas of the building other than the room the generator is located in by an approved method, or an one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.

2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.

3. Other approved methods.

~~[F]~~ 403.4.8.2 Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by ~~an approved method or~~ one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.

2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.

3. Other approved methods.

Add new standard(s) as follows:

UL

10C—09: Positive Pressure Fire Tests of Door Assemblies—with revisions through February 2015

2018 International Building Code

[F] 2702.1.2 Fuel-line piping protection. Fuel lines supplying a generator set inside a high-rise building shall be separated from areas of the building other than the room the generator is located in by ~~an approved method, or an~~ one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.

2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.

3. Other approved methods.

Add new standard(s) as follows:

UL

10C—09: Positive Pressure Fire Tests of Door Assemblies—with revisions through February 2015

Code Change No: F196-18

Original Proposal

Section(s): 1203.1.2, Chapter 80; IBC: [F]403.4.8.2, [F] 2702.1.2; Chapter 35

Proponents: Jonathan Roberts, UL LLC, representing UL LLC (jonathan.roberts@ul.com)

2018 International Fire Code

Revise as follows:

1203.1.2 Fuel line piping protection. Fuel lines supplying a generator set inside a high-rise building shall be separated from areas of the building other than the room the generator is located in by an approved method, or an one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.
2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.
3. Other approved methods.

~~[F]~~ 403.4.8.2 Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by ~~an approved methed or~~ one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.
2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.
3. Other approved methods.

Add new standard(s) as follows:

UL
10C—09: Positive Pressure Fire Tests of Door Assemblies—with revisions through February 2015

2018 International Building Code

~~[F]~~ 2702.1.2 Fuel-line piping protection. Fuel lines supplying a generator set inside a high-rise building shall be separated from areas of the building other than the room the generator is located in by ~~an approved method, or an~~ one of the following methods:

1. A fire-resistant pipe-protection system that has been tested in accordance with UL 1489. The system shall be installed as tested and in accordance with the manufacturer's installation instructions, and shall have a rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required rating shall be reduced to 1 hour.
2. An assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.
3. Other approved methods.

Add new standard(s) as follows:

UL

10C—09: Positive Pressure Fire Tests of Door Assemblies—with revisions through February 2015

Reason: This proposal is intended to provide a third option for protecting fuel lines supplying a generator set inside a high-rise building. The third option is through the use of a fire-resistant pipe-protection system tested to UL 1489, "Fire Resistant Pipe Protection Systems Carrying Combustible Liquids". The system shall be installed as tested and in accordance with the manufacturer's installation instructions.

UL 1489 addresses the fire-resistive performance of fuel lines protected for an hourly rating. UL 1489 compliments the two standards currently referenced in the International Fire Code for establishing fire-resistance ratings: ASTM E119 and UL 263. The standard describes the same test equipment and same time-temperature fire exposure as ASTM E119 and UL 263. However, the sample testing configuration specifically addresses pipe-protection systems. The Conditions of Acceptance follow the intent of ASTM E119 and UL 263, but specifically address the performance requirements for fire-resistant pipe-protection systems. Specifically, the Conditions of Acceptance requires 1) resistance to the fire and hose stream exposure without developing openings in the pipe, and 2) preventing a temperature increase exceeding 325°F at any single point or 250°F at any cross section along the pipe.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Fuel lines supplying stationary generators already require protection in accordance with this section. This proposal simply provides an additional option for protecting the fuel lines.

Analysis: A review of the standard proposed for inclusion in the code, UL 1489-2016 Fire Resistant Pipe Protection Systems Carrying Combustible Liquids, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 2, 2018.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal was approved as it provides another method of compliance for protection of fuel lines. (Vote: 13-0)

Assembly Action: **None**

Final Action

F196-18 **AS**

E9124/ADM47-16

7

Date Submitted	2/18/2021	**Section**	101	**Proponent**	Mo Madani
Chapter	35	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

Standards update as applicable to all sub-codes.

Summary of Modification

Updates Referenced standards

Rationale

The CP28 Code Development Policy, Section 4.6 requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2018, a letter was sent to each developer of standards that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Listed are the referenced standards that are to be updated based upon responses received from standards developers.

Comment Period History

E9124-G1

Proponent Joseph Belcher **Submitted** 7/1/2021 **Attachments** No

Comment:

The Florida Home Builders Association (FHBA) joins the Leading Builders of America in requesting denial of the NEC 2020 Article 210.8(F) adopted by this proposed code change. Specifically, the requirement for GFCI on outdoor outlets [Article 210.8(F)] is leading to the shutdown of HVAC systems in many locations that have adopted the NEC 2020. Numerous occurrences of field tripping of the GFCI breaker on ductless mini splits, units containing power conversion equipment, and many single-stage units have been reported. Due to this issue, ten states (WA, OR, CO, ND, SD, MN, IA, TX, GA, MA) have already taken steps to delete, modify or delay enforcement of the requirement. Another six states (UT, NC, WV, CT, NH, ME) all plan to adopt the 2020 NEC with modifications to section 210.8(F). This issue poses a serious health risk to Floridians. We are open to resolving the issue with modifications if an interested party submits a change during Phase II.

E9124 Text Modification

Please see attachment

Code Change No: ADM47-16

Original Proposal

The following table provides a comprehensive list of all standards that the respective standards promulgators have indicated have been, or will be, updated from the listing in the 2018 Editions of the International Codes. According to Section 4.5.1 of ICC Council Policy #CP 28, Code Development Policy, the updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee. Therefore, referenced standards that are to beupdated for the 2020 edition of any of the I-Codes are listed in this single code change proposal. Note that the table below indicates the change to the standard, and the code or codes in which each standard appears. The list includes standards that the promulgators have already updated or will have updated by December 1, 2020.

AA — Aluminum Association

Standard Reference Number	Title	Referenced In Code(s):	
~~ADM1—2015~~ ADM1—2020	Aluminum Design Manual: Part ~~1—A Specification~~ 1—Specification for Aluminum Structures	IBC®	

AAMA — American Architectural Manufacturers Association

Standard Reference Number	Title	Referenced in Code(s):	
~~711—16~~ 711—20	Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products	IBC®	IRC®
~~714—15~~ 714—20	Voluntary Specification for Liquid Applied Flashing Used to Create a Water-resistive Seal around Exterior Wall Openings in Buildings	IBC®	IRC®

ACI — American Concrete Institute

Standard Reference Number	Title	Referenced in Code(s):	
~~318—14~~ 318—19	Building Code Requirements for Structural Concrete	IBC®	IRC®

AISI — American Iron and Steel Institute

Standard Reference Number	Title	Referenced in Code(s):	
AISI S100—16/S1-18	North American Specification for the Design of Cold-formed Steel Structural Members, 2016, with Supplement 1, dated 2018	IBC®	IRC®
AISI ~~S202—15~~ S202—20	Code of Standard Practice for Cold-formed Steel Structural Framing, ~~2015~~ 2020	IBC®	
AISI ~~S220—15~~ S220—20	North American Standard for Cold-formed Steel Framing—Nonstructural Members, ~~2015~~ 2020	IBC®	IRC®
AISI ~~S230—15~~ S230—18	Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings, ~~2015~~ 2018	IBC®	IRC®
AISI ~~S240—15~~ S240—20	North American Standard for Cold-Formed Steel Structuring Framing, ~~2015~~ 2020	IBC®	IRC®
AISI ~~S400—15/S1—16~~ S400—20	North American Standard for Seismic Design of Cold-formed Steel Structural Systems, ~~2015, with Supplement 1, dated 2016;~~ 2020	IBC®	

ANSI — American National Standards Institute

Standard Reference Number	Title	Referenced in Code(s):	
~~A13.1—2015~~ A13.1—2020	Scheme for the Identification of Piping Systems	IBC®	IFC®
~~A108.1A—16~~ A108.1A—17	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar	IBC®	IRC®
~~A108.1B—99~~ A108.1B—17	Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-Portland Mortar	IBC®	IRC®
~~A108.4—99~~ A108.4—09	Installation of Ceramic Tile with Organic Adhesives or Water-cleanable Tile-setting Epoxy Adhesive	IBC®	IRC®

~~A108.5—99~~ A108.5—19	Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex-Portland Cement Mortar	IBC®	IRC®
~~A108.6—99~~ A108.6—19	Installation of Ceramic Tile with Chemical-resistant, Water Cleanable Tile-setting and -grouting Epoxy	IBC®	IRC®
~~A108.8—99~~ A108.8—19	Installation of Ceramic Tile with Chemical-resistant Furan Resin Mortar and Grout	IBC®	
~~A108.9—99~~ A108.9—19	Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout	IBC®	
~~A108.10—99~~ A108.10—17	Installation of Grout in Tilework	IBC®	
~~A118.1—16~~ A118.1—18	American National Standard Specifications for Dry-set Portland Cement Mortar	IBC®	IRC®
~~A118.3—13~~ A118.3—20	American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy and Water Cleanable Tile-setting Epoxy Adhesive	IBC®	IRC®
~~A118.4—16~~ A118.4—18	American National Standard Specifications for Modified Dry-set Cement Mortar	IBC®	IRC®
~~A118.6—18~~ A118.6—19	American National Standard Specifications for Cement Grouts for Tile Installation	IBC®	
~~A136.1—08~~ A136.1—19	American National Standard Specifications for the Installation of Ceramic Tile	IBC®	IRC®
~~A137.1—17~~ A137.1—19	American National Standard Specifications for Ceramic Tile	IBC®	IRC®

APA — APA - Engineered Wood Association

Standard Reference Number	Title	Referenced In Code(s):
ANSI ~~117—15~~ 117—2020	Standard Specification for Structural Glued Laminated Timber of Softwood Species	IBC®
ANSI/APA ~~A190.1—17~~ A190.1—2017	Structural Glued Laminated Timber	IBC®
ANSI/APA PRP ~~210—14~~ 210—2019	Standard for Performance-Rated Engineered Wood Siding	IBC®
APA ~~PDS—12~~ PDS—20	Panel Design Specification	IBC®
ANSI/APA PRG ~~320—17~~ 320—2019	Standard for Performance-rated Cross-laminated Timber	IBC®
APA ~~R540—13~~ R540—19	~~Builders~~ Builder Tips: Proper Storage and Handling of Glulam Beams	IBC®
APA ~~S475—16~~ S475—20	Glued Laminated Beam Design Tables	IBC®
APA ~~S560—14~~ S560—20	Field Notching and Drilling of Glued Laminated Timber Beams	IBC®
APA ~~X450—01~~ X450—18	Glulam in Residential ~~Construction—Western Edition~~ Building—Construction Guide	IBC®

ASABE — American Society of Agricultural and Biological Engineers

Standard Reference Number	Title	Referenced In Code(s):
EP 484.3 ~~MON2016~~ DEC2017	Diaphragm Design of Metal-clad, Wood-frame Rectangular Buildings	IBC®
EP ~~486.2 OCT 2012ED~~ 486.3 SEP2017	Shallow-post and Pier Foundation Design	IBC®
EP ~~559.2 MON2016~~ 559.1 W/Corr. AUG2010 (R2014)	Design Requirements and Bending Properties for Mechanically Laminated Wood Assemblies	IBC®

ASCE/SEI — American Society of Civil EngineersStructural Engineering Institute

Standard Reference Number	Title	Referenced in Code(s):	
7—16 with Supplement 1	Minimum Design Loads and Associated Criteria for Buildings and Other Structures	IBC® IRC®	IEBC®

~~24—14~~ 24—20	Flood Resistant Design and Construction	IBC®	IRC®
~~29—17~~ 29—19	Standard Calculation Methods for Structural Fire Protection	IBC®	
~~49—07~~ 49—12	Wind Tunnel Testing for Buildings and Other Structures	IBC®	

ASME — American Society of Mechanical Engineers

Standard Reference Number	Title	Referenced in Code(s):	
ASME/~~A17.1—2016~~ A17.1—2019/CSA ~~B44—16~~ B44—19	Safety Code for Elevators and Escalators	IBC®	
A17.7—2007/CSA B44—07(~~R2012~~ R2019)	Performance-based Safety Code for Elevators and Escalators	IBC®	
~~A18.1—2014~~ A18.1—2020	Safety Standard for Platform Lifts and Stairway Chairlifts	IBC® IRC®	IEBC®
~~A90.1—2015~~ A90.1—2020	Safety Standard for Belt Manlifts	IBC®	
~~B16.18—2012~~ B16.18—2018	Cast Copper Alloy Solder Joint Pressure Fittings	IBC® IMC® IRC®	IFC® IPC®
~~B16.22—2013~~ B16.22—2018	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	IBC® IMC® IRC®	IFC® IPC®
~~B20.1—2015~~ B20.1—2021	Safety Standard for Conveyors and Related Equipment	IBC®	
~~B31.3—2016~~ B31.3—2020	Process Piping	IBC® IFGC®	IFC®

ASSE — American Society of Safety Engineers

Standard Reference Number	Title	Referenced In Code(s):	
ANSI/~~ASSE Z359.1—2016~~ ASSP Z359.1—2019	~~Requirements for the ANSI/ASSE Z359~~ The Fall Protection Code	IBC® IMC®	IFC®

ASTM — ASTM International

Standard Reference Number	Title	Referenced in Code(s):	
A6/~~A6M—14~~ A6M—2017A	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling	IBC®	
A153/~~A153M—09~~ A153M—2016A	Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware	IBC®	IRC®
~~A240/A240M—15a~~ A240M—17	Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications	IBC® ISPSC®	IRC®
~~A252—10~~ A252—2010(2018)	Specification for Welded and Seamless Steel Pipe Piles	IBC®	
A283/~~A283M—13~~ A283M—2018	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	IBC®	
A416/~~A416M—15~~ A416M—2017A	Specification for Steel Strand, Uncoated Seven-wire for Prestressed Concrete	IBC®	
A572/~~A572M—15~~ A572M—2018	Specification for High-strength Low-alloy Columbium-Vanadium Structural Steel	IBC®	
A653/~~A653M—15~~ A653M—2017	Specification for Steel Sheet, Zinc-coated Galvanized or Zinc-iron Alloy-coated Galvannealed by the Hot-dip Process	IBC®	IRC®

A690/A690M—13a(2018)	Standard Specification for High-strength Low-alloy Nickel, Copper, Phosphorus Steel H-piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments	IBC®	
~~A706/A706M—15~~ A706M—2016	Specification for Low-alloy Steel Deformed and Plain Bars for Concrete Reinforcement	IBC®	IRC®
~~A722/A722M—15~~ A722M—2018	Specification for High-strength Steel Bars for Prestressed Concrete	IBC®	
~~A755/A755M—15~~ A755M—2016E1	Specification for Steel Sheet, Metallic-coated by the Hot-dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC®	
~~A924/A924M—14~~ A924M—2017A	Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process	IBC®	IRC®
~~B88—14~~ B88—2016	Specification for Seamless Copper Water Tube	IBC® IFGC® IPC® IRC®	IFC® IMC® IPSDC® ISPSC®
~~B251—10~~ B251/B251M—2017	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube	IBC® IMC® IPSDC®	IFC® IPC® IRC®
~~B280—13~~ B280—2018	Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service	IBC® IFGC®	IFC® IMC®
~~B695—04~~ B695—2004(~~2009~~ 2016)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel Strip for Building Construction	IBC®	IRC®
~~C5—18~~ C5—2018	Specification for Quicklime for Structural Purposes	IBC®	IRC®
~~C27—98~~ C27—1998(~~2013~~ 2018)	Specification for Classification of Fireclay and High-alumina Refractory Brick	IBC®	IRC®
C31/~~C31M—15~~ C31M—2018B	Practice for Making and Curing Concrete Test Specimens in the Field	IBC®	
C33/~~C33M—13~~ C33M—2018	Specification for Concrete Aggregates	IBC®	IRC®
~~C55—2014e~~ C55—2017	Specification for Concrete Building Brick	IBC®	IRC®
~~C62—13a~~ C62—2017	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C67—14~~ C67/C67M—2018	Test Methods of Sampling and Testing Brick and Structural Clay Tile	IBC®	
~~C73—14~~ C73—2017	Specification for Calcium Silicate Brick (Sand-lime Brick)	IBC®	IRC®
~~C90—14~~ C90—2016A	Specification for Loadbearing Concrete Masonry Units	IBC® IRC®	IECC
C91/~~C91M—12~~ C91M—2018	Specification for Masonry Cement	IBC®	IRC®
C94/~~C94M—15a~~ C94M—2017A	Specification for Ready-mixed Concrete	IBC® IRC®	IEBC®
C140/~~C140M—15~~ C140M—2018	Test Method Sampling and Testing Concrete Masonry Units and Related Units	IBC®	
C150/~~C150M—15~~ C150M—2018	Specification for Portland Cement	IBC®	IRC®
C172/~~C172M—14a~~ C172M—2017	Practice for Sampling Freshly Mixed Concrete	IBC®	
~~C199—84~~ C199—1984(~~2011~~ 2016)	Test Method for Pier Test for Refractory Mortars	IBC®	IRC®
~~C208—12~~ C208—2012(2017)E1	Specification for Cellulosic Fiber Insulating Board	IBC®	IRC®
~~C216—15~~ C216—2017A	Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C315—07~~ C315—2007(~~2011~~ 2016)	Specification for Clay Flue Liners and Chimney Pots	IBC® IMC®	IFGC® IRC®

C317/~~C317M—00~~ C317M—2000(2015)	Specification for Gypsum Concrete	IBC®	
C330/~~C330M—14~~ C330M—2017A	Specification for Lightweight Aggregates for Structural Concrete	IBC®	
C331/~~C331M—14~~ C331M—2017	Specification for Lightweight Aggregates for Concrete Masonry Units	IBC®	
~~C473—15~~ C473—2017	Test Methods for Physical Testing of Gypsum Panel Products	IBC®	
C475/~~C475M—15~~ C475M—2017	Specification for Joint Compound and Joint Tape for Finishing Gypsum Board	IBC®	IRC®
~~C516—08~~ C516—2008(~~2014~~ 2013)~~e1~~ E1	Specifications for Vermiculite Loose Fill Thermal Insulation	IBC®	
~~C547—15~~ C547—2017	Specification for Mineral Fiber Pipe Insulation	IBC®	
C549—06(2012)	Specification for Perlite Loose Fill Insulation	IBC®	
~~C552—15~~ C552—2017E1	Standard Specification for Cellular Glass Thermal Insulation	IBC®	IRC®
~~C557—03~~ C557—2003(~~2009~~ 2017)~~e01~~	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC®	IRC®
~~C578—15~~ C578—2018	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation	IBC®	IRC®
~~C587—04~~ C587—2004(~~2014~~ 2018)	Specification for Gypsum Veneer Plaster	IBC®	IRC®
C595/~~C595M—14e1~~ C595M—2018	Specification for Blended Hydraulic Cements	IBC®	IRC®
C635/~~C635M—13a~~ C635M—2017	Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings	IBC®	
~~C652—15~~ C652—2017A	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C726—12~~ C726—2017	Standard Specification for Mineral Wool Roof Insulation Board	IBC®	IRC®
~~C728—15~~ C728—2017A	Standard Specification for Perlite Thermal Insulation Board	IBC®	IRC®
~~C744—14~~ C744—2016	Specification for Prefaced Concrete and Calcium Silicate Masonry Units	IBC®	IRC®
~~C754—15~~ C754—2018	Specification for Installation of Steel Framing Members to Receive Screw-attached Gypsum Panel Products	IBC®	
C836/~~C836M—15~~ C836M—2018	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course	IBC®	IRC®
~~C840—13~~ C840—2018A	Specification for Application and Finishing of Gypsum Board	IBC®	
~~C841—03~~ C841—2003(~~2013~~ 2018)	Specification for Installation of Interior Lathing and Furring	IBC®	IRC®
~~C843—99(2012)~~ C843—2017	Specification for Application of Gypsum Veneer Plaster	IBC®	IRC®
~~C847—14a~~ C847—2018	Specification for Metal Lath	IBC®	IRC®
~~C920—14a~~ C920—2018	Standard for Specification for Elastomeric Joint Sealants	IBC®	IRC®
~~C926—15b~~ C926—2018B	Specification for Application of Portland Cement-based Plaster	IBC®	IRC®
~~C933—14~~ C933—2018	Specification for Welded Wire Lath	IBC®	IRC®
~~C946—10~~ C946—2018	Specification for Construction of Dry-stacked, Surface-bonded Walls	IBC®	IRC®
~~C954—15~~ C954—2018	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness	IBC®	IRC®
C957/~~C957M—15~~ C957M—2017	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane with Integral Wearing Surface	IBC®	IRC®
~~C1002—14~~ C1002—2018	Specification for Steel Self-piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	IBC®	IRC®
~~C1032—14~~ C1032—2018	Specification for Woven Wire Plaster Base	IBC®	IRC®
~~C1047—14a~~ C1047—2018	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base	IBC®	IRC®
	Specification for Installation of Lathing and Furring to Receive Interior and Exterior		

~~C1063—15a~~ C1063—2018B	Portland Cement-based Plaster	IBC®	IRC®
~~C1088—14~~ C1088—2018	Specification for Thin Veneer Brick Units Made from Clay or Shale	IBC®	IRC®
C1157/~~C1157M—11~~ C1157M—2017	Standard Performance Specification for Hydraulic Cement	IBC®	
~~C1167—11~~ C1167—2011(2017)	Specification for Clay Roof Tiles	IBC®	IRC®
C1177/~~C1177M—13~~ C1177M—2017	Specification for Glass Mat Gypsum Substrate for Use as Sheathing	IBC®	IRC®
C1178/~~C1178M—13~~ C1178M—2018	Specification for Coated Mat Water-resistant Gypsum Backing Panel	IBC®	IRC®
~~C1186—08~~ C1186—2008(~~2012~~ 2016)	Specification for Flat Fiber Cement Sheets	IBC®	IRC®
~~C1261—13~~ C1261—2013(2017)E1	Specification for Firebox Brick for Residential Fireplaces	IBC®	IRC®
C1278/~~C1278M—07a(2011)~~ C1278M—2017	Specification for Fiber-reinforced Gypsum Panel	IBC®	IRC®
~~C1283—11~~ C1283—2015	Practice for Installing Clay Flue Lining	IBC®	IRC®
~~C1288—14~~ C1288—2017	Standard Specification for Discrete Nonasbestos Fiber-cement Interior Substrate Sheets	IBC®	IRC®
~~C1289—15~~ C1289—2018	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board	IBC®	IRC®
~~C1325—14~~ C1325—2018	Standard Specification for Nonasbestos Fiber-mat Reinforced Cement Backer Units	IBC®	IRC®
~~C1364—18B~~ C1364—2017	Standard Specification for Architectural Cast Stone	IBC®	IRC®
C1396/~~C1396M—14a~~ C1396M—2017	Specification for Gypsum Board	IBC®	
~~C1492—03~~ C1492—2003(~~2009~~ 2016)	Standard Specification for Concrete Roof Tile	IBC®	IRC®
C1600/~~C1600M—11~~ C1600M—2017	Standard Specification for Rapid Hardening Hydraulic Cement	IBC®	
C1629/~~C1629M—15~~ C1629M—2018A	Standard Classification for Abuse-resistant Nondecorated Interior Gypsum Panel Products and Fiber-reinforced Cement Panels	IBC®	
C1658/~~C1658M—13~~ C1658M—2018	Standard Specification for Glass Mat Gypsum Panels	IBC®	IRC®
~~C1670—16~~ C1670/C1670M—2018	Standard Specification for Adhered Manufactured Stone Masonry Veneer Units	IBC®	
~~C1766—13~~ C1766—2015	Standard Specification for Factory-laminated Gypsum Panel Products	IBC®	IRC®
~~D25—12~~ D25—2012(2017)	Specification for Round Timber Piles	IBC®	
D41/~~D41M—11~~ D41M—2011(2016)	Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing	IBC®	
D43/~~D43M—00~~ D43M—2000(~~2012~~ 2018)~~e1~~	Specification for Coal Tar Primer Used in Roofing, Dampproofing and Waterproofing	IBC®	
~~D56—05(2010)~~ D56—2016A	Test Method for Flash Point by Tag Closed Cup Tester	IBC® IMC®	IFC®
~~D86—15~~ D86—2017	Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure	IBC®	IFC®
~~D93—15~~ D93—2018	Test Methods for Flash Point by Pensky-Martens Closed Cup Tester	IBC® IMC®	IFC®
D226/~~D226M—09~~ D226M—2017	Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing	IBC®	IRC®
D227/~~D227M—03~~ D227M—2003(~~2011~~ 2018)~~e1~~	Specification for Coal-tar-saturated Organic Felt Used in Roofing and Waterproofing	IBC®	IRC®
D312/~~D312M—15~~ D312M—			

~~2016M~~ D448—2012(2017)	Specification for Asphalt Used in Roofing Standard Classification for Sizes of Aggregate for Road and Bridge Construction	IBC® IBC®	
D450/~~D450M—07~~ D450M—2017(~~2013~~ 2018)~~e1~~	Specification for Coal-tar Pitch Used in Roofing, Dampproofing and Waterproofing	IBC®	IRC®
D1143/~~D1143M—07~~ D1143M—2007(2013) E1	Test Methods for Deep Foundations Under Static Axial Compressive Load	IBC®	
D1863/~~D1863M—05~~ D1863M—2005(~~2011~~ 2018)~~e1~~	Specification for Mineral Aggregate Used on Built-up Roofs	IBC®	IRC®
D1970/~~D1970M—15a~~ D1970M—2017A	Specification for Self-adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection	IBC®	
D2178/~~D2178M—15~~ D2178M—15A	Specification for Asphalt Glass Felt Used in Roofing and Waterproofing	IBC®	IRC®
~~D2487—11~~ D2487—2017	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	IBC®	
D2822/~~D2822M—05~~ D2822M—2005(2011)~~e1~~	Specification for Asphalt Roof Cement, Asbestos Containing	IBC®	IRC®
D2824/~~D2824M—13~~ D2824M—2018	Standard Specification for Aluminum-pigmented Asphalt Roof Coatings, Nonfibered and Fibered without Asbestos	IBC®	
~~D2859—16~~ D2859—2016	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials	IBC®	IFC®
~~D2898—10~~ D2898—2010(2017)	Test Methods for Accelerated Weathering of Fire-retardant-treated Wood for Fire Testing	IBC® IWUIC®	IRC®
~~D3019—08~~ D3019/D3019M—2017	Specification for Lap Cement Used with Asphalt Roll Roofing, Nonfibered, Asbestos Fibered and Nonasbestos Fibered	IBC®	IRC®
D3161/~~D3161M—15~~ D3161M—2016A	Test Method for Wind Resistance of Steep Slope Roofing Products (Fan Induced Method)	IBC®	IRC®
~~D3200—74~~ D3200—1974(~~2012~~ 2017)	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles	IBC®	
D3462/~~D3462M—10a~~ D3462M—2016	Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules	IBC®	IRC®
~~D3679—13~~ D3679—2017	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding	IBC®	IRC®
~~D3737—12~~ D3737—2018E1	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)	IBC®	
~~D3746—85~~ D3746/D3746M—1985(~~2008~~ 2015) E1	Test Method for Impact Resistance of Bituminous Roofing Systems	IBC®	
~~D3957—09~~ D3957—2009(2015)	Standard Practices for Establishing Stress Grades for Structural Members Used in Log Buildings	IBC®	
~~D4318—10e1~~ D4318—2017E1	Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils	IBC®	IRC®
D4434/~~D4434M—12~~ D4434M—2015	Specification for Poly (Vinyl Chloride) Sheet Roofing	IBC®	IRC®
D4479/~~D4479M—07~~ D4479M—2007(~~2012~~ 2018)~~e1~~	Specification for Asphalt Roof Coatings—Asbestos-free	IBC®	IRC®
D4586/~~D4586M—07~~ D4586M—2007(~~2012~~ 2018)~~e1~~	Specification for Asphalt Roof Cement—Asbestos-free	IBC®	IRC®
D4637/~~D4637M—14e1~~ D4637M—2015	Specification for EPDM Sheet Used in Single-ply Roof Membrane	IBC®	IRC®
D4869/~~D4869M—15~~ D4869M—2016A	Specification for Asphalt-saturated (Organic Felt) Underlayment Used in Steep Slope Roofing	IBC®	IRC®
D4897/~~D4897M—01(2009)~~			

~~D4897M—2016~~ ~~D4945—12~~ D4945—2017	Specification for Asphalt-coated Glass Fiber Venting Base Sheet Used in Roofing Test Method for High-strain Dynamic Testing of Deep Foundations	IBC® IBC®	IRC®
~~D5055—13e1~~ D5055—2016	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-joists	IBC®	IRC®
~~D5456—14b~~ D5456—2018	Specification for Evaluation of Structural Composite Lumber Products	IBC®	IRC®
~~D5516—09~~ D5516—2018	Test Method of Evaluating the Flexural Properties of Fire-retardant Treated Softwood Plywood Exposed to Elevated Temperatures	IBC®	IRC®
D5643/~~D5643M—06~~ D5643M—2006(~~2012~~ 2018)~~e1~~	Specification for Coal Tar Roof Cement, Asbestos-free	IBC®	IRC®
~~D5664—10~~ D5664—2017	Standard Test Method for Evaluating the Effects of Fire-retardant Treatment and Elevated Temperatures on Strength Properties of Fire-retardant Treated Lumber	IBC®	IRC®
~~D6083—05e01~~ D6083/D6083M—2018	Specification for Liquid Applied Acrylic Coating Used in Roofing	IBC®	IRC®
D6162/~~D6162M—00a(2015)e1~~ D6162M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC®	
D6163/~~D6163M—00(2015)e1~~ D6163M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements	IBC®	
D6164/~~D6164M—11~~ D6164M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Metal Materials Using Polyester Reinforcements	IBC®	IRC®
D6222/~~D6222M—11~~ D6222M—2016	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC®	IRC®
D6223/~~D6223M—02(2009)e1~~ D6223M—2016	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC®	IRC®
~~D6298—13~~ D6298/D6298M—2016	Specification for Fiberglass Reinforced Styrene-butadiene-styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface	IBC®	IRC®
D6380/~~D6380M—03~~ D6380M—2003(~~2013~~ 2018)~~e1~~	Standard Specification for Asphalt Roll Roofing (Organic) Felt	IBC®	
~~D6464—03a~~ D6464—2003A(~~2009~~ 2017)~~e1~~	Standard Specification for Expandable Foam Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC®	IRC®
D6509/~~D6509M—09(2015)~~ D6509M—2016	Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Base Sheet Materials Using Glass Fiber Reinforcements	IBC®	
D6754/~~D6754M—10~~ D6754M—2015	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing	IBC®	IRC®
~~D6757—2013~~ D6757/D6757M—2018	Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep Slope Roofing	IBC®	IRC®
~~D6841—08~~ D6841—2016	Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-retardant Treated Lumber	IBC®	IRC®
D6878/~~D6878M—13~~ D6878M—2017	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing	IBC®	IRC®
D6947/~~D6947M—07(2013)e1~~ D6947M—2016	Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System	IBC®	IRC®
~~D7032—14~~ D7032—2017	Standard Specification for Establishing Performance Ratings for Wood, Plastic Composite Deck Boards and Guardrail Systems (Guards or Rails)	IBC® IWUIC®	IRC®
~~D7147—11~~ D7147—2011(2018)	Specification for Testing and Establishing Allowable Loads of Joist Hangers	IBC®	
D7158/~~D7158M—16~~ D7158M—2019	Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)	IBC®	
~~D7254—15~~ D7254—2017	Standard Specification for Polypropylene (PP) Siding	IBC®	IRC®
D7655/~~D7655M—12~~ D7655M—2012(2017)	Standard Classification for Size of Aggregate Used as Ballast for Roof Membrane Systems	IBC®	

~~D7672—14~~ D7672—14E1	Standard Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies	IBC®	IRC®
~~E84—16~~ E84—2018B	Standard Test Methods for Surface Burning Characteristics of Building Materials	IBC®	
~~E90—09~~ E90—2009(2016)	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements	IBC®	
~~E96/E96M—15~~ E96M—2016	Standard Test Methods for Water Vapor Transmission of Materials	IBC®	
~~E108—16~~ E108—2017	Standard Test Methods for Fire Tests of Roof Coverings	IBC® IWUIC®	IEBC®
~~E119—16~~ E119—2018B	Standard Test Methods for Fire Tests of Building Construction and Materials	IBC®	
~~E136—16~~ E136—2016A	Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C	IBC® IFGC® IWUIC®	IEBC® IMC®
~~E283—04~~ E283—2004(2012)	Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences across the Specimen	IBC® IECC	IECC IRC®
~~E331—00~~ E331—2000(~~2009~~ 2016)	Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference	IBC®	IRC®
~~E492—09~~ E492—2009(2016)E1	Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-ceiling Assemblies Using the Tapping Machine	IBC®	
~~E648—15c1~~ E648—2017A	Standard Test Method for Critical Radiant Flux of Floor-covering Systems Using a Radiant Heat Energy Source	IBC®	IFC®
E736/~~E736M—00(2015)e1~~ E736M—2017	Test Method for Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members	IBC®	
E814—2013A(2017)	Test Method for Fire Tests of Penetration Firestop Systems	IBC®	IRC®
~~E970—14~~ E970—2017	Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	IBC®	IRC®
~~E1300—12ae1~~ E1300—2016	Practice for Determining Load Resistance of Glass in Buildings	IBC®	
~~E1354—16~~ E1354—17	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter	IBC®	
~~E1592—05~~ E1592—2005(~~2012~~ 2017)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	IBC®	
~~E1602—03~~ E1602—2003(~~2010~~ 2017)e1	Guide for Construction of Solid Fuel-burning Masonry Heaters	IBC®	IRC®
~~E1886—13A~~ E1886—2013A	Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials	IBC®	IRC®
~~E1996—14a~~ E1996—2017	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes	IBC®	
~~E2174—14b~~ E2174—2018	Standard Practice for On-site Inspection of Installed Fire Stops	IBC®	
~~E2273—03(2011)~~ E2273—2018	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies	IBC®	IRC®
~~E2307—15b~~ E2307—15BE1	Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using the Intermediate-scale, Multistory Test Apparatus	IBC®	
~~E2353—14~~ E2353—2016	Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards and Balustrades	IBC®	
~~E2404—15a~~ E2404—2017	Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facing and Veneers to Assess Surface Burning Characteristics	IBC®	IFC®
E2556/~~E2556M—10~~ E2556M—2010(2016)	Standard Specification for Vapor Permeable Flexible Sheet Water-resistive Barriers Intended for Mechanical Attachment	IBC®	
~~E2568—09e1~~ E2568—	Standard Specification for PB Exterior Insulation and Finish Systems	IBC®	IRC®

~~2017A~~ E2570/E2570M—07(2014)e1	Standard Test Method for Evaluating Water-resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) for EIFS with Drainage	IBC®	IRC®
~~E2573—12~~ E2573—2017	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	IBC®	IFC®
~~E2579—13~~ E2579—2015	Standard Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics	IBC®	IFC®
~~E2599—15~~ E2599—2018	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics	IBC®	
~~E2634—11(2015)~~ E2634—2018	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	IBC®	IRC®
E2751/~~E2751M—13~~ E2751M—2017A	Practice for Design and Performance of Supported Laminated Glass Walkways	IBC®	
~~F547—06(2012)~~ F547—2017	Terminology of Nails for Use with Wood and Wood-base Materials	IBC®	
~~F1667—15~~ F1667—2018	Specification for Driven Fasteners: Nails, Spikes and Staples	IBC®	IRC®
~~F2200—14~~ F2200—2017	Standard Specification for Automated Vehicular Gate Construction	IBC®	IFC®
~~G154—12a~~ G154—2016A	Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials	IBC®	

AWC — American Wood Council

Standard Reference Number	Title	Referenced In Code(s):	
AWC ~~STJR—2015~~ STJR—2021	Span Tables for Joists and Rafters	IBC®	IRC®
ANSI/AWC ~~PWF—2015~~ PWF—2021	Permanent Wood Foundation Design Specification	IBC®	IRC®
ANSI/AWC ~~SDPWS—2015~~ SDPWS—2021	Special Design Provisions for Wind and Seismic	IBC®	

AWPA — American Wood Protection Association

Standard Reference Number	Title	Referenced In Code(s):	
~~M4—16~~ M4—15	Standard for the Care of Preservative-treated Wood Products	IBC®	IRC®
~~U1—16~~ U1—20	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Commodity Specification H	IBC®	IRC®

AWS — American Welding Society

Standard Reference Number	Title	Referenced in Code(s):
D1.4/~~D1.4M—2017~~ D1.4M—2018	Structural Welding ~~Code—Reinforcing Steel Including Metal Inserts and Connections in Reinforced Concrete Construction~~ Code—Steel Reinforcing Bars	IBC®

BHMA — Builders Hardware Manufacturers' Association

Standard Reference Number	Title	Referenced In Code(s):
A ~~156.10—2011~~ 156.10—2017	Power Operated Pedestrian Doors	IBC®

A ~~156.19—2013~~ 156.19—2020	Standard for Power Assist and Low Energy Power Operated Doors	IBC®
A ~~156.27—2011~~ 156.27—2019	Power and Manual Operated Revolving Pedestrian Doors	IBC®
A ~~156.38—2014~~ 156.38—2020	Low Energy Power Operated Sliding and Folding Doors	IBC®

CSA — Canadian Standards Association

Standard Reference Number	Title	Referenced In Code(s):
ASME ~~A17.1—2016~~ A17.1—2019/CSA ~~B44—16~~ B44—19	Safety Code for Elevators and Escalators	IBC®
ASME A17.7—2007/CSA B44.7—07(R2017)	Performance-based Safety Code for Elevators and Escalators	IBC®

DASMA — Door & Access Systems Manufacturers Association International

Standard Reference Number	Title	Referenced in Code(s):
ANSI/DASMA ~~115—2016~~ 115—2017	Standard Method for Testing Sectional Garage Doors, Rolling Doors and Flexible Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure	IBC®

DOC — U.S. Department of Commerce

Standard Reference Number	Title	Referenced In Code(s):	
PS ~~1—09~~ 1—19	Structural Plywood	IBC®	IRC®
PS ~~2—10~~ 2—18	Performance Standard for ~~Wood-based Structural-use~~ Wood Structural Panels	IBC®	IRC®
PS 20—05	American Softwood Lumber Standard	IBC®	IRC®

FM — FM Approvals

Standard Reference Number	Title	Referenced in Code(s):
~~4880—2015~~ 4880—2017	~~Approval~~ American National Standard for ~~Class 1 Fire Rating of Building Panels or~~ Evaluating the Fire Performance Insulated Building Panel Assemblies and Interior Finish Materials	IBC®

GA — Gypsum Association

Standard Reference Number	Title	Referenced in Code(s):
GA ~~216—2016~~ 216—2018	Application and Finishing of Gypsum Panel Products	IBC®
GA ~~600—2015~~ 600—2018	Fire-resistance and Sound Control Design Manual, ~~21st~~ 22nd Edition	IBC®

NAAMM — National Association of Architectural Metal Manufacturers

Standard Reference Number	Title	Referenced in Code(s):
FP ~~1001—17~~ 1001—18	Guide Specifications for Design of Metal Flag Poles	IBC®

NCMA	National Concrete Masonry Association	
Standard Reference Number	**Title**	**Referenced In Code(s):**
TEK ~~5—84(1996~~ 2005)	Details for Concrete Masonry Fire Walls	IBC®

NFPA	National Fire Protection Association		
Standard Reference Number	**Title**	**Referenced In Code(s):**	
~~10—18~~ 10—21	Standard for Portable Fire Extinguishers	IBC®	IFC®
11—16	Standard for ~~Low~~ Low-, Medium, and High Expansion Foam	IBC®	IFC®
~~12A—15~~ 12A—18	Standard on Halon 1301 Fire Extinguishing Systems	IBC® IPMC®	IFC®
~~13—16~~ 13—19	Standard for Installation of Sprinkler Systems	IBC® IRC®	IFC®
~~13D—16~~ 13D—19	Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes	IBC® IRC®	IFC®
~~13R—16~~ 13R—19	Standard for the Installation of Sprinkler Systems in Low-rise Residential Occupancies	IBC® IRC®	IFC®
~~14—16~~ 14—19	Standard for the Installation of Standpipe and Hose System	IBC®	IFC®
~~16—15~~ 16—19	Standard for the Installation of Foam-water Sprinkler and Foam-water Spray Systems	IBC®	IFC®
~~17—17~~ 17—20	Standard for Dry Chemical Extinguishing Systems	IBC® IPMC®	IFC®
~~17A—17~~ 17A—20	Standard for Wet Chemical Extinguishing Systems	IBC® IPMC®	IFC®
~~20—16~~ 20—19	Standard for the Installation of Stationary Pumps for Fire Protection	IBC®	IFC®
~~30—18~~ 30—21	Flammable and Combustible Liquids Code	IBC®	IFC®
~~30A—18~~ 30A—21	Code for Motor Fuel Dispensing Facilities and Repair Garages	IBC® IFGC®	IFC® IMC®
~~31—16~~ 31—20	Standard for the Installation of Oil-burning Equipment	IBC® IMC®	IFC® IRC®
32—16	Standard for ~~Dry Cleaning Plants~~ Drycleaning Facilities	IBC®	IFC®
~~40—16~~ 40—19	Standard for the Storage and Handling of Cellulose Nitrate Film	IBC®	IFC®
~~45—15~~ 45—19	Standard on Fire Protection Laboratories Using Chemicals (2015 Edition)	IBC®	IFC®
~~58—17~~ 58—20	Liquefied Petroleum Gas Code	IBC® IFGC® IRC®	IFC® IMC®
~~61—17~~ 61—20	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities	IBC®	IFC®
~~72—16~~ 72—19	National Fire Alarm and Signaling Code	IBC® IMC® IRC®	IFC® IPMC®
~~80—16~~ 80—19	Standard for Fire Doors and Other Opening Protectives	IBC® IPMC®	IFC®
~~82—14~~ 82—19	Standard on Incinerators and Waste and Linen Handling Systems and Equipment	IBC® IMC®	IFGC®
~~85—15~~ 85—19	Boiler and Combustion System Hazards Code	IBC® IFGC® IRC®	IFC® IMC®
~~92—15~~ 92—18	Standard for Smoke Control Systems	IBC® IMC®	IFC®

~~99—18~~ 99—21	Health Care Facilities Code	IBC® IPC®	IFC®
~~101—18~~ 101—21	Life Safety Code	IBC®	IFC®
~~105—16~~ 105—19	Standard for Smoke Door Assemblies and Other Opening Protectives	IBC® IPMC®	IFC®
~~110—16~~ 110—19	Standard for Emergency and Standby Power Systems	IBC®	IFC®
~~111—13~~ 111—19	Standard on Stored Electrical Energy Emergency and Standby Power Systems	IBC®	IFC®
~~120—15~~ 120—20	Standard for Fire Prevention and Control in Coal Mines	IBC®	IFC®
~~211—16~~ 211—19	Standard for Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances	IBC® IFGC® IRC®	IFC® IMC®
~~221—18~~ 221—21	Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls	IBC®	
~~253—15~~ 253—19	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	IBC®	IFC®
~~265—15~~ 265—19	Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls	IBC®	IFC®
~~286—15~~ 286—19	Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	IBC® IMC®	IFC® IRC®
~~276—15~~ 276—19	Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-deck Roofing Components	IBC®	
~~289—18~~ 289—19	Standard Method of Fire Test for Individual Fuel Packages	IBC®	IFC®
~~484—18~~ 484—19	Standard for Combustible Metals	IBC®	
~~652—16~~ 652—19	Standard on the Fundamentals of Combustible Dust	IBC®	IFC®
~~654—17~~ 654—20	Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids	IBC®	IFC®
~~664—17~~ 664—20	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	IBC®	IFC®
~~701—15~~ 701—19	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films	IBC®	IFC®
~~750—15~~ 750—19	Standard on Water Mist Fire Protection Systems	IBC®	IFC®
~~2001—15~~ 2001—18	Standard on Clean Agent Fire Extinguishing Systems	IBC® IPMC®	IFC®
~~2010—15~~ 2010—20	Standard for Fixed Aerosol Fire-extinguishing Systems	IBC®	IFC®

PCI — Precast Prestressed Concrete Institute

Standard Reference Number	Title	Referenced In Code(s):
~~MNL-124—11~~ PCI 124—18	~~Design~~ Specification for Fire Resistance of Precast / Prestressed Concrete	IBC®
~~MNL-128—01~~ PCI 128—19	~~Recommended Practice~~ Specification for Glass Fiber Reinforced Concrete Panels	IBC®

PTI — Post-Tensioning Institute

Standard Reference Number	Title	Referenced In Code(s):
PTI ~~DC—10.5-12~~ DC—10.5-19	Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive and Stable Soils	IBC®

SBCA — Structural Building Components Association

Standard Reference Number	Title	Referenced in Code(s):
ANSI/FS 100-12(R2018)	Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating	IBC®

Sheathing Used in Exterior Wall Covering Assemblies

SPRI	Single-Ply Roofing Institute	
Standard Reference Number	**Title**	**Referenced In Code(s):**
ANSI/SPRI/FM ~~4435-ES-1—11~~ 4435 ES-1—17	Wind Test Design Standard for Edge Systems Used with Low Slope Roofing Systems	IBC®
ANSI/SPRI ~~RP-4—13~~ RP-4—18	Wind Design Guide for Ballasted Single-ply Roofing Systems	IBC®
ANSI/SPRI ~~VF-1—16~~ VF-1—17	External Fire Design Standard for Vegetative Roofs	IBC®

TIA	Telecommunications Industry Association	
Standard Reference Number	**Title**	**Referenced In Code(s):**
~~222-H—2016~~ ANSI/TIA 222-H—2017	Structural ~~Standards~~ Standard for Antenna Supporting Structures ~~and Antennas~~ , Antennas and Small Wind Turbine Support Structures	IBC®

TMS	The Masonry Society	
Standard Reference Number	**Title**	**Referenced In Code(s):**
~~302—2012~~ 302—2018	Standard Method for Determining the Sound Transmission Class Rating for Masonry Walls	IBC®

UL	UL LLC		
Standard Reference Number	**Title**	**Referenced in Code(s):**	
10A—2009	Tin Clad Fire Doors—with Revisions through ~~December 2013~~ July 2018	IBC®	
~~10C—2009~~ 10C—2016	Positive Pressure Fire Tests of Door ~~Assemblies—with Revisions through February 2015~~ Assemblies	IBC®	
14B—2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors—with Revisions through ~~May 2013~~ July 2017	IBC®	
~~14C—06~~ 14C—2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs—with Revisions through ~~May 2013~~ July 2017	IBC®	
~~55A—04~~ 55A—2004	Materials for Built-up Roof Coverings	IBC®	IRC®
103—2010	Factory-built Chimneys, for Residential Type and Building Heating Appliances—with Revisions through ~~July 2012~~ March 2017	IBC® IMC®	IFGC® IRC®
127—2011	Factory-built Fireplaces—with Revisions through ~~May 2015~~ July 2016	IBC® IMC®	IFGC® IRC®
~~199E—04~~ 199E—2004	Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers	IBC®	IFC®
~~217—06~~ 217—2015	Single and Multiple Station Smoke Alarms—with Revisions through ~~October 2015~~ November 2016	IBC® IRC®	IFC®
263—11	Fire Tests of Building Construction and Materials—with Revisions through ~~June 2015~~ March 2018	IBC®	
~~268—09~~ 268—2016	Smoke Detectors for Fire Alarm ~~Systems~~ Systems-with revisions through July 2016	IBC® IPMC®	IFC®
~~294—1999~~ 294—2018	Access Control System Units—with Revisions through ~~February 2015~~ October 2018	IBC®	IFC®
	Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking		

~~300—05~~ 300—2005(R2010)	Equipment—with Revisions through December 2014	IBC®	IFC®
~~300A—06~~ 300A—2006	Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces	IBC®	IFC®
305—2012	Panic Hardware—with Revisions through ~~August 2014~~ March 2017	IBC®	IFC®
~~325—02~~ 325—2017	Door, Drapery, Gate, Louver and Window Operations and ~~Systems—with Revisions through May 2015~~ Systems	IBC® IRC®	IFC®
555—2006	Fire Dampers—with Revisions through ~~May 2014~~ October 2016	IBC®	
~~555C—2006~~ 555C—2014	Ceiling Dampers—with Revisions through ~~December 2014~~ May 2017	IBC®	
~~555S—99~~ 555S—2014	Smoke Dampers—with Revisions through ~~February 2014~~ October 2016	IBC®	IMC®
580—2006	Test for Uplift Resistance of Roof Assemblies—with Revisions through October ~~2013~~ 2018	IBC®	
641—2010	Type L Low-temperature Venting Systems—with Revisions through ~~June 2013~~ April 2018	IBC® IMC®	IFGC® IRC®
~~723—2008~~ 723—2018	Test for Surface Burning Characteristics of Building ~~Materials—with Revisions through August 2013~~ Materials	IBC® IWUIC®	IMC®
~~790—04~~ 790—2004	Standard Test Methods for Fire Tests of Roof Coverings—with Revisions through ~~July 2014~~ October 2018	IBC® IFC®	IEBC® IRC®
~~793—08~~ 793—2008	Automatically Operated Roof Vents for Smoke and Heat—with Revisions through ~~September 2011~~ March 2017	IBC®	IFC®
~~864—03~~ 864—2014	Control Units and Accessories for Fire Alarm Systems—with Revisions through ~~December 2014~~ March 2018	IBC®	IFC®
~~924—06~~ 924—2016	Safety Emergency Lighting and Power Equipment—with Revisions through ~~April 2014~~ May 2018	IBC®	IFC®
~~1040—96~~ 1040—1996	Fire Test of Insulated Wall Construction—with Revisions through ~~October 2012~~ April 2017	IBC®	IRC®
1256—02	Fire Test of Roof Deck Construction—with Revisions through ~~July 2013~~ August 2018	IBC®	IRC®
~~1479—03~~ 1479—2015	Fire Tests of Penetration ~~Firestops—with Revisions through June 2015~~ Firestops	IBC® IRC®	IMC®
~~1703—02~~ 1703—2002	Flat-plate Photovoltaic Modules and Panels—with Revisions through ~~October 2015~~ September 2018	IBC®	IRC®
1715—97	Fire Test of Interior Finish Material—with Revisions through ~~January 2013~~ April 2017	IBC®	IRC®
1741—2010	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources—with Revisions through ~~January 2015~~ February 2018	IBC®	IRC®
1777—2007	Chimney Liners—with Revisions through ~~October 2015~~ April 2014	IBC® IMC®	IFGC®
~~1784—01~~ 1784—2015	Air Leakage Tests of Door ~~Assemblies—with Revisions through February 2015~~ Assemblies	IBC®	IECC
~~1897—12~~ 1897—2015	Uplift Tests for Roof Covering ~~Systems—with Revisions through September 2015~~ Systems	IBC®	IRC®
~~1994—04~~ 1994—2015	Luminous Egress Path Marking ~~Systems—with Revisions through May 2015~~ Systems	IBC®	IFC®
~~2034—2008~~ 2034—2017	Single- and Multiple-station Carbon Monoxide Alarms—with Revisions through ~~March 2015~~ September 2018	IBC®	
2075—2013	Standard for Gas and Vapor Detectors and ~~Sensors~~ Sensors-with revisions through December 2017	IBC® IMC®	IFC® IRC®
~~2079—04~~ 2079—2015	Tests for Fire Resistance of Building Joint ~~Systems—with Revisions through August 2015~~ Systems	IBC®	IFC®
~~2196—2001~~ 2196—2017	~~Tests~~ Standard for Fire ~~Resistive Cables—with Revisions through March 2012~~ Test for Circuit Integrity of Fire- Resistive Power, Instrumentation, Control and Data Cables	IBC®	IFC®
2200—2012	Stationary Engine Generator Assemblies—with Revisions through ~~July~~ October 2015	IBC® IFGC®	IFC® IMC®
2202—2009	Electric Vehicle (EV) Charging System ~~Equipment~~ Equipment-with revisions through February 2018	IBC®	

~~2594—2013~~ 2594—2016	Electric Vehicle Supply Equipment	IBC®
2703—2014	~~Outline of Investigation for~~ Mounting Systems, Mounting Devices, Clamping/Retention Devices and Ground Lugs for Use with Flat-plate Photovoltaic Modules and ~~Panels~~ Panels-with revisions through December 2019	IBC®

ULC	Underwriters Laboratories of Canada		
Standard Reference Number	**Title**	**Referenced in Code(s):**	
CAN/ULC S ~~102.2—2010~~ 102.2—2018	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and ~~Assemblies—with 2000 Revisions~~ Assemblies	IBC®	IRC®

Reason: THIS IS THE ADMIN STANDARDS UPDATE CODE CHANGE FOR THE IBC.
The CP28 Code Development Policy, Section 4.6 requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2018, a letter was sent to each developer of standards that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Listed are the referenced standards that are to be updated based upon responses received from standard developers.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Not applicable.

Proposal # 5823

ADM47-IBC-19

Code Change No: ADM47-16

Original Proposal

The following table provides a comprehensive list of all standards that the respective standards promulgators have indicated have been, or will be, updated from the listing in the 2018 Editions of the International Codes. According to Section 4.5.1 of ICC Council Policy #CP 28, Code Development Policy, the updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee. Therefore, referenced standards that are to beupdated for the 2020 edition of any of the I-Codes are listed in this single code change proposal. Note that the table below indicates the change to the standard, and the code or codes in which each standard appears. The list includes standards that the promulgators have already updated or will have updated by December 1, 2020.

AA — Aluminum Association

Standard Reference Number	Title	Referenced In Code(s):	
~~ADM1—2015~~ ADM1—2020	Aluminum Design Manual: Part ~~1—A Specification~~ 1—Specification for Aluminum Structures	IBC®	

AAMA — American Architectural Manufacturers Association

Standard Reference Number	Title	Referenced in Code(s):	
~~711—16~~ 711—20	Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products	IBC®	IRC®
~~714—15~~ 714—20	Voluntary Specification for Liquid Applied Flashing Used to Create a Water-resistive Seal around Exterior Wall Openings in Buildings	IBC®	IRC®

ACI — American Concrete Institute

Standard Reference Number	Title	Referenced in Code(s):	
~~318—14~~ 318—19	Building Code Requirements for Structural Concrete	IBC®	IRC®

AISI — American Iron and Steel Institute

Standard Reference Number	Title	Referenced in Code(s):	
AISI S100—16/S1-18	North American Specification for the Design of Cold-formed Steel Structural Members, 2016, with Supplement 1, dated 2018	IBC®	IRC®
AISI ~~S202—15~~ S202—20	Code of Standard Practice for Cold-formed Steel Structural Framing, ~~2015~~ 2020	IBC®	
AISI ~~S220—15~~ S220—20	North American Standard for Cold-formed Steel Framing—Nonstructural Members, ~~2015~~ 2020	IBC®	IRC®
AISI ~~S230—15~~ S230—18	Standard for Cold-formed Steel Framing—Prescriptive Method for One- and Two-family Dwellings, ~~2015~~ 2018	IBC®	IRC®
AISI ~~S240—15~~ S240—20	North American Standard for Cold-Formed Steel Structuring Framing, ~~2015~~ 2020	IBC®	IRC®
AISI ~~S400—15/S1—16~~ S400—20	North American Standard for Seismic Design of Cold-formed Steel Structural Systems, ~~2015, with Supplement 1, dated 2016;~~ 2020	IBC®	

ANSI — American National Standards Institute

Standard Reference Number	Title	Referenced in Code(s):	
~~A13.1—2015~~ A13.1—2020	Scheme for the Identification of Piping Systems	IBC®	IFC®
~~A108.1A—16~~ A108.1A—17	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar	IBC®	IRC®
~~A108.1B—99~~ A108.1B—17	Installation of Ceramic Tile, Quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-Portland Mortar	IBC®	IRC®
~~A108.4—99~~ A108.4—09	Installation of Ceramic Tile with Organic Adhesives or Water-cleanable Tile-setting Epoxy Adhesive	IBC®	IRC®

~~A108.5—99~~ A108.5—19	Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex-Portland Cement Mortar	IBC®	IRC®
~~A108.6—99~~ A108.6—19	Installation of Ceramic Tile with Chemical-resistant, Water Cleanable Tile-setting and -grouting Epoxy	IBC®	IRC®
~~A108.8—99~~ A108.8—19	Installation of Ceramic Tile with Chemical-resistant Furan Resin Mortar and Grout	IBC®	
~~A108.9—99~~ A108.9—19	Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout	IBC®	
~~A108.10—99~~ A108.10—17	Installation of Grout in Tilework	IBC®	
~~A118.1—16~~ A118.1—18	American National Standard Specifications for Dry-set Portland Cement Mortar	IBC®	IRC®
~~A118.3—13~~ A118.3—20	American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy and Water Cleanable Tile-setting Epoxy Adhesive	IBC®	IRC®
~~A118.4—16~~ A118.4—18	American National Standard Specifications for Modified Dry-set Cement Mortar	IBC®	IRC®
~~A118.6—18~~ A118.6—19	American National Standard Specifications for Cement Grouts for Tile Installation	IBC®	
~~A136.1—08~~ A136.1—19	American National Standard Specifications for the Installation of Ceramic Tile	IBC®	IRC®
~~A137.1—17~~ A137.1—19	American National Standard Specifications for Ceramic Tile	IBC®	IRC®

APA — APA - Engineered Wood Association

Standard Reference Number	Title	Referenced In Code(s):
ANSI ~~117—15~~ 117—2020	Standard Specification for Structural Glued Laminated Timber of Softwood Species	IBC®
ANSI/APA ~~A190.1—17~~ A190.1—2017	Structural Glued Laminated Timber	IBC®
ANSI/APA PRP ~~210—14~~ 210—2019	Standard for Performance-Rated Engineered Wood Siding	IBC®
APA ~~PDS—12~~ PDS—20	Panel Design Specification	IBC®
ANSI/APA PRG ~~320—17~~ 320—2019	Standard for Performance-rated Cross-laminated Timber	IBC®
APA ~~R540—13~~ R540—19	~~Builders~~ Builder Tips: Proper Storage and Handling of Glulam Beams	IBC®
APA ~~S475—16~~ S475—20	Glued Laminated Beam Design Tables	IBC®
APA ~~S560—14~~ S560—20	Field Notching and Drilling of Glued Laminated Timber Beams	IBC®
APA ~~X450—01~~ X450—18	Glulam in Residential ~~Construction—Western Edition~~ Building—Construction Guide	IBC®

ASABE — American Society of Agricultural and Biological Engineers

Standard Reference Number	Title	Referenced In Code(s):
EP 484.3 ~~MON2016~~ DEC2017	Diaphragm Design of Metal-clad, Wood-frame Rectangular Buildings	IBC®
EP ~~486.2 OCT 2012ED~~ 486.3 SEP2017	Shallow-post and Pier Foundation Design	IBC®
EP ~~559.2 MON2016~~ 559.1 W/Corr. AUG2010 (R2014)	Design Requirements and Bending Properties for Mechanically Laminated Wood Assemblies	IBC®

ASCE/SEI — American Society of Civil EngineersStructural Engineering Institute

Standard Reference Number	Title	Referenced in Code(s):	
7—16 with Supplement 1	Minimum Design Loads and Associated Criteria for Buildings and Other Structures	IBC® IRC®	IEBC®

~~24—14~~ 24—20	Flood Resistant Design and Construction	IBC®	IRC®
~~29—17~~ 29—19	Standard Calculation Methods for Structural Fire Protection	IBC®	
~~49—07~~ 49—12	Wind Tunnel Testing for Buildings and Other Structures	IBC®	

ASME — American Society of Mechanical Engineers

Standard Reference Number	Title	Referenced in Code(s):	
ASME/~~A17.1—2016~~ A17.1—2019/CSA ~~B44—16~~ B44—19	Safety Code for Elevators and Escalators	IBC®	
A17.7—2007/CSA B44—07(~~R2012~~ R2019)	Performance-based Safety Code for Elevators and Escalators	IBC®	
~~A18.1—2014~~ A18.1—2020	Safety Standard for Platform Lifts and Stairway Chairlifts	IBC® IRC®	IEBC®
~~A90.1—2015~~ A90.1—2020	Safety Standard for Belt Manlifts	IBC®	
~~B16.18—2012~~ B16.18—2018	Cast Copper Alloy Solder Joint Pressure Fittings	IBC® IMC® IRC®	IFC® IPC®
~~B16.22—2013~~ B16.22—2018	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	IBC® IMC® IRC®	IFC® IPC®
~~B20.1—2015~~ B20.1—2021	Safety Standard for Conveyors and Related Equipment	IBC®	
~~B31.3—2016~~ B31.3—2020	Process Piping	IBC® IFGC®	IFC®

ASSE — American Society of Safety Engineers

Standard Reference Number	Title	Referenced In Code(s):	
ANSI/~~ASSE Z359.1—2016~~ ASSP Z359.1—2019	~~Requirements for the ANSI/ASSE Z359~~ The Fall Protection Code	IBC® IMC®	IFC®

ASTM — ASTM International

Standard Reference Number	Title	Referenced in Code(s):	
A6/~~A6M—14~~ A6M—2017A	Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling	IBC®	
A153/~~A153M—09~~ A153M—2016A	Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware	IBC®	IRC®
~~A240/A240M—15a~~ A240M—17	Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications	IBC® ISPSC®	IRC®
~~A252—10~~ A252—2010(2018)	Specification for Welded and Seamless Steel Pipe Piles	IBC®	
A283/~~A283M—13~~ A283M—2018	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	IBC®	
A416/~~A416M—15~~ A416M—2017A	Specification for Steel Strand, Uncoated Seven-wire for Prestressed Concrete	IBC®	
A572/~~A572M—15~~ A572M—2018	Specification for High-strength Low-alloy Columbium-Vanadium Structural Steel	IBC®	
A653/~~A653M—15~~ A653M—2017	Specification for Steel Sheet, Zinc-coated Galvanized or Zinc-iron Alloy-coated Galvannealed by the Hot-dip Process	IBC®	IRC®

A690/A690M—13a(2018)	Standard Specification for High-strength Low-alloy Nickel, Copper, Phosphorus Steel H-piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments	IBC®	
~~A706/A706M—15~~ A706M—2016	Specification for Low-alloy Steel Deformed and Plain Bars for Concrete Reinforcement	IBC®	IRC®
~~A722/A722M—15~~ A722M—2018	Specification for High-strength Steel Bars for Prestressed Concrete	IBC®	
~~A755/A755M—15~~ A755M—2016E1	Specification for Steel Sheet, Metallic-coated by the Hot-dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC®	
~~A924/A924M—14~~ A924M—2017A	Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process	IBC®	IRC®
~~B88—14~~ B88—2016	Specification for Seamless Copper Water Tube	IBC® IFGC® IPC® IRC®	IFC® IMC® IPSDC® ISPSC®
~~B251—10~~ B251/B251M—2017	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube	IBC® IMC® IPSDC®	IFC® IPC® IRC®
~~B280—13~~ B280—2018	Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service	IBC® IFGC®	IFC® IMC®
~~B695—04~~ B695—2004(~~2009~~ 2016)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel Strip for Building Construction	IBC®	IRC®
~~C5—10~~ C5—2018	Specification for Quicklime for Structural Purposes	IBC®	IRC®
~~C27—98~~ C27—1998(~~2013~~ 2018)	Specification for Classification of Fireclay and High-alumina Refractory Brick	IBC®	IRC®
C31/~~C31M—15~~ C31M—2018B	Practice for Making and Curing Concrete Test Specimens in the Field	IBC®	
C33/~~C33M—13~~ C33M—2018	Specification for Concrete Aggregates	IBC®	IRC®
~~C55—2014a~~ C55—2017	Specification for Concrete Building Brick	IBC®	IRC®
~~C62—13a~~ C62—2017	Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C67—14~~ C67/C67M—2018	Test Methods of Sampling and Testing Brick and Structural Clay Tile	IBC®	
~~C73—14~~ C73—2017	Specification for Calcium Silicate Brick (Sand-lime Brick)	IBC®	IRC®
~~C90—14~~ C90—2016A	Specification for Loadbearing Concrete Masonry Units	IBC® IRC®	IECC
C91/~~C91M—12~~ C91M—2018	Specification for Masonry Cement	IBC®	IRC®
C94/~~C94M—15a~~ C94M—2017A	Specification for Ready-mixed Concrete	IBC® IRC®	IEBC®
C140/~~C140M—15~~ C140M—2018	Test Method Sampling and Testing Concrete Masonry Units and Related Units	IBC®	
C150/~~C150M—15~~ C150M—2018	Specification for Portland Cement	IBC®	IRC®
C172/~~C172M—14a~~ C172M—2017	Practice for Sampling Freshly Mixed Concrete	IBC®	
~~C199—84~~ C199—1984(~~2011~~ 2016)	Test Method for Pier Test for Refractory Mortars	IBC®	IRC®
~~C208—12~~ C208—2012(2017)E1	Specification for Cellulosic Fiber Insulating Board	IBC®	IRC®
~~C216—15~~ C216—2017A	Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C315—07~~ C315—2007(~~2011~~ 2016)	Specification for Clay Flue Liners and Chimney Pots	IBC® IMC®	IFGC® IRC®

C317/~~C317M—00~~ C317M—2000(2015)	Specification for Gypsum Concrete	IBC®	
C330/~~C330M—14~~ C330M—2017A	Specification for Lightweight Aggregates for Structural Concrete	IBC®	
C331/~~C331M—14~~ C331M—2017	Specification for Lightweight Aggregates for Concrete Masonry Units	IBC®	
~~C473—15~~ C473—2017	Test Methods for Physical Testing of Gypsum Panel Products	IBC®	
C475/~~C475M—15~~ C475M—2017	Specification for Joint Compound and Joint Tape for Finishing Gypsum Board	IBC®	IRC®
~~C516—08~~ C516—2008(~~2014~~ 2013)~~e1~~ E1	Specifications for Vermiculite Loose Fill Thermal Insulation	IBC®	
~~C547—15~~ C547—2017	Specification for Mineral Fiber Pipe Insulation	IBC®	
C549—06(2012)	Specification for Perlite Loose Fill Insulation	IBC®	
~~C552—15~~ C552—2017E1	Standard Specification for Cellular Glass Thermal Insulation	IBC®	IRC®
~~C557—03~~ C557—2003(~~2009~~ 2017)~~e01~~	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC®	IRC®
~~C578—15~~ C578—2018	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation	IBC®	IRC®
~~C587—04~~ C587—2004(~~2014~~ 2018)	Specification for Gypsum Veneer Plaster	IBC®	IRC®
C595/~~C595M—14e1~~ C595M—2018	Specification for Blended Hydraulic Cements	IBC®	IRC®
C635/~~C635M—13a~~ C635M—2017	Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings	IBC®	
~~C652—15~~ C652—2017A	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)	IBC®	IRC®
~~C726—12~~ C726—2017	Standard Specification for Mineral Wool Roof Insulation Board	IBC®	IRC®
~~C728—15~~ C728—2017A	Standard Specification for Perlite Thermal Insulation Board	IBC®	IRC®
~~C744—14~~ C744—2016	Specification for Prefaced Concrete and Calcium Silicate Masonry Units	IBC®	IRC®
~~C754—15~~ C754—2018	Specification for Installation of Steel Framing Members to Receive Screw-attached Gypsum Panel Products	IBC®	
C836/~~C836M—15~~ C836M—2018	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course	IBC®	IRC®
~~C840—13~~ C840—2018A	Specification for Application and Finishing of Gypsum Board	IBC®	
~~C841—03~~ C841—2003(~~2013~~ 2018)	Specification for Installation of Interior Lathing and Furring	IBC®	IRC®
~~C843—99(2012)~~ C843—2017	Specification for Application of Gypsum Veneer Plaster	IBC®	IRC®
~~C847—14a~~ C847—2018	Specification for Metal Lath	IBC®	IRC®
~~C920—14a~~ C920—2018	Standard for Specification for Elastomeric Joint Sealants	IBC®	IRC®
~~C926—15b~~ C926—2018B	Specification for Application of Portland Cement-based Plaster	IBC®	IRC®
~~C933—14~~ C933—2018	Specification for Welded Wire Lath	IBC®	IRC®
~~C946—10~~ C946—2018	Specification for Construction of Dry-stacked, Surface-bonded Walls	IBC®	IRC®
~~C954—15~~ C954—2018	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness	IBC®	IRC®
C957/~~C957M—15~~ C957M—2017	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane with Integral Wearing Surface	IBC®	IRC®
~~C1002—14~~ C1002—2018	Specification for Steel Self-piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	IBC®	IRC®
~~C1032—14~~ C1032—2018	Specification for Woven Wire Plaster Base	IBC®	IRC®
~~C1047—14a~~ C1047—2018	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base	IBC®	IRC®
	Specification for Installation of Lathing and Furring to Receive Interior and Exterior		

~~C1063—15a~~ C1063—2018B	Portland Cement-based Plaster	IBC®	IRC®
~~C1088—14~~ C1088—2018	Specification for Thin Veneer Brick Units Made from Clay or Shale	IBC®	IRC®
C1157/~~C1157M—11~~ C1157M—2017	Standard Performance Specification for Hydraulic Cement	IBC®	
~~C1167—11~~ C1167—2011(2017)	Specification for Clay Roof Tiles	IBC®	IRC®
C1177/~~C1177M—13~~ C1177M—2017	Specification for Glass Mat Gypsum Substrate for Use as Sheathing	IBC®	IRC®
C1178/~~C1178M—13~~ C1178M—2018	Specification for Coated Mat Water-resistant Gypsum Backing Panel	IBC®	IRC®
~~C1186—08~~ C1186—2008(~~2012~~ 2016)	Specification for Flat Fiber Cement Sheets	IBC®	IRC®
~~C1261—13~~ C1261—2013(2017)E1	Specification for Firebox Brick for Residential Fireplaces	IBC®	IRC®
C1278/~~C1278M—07a(2011)~~ C1278M—2017	Specification for Fiber-reinforced Gypsum Panel	IBC®	IRC®
~~C1283—11~~ C1283—2015	Practice for Installing Clay Flue Lining	IBC®	IRC®
~~C1288—14~~ C1288—2017	Standard Specification for Discrete Nonasbestos Fiber-cement Interior Substrate Sheets	IBC®	IRC®
~~C1289—15~~ C1289—2018	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board	IBC®	IRC®
~~C1325—14~~ C1325—2018	Standard Specification for Nonasbestos Fiber-mat Reinforced Cement Backer Units	IBC®	IRC®
~~C1364—18B~~ C1364—2017	Standard Specification for Architectural Cast Stone	IBC®	IRC®
C1396/~~C1396M—14a~~ C1396M—2017	Specification for Gypsum Board	IBC®	
~~C1492—03~~ C1492—2003(~~2009~~ 2016)	Standard Specification for Concrete Roof Tile	IBC®	IRC®
C1600/~~C1600M—11~~ C1600M—2017	Standard Specification for Rapid Hardening Hydraulic Cement	IBC®	
C1629/~~C1629M—15~~ C1629M—2018A	Standard Classification for Abuse-resistant Nondecorated Interior Gypsum Panel Products and Fiber-reinforced Cement Panels	IBC®	
C1658/~~C1658M—13~~ C1658M—2018	Standard Specification for Glass Mat Gypsum Panels	IBC®	IRC®
~~C1670—16~~ C1670/C1670M—2018	Standard Specification for Adhered Manufactured Stone Masonry Veneer Units	IBC®	
~~C1766—13~~ C1766—2015	Standard Specification for Factory-laminated Gypsum Panel Products	IBC®	IRC®
~~D25—12~~ D25—2012(2017)	Specification for Round Timber Piles	IBC®	
D41/~~D41M—11~~ D41M—2011(2016)	Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing	IBC®	
D43/~~D43M—00~~ D43M—2000(~~2012~~ 2018)~~e1~~	Specification for Coal Tar Primer Used in Roofing, Dampproofing and Waterproofing	IBC®	
~~D56—05(2010)~~ D56—2016A	Test Method for Flash Point by Tag Closed Cup Tester	IBC® IMC®	IFC®
~~D86—15~~ D86—2017	Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure	IBC®	IFC®
~~D93—15~~ D93—2018	Test Methods for Flash Point by Pensky-Martens Closed Cup Tester	IBC® IMC®	IFC®
D226/~~D226M—09~~ D226M—2017	Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing	IBC®	IRC®
D227/~~D227M—03~~ D227M—2003(~~2011~~ 2018)~~e1~~	Specification for Coal-tar-saturated Organic Felt Used in Roofing and Waterproofing	IBC®	IRC®
D312/~~D312M—15~~ D312M—			

~~2016M~~ D448—2012(2017)	Specification for Asphalt Used in Roofing Standard Classification for Sizes of Aggregate for Road and Bridge Construction	IBC® IBC®	
D450/~~D450M—07~~ D450M—2017(~~2013~~ 2018)~~e1~~	Specification for Coal-tar Pitch Used in Roofing, Dampproofing and Waterproofing	IBC®	IRC®
D1143/~~D1143M—07~~ D1143M—2007(2013) E1	Test Methods for Deep Foundations Under Static Axial Compressive Load	IBC®	
D1863/~~D1863M—05~~ D1863M—2005(~~2011~~ 2018)~~e1~~	Specification for Mineral Aggregate Used on Built-up Roofs	IBC®	IRC®
D1970/~~D1970M—15a~~ D1970M—2017A	Specification for Self-adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection	IBC®	
D2178/~~D2178M—15~~ D2178M—15A	Specification for Asphalt Glass Felt Used in Roofing and Waterproofing	IBC®	IRC®
~~D2487—11~~ D2487—2017	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	IBC®	
D2822/~~D2822M—05~~ D2822M—2005(2011)~~e1~~	Specification for Asphalt Roof Cement, Asbestos Containing	IBC®	IRC®
D2824/~~D2824M—13~~ D2824M—2018	Standard Specification for Aluminum-pigmented Asphalt Roof Coatings, Nonfibered and Fibered without Asbestos	IBC®	
~~D2859—16~~ D2859—2016	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials	IBC®	IFC®
~~D2898—10~~ D2898—2010(2017)	Test Methods for Accelerated Weathering of Fire-retardant-treated Wood for Fire Testing	IBC® IWUIC®	IRC®
~~D3019—08~~ D3019/D3019M—2017	Specification for Lap Cement Used with Asphalt Roll Roofing, Nonfibered, Asbestos Fibered and Nonasbestos Fibered	IBC®	IRC®
D3161/~~D3161M—15~~ D3161M—2016A	Test Method for Wind Resistance of Steep Slope Roofing Products (Fan Induced Method)	IBC®	IRC®
~~D3200—74~~ D3200—1974(~~2012~~ 2017)	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles	IBC®	
D3462/~~D3462M—10a~~ D3462M—2016	Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules	IBC®	IRC®
~~D3679—13~~ D3679—2017	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding	IBC®	IRC®
~~D3737—12~~ D3737—2018E1	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)	IBC®	
~~D3746—85~~ D3746/D3746M—1985(~~2008~~ 2015) E1	Test Method for Impact Resistance of Bituminous Roofing Systems	IBC®	
~~D3957—09~~ D3957—2009(2015)	Standard Practices for Establishing Stress Grades for Structural Members Used in Log Buildings	IBC®	
~~D4318—10e1~~ D4318—2017E1	Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils	IBC®	IRC®
D4434/~~D4434M—12~~ D4434M—2015	Specification for Poly (Vinyl Chloride) Sheet Roofing	IBC®	IRC®
D4479/~~D4479M—07~~ D4479M—2007(~~2012~~ 2018)~~e1~~	Specification for Asphalt Roof Coatings—Asbestos-free	IBC®	IRC®
D4586/~~D4586M—07~~ D4586M—2007(~~2012~~ 2018)~~e1~~	Specification for Asphalt Roof Cement—Asbestos-free	IBC®	IRC®
D4637/~~D4637M—14e1~~ D4637M—2015	Specification for EPDM Sheet Used in Single-ply Roof Membrane	IBC®	IRC®
D4869/~~D4869M—15~~ D4869M—2016A	Specification for Asphalt-saturated (Organic Felt) Underlayment Used in Steep Slope Roofing	IBC®	IRC®
D4897/~~D4897M—01(2009)~~			

~~D4897M—2016~~ ~~D4945—12~~ D4945—2017	Specification for Asphalt-coated Glass Fiber Venting Base Sheet Used in Roofing Test Method for High-strain Dynamic Testing of Deep Foundations	IBC® IBC®	IRC®
~~D5055—13e1~~ D5055—2016	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-joists	IBC®	IRC®
~~D5456—14b~~ D5456—2018	Specification for Evaluation of Structural Composite Lumber Products	IBC®	IRC®
~~D5516—09~~ D5516—2018	Test Method of Evaluating the Flexural Properties of Fire-retardant Treated Softwood Plywood Exposed to Elevated Temperatures	IBC®	IRC®
D5643/~~D5643M—06~~ D5643M—2006(~~2012~~ 2018)~~e1~~	Specification for Coal Tar Roof Cement, Asbestos-free	IBC®	IRC®
~~D5664—10~~ D5664—2017	Standard Test Method for Evaluating the Effects of Fire-retardant Treatment and Elevated Temperatures on Strength Properties of Fire-retardant Treated Lumber	IBC®	IRC®
~~D6083—05e01~~ D6083/D6083M—2018	Specification for Liquid Applied Acrylic Coating Used in Roofing	IBC®	IRC®
D6162/~~D6162M—00a(2015)e1~~ D6162M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC®	
D6163/~~D6163M—00(2015)e1~~ D6163M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements	IBC®	
D6164/~~D6164M—11~~ D6164M—2016	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Metal Materials Using Polyester Reinforcements	IBC®	IRC®
D6222/~~D6222M—11~~ D6222M—2016	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC®	IRC®
D6223/~~D6223M—02(2009)e1~~ D6223M—2016	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC®	IRC®
~~D6298—13~~ D6298/D6298M—2016	Specification for Fiberglass Reinforced Styrene-butadiene-styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface	IBC®	IRC®
D6380/~~D6380M—03~~ D6380M—2003(~~2013~~ 2018)~~e1~~	Standard Specification for Asphalt Roll Roofing (Organic) Felt	IBC®	
~~D6464—03a~~ D6464—2003A(~~2009~~ 2017)~~e1~~	Standard Specification for Expandable Foam Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC®	IRC®
D6509/~~D6509M—09(2015)~~ D6509M—2016	Standard Specification for Atactic Polypropylene (APP) Modified Bituminous Base Sheet Materials Using Glass Fiber Reinforcements	IBC®	
D6754/~~D6754M—10~~ D6754M—2015	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing	IBC®	IRC®
~~D6757—2013~~ D6757/D6757M—2018	Specification for Underlayment Felt Containing Inorganic Fibers Used in Steep Slope Roofing	IBC®	IRC®
~~D6841—08~~ D6841—2016	Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-retardant Treated Lumber	IBC®	IRC®
D6878/~~D6878M—13~~ D6878M—2017	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing	IBC®	IRC®
D6947/~~D6947M—07(2013)e1~~ D6947M—2016	Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System	IBC®	IRC®
~~D7032—14~~ D7032—2017	Standard Specification for Establishing Performance Ratings for Wood, Plastic Composite Deck Boards and Guardrail Systems (Guards or Rails)	IBC® IWUIC®	IRC®
~~D7147—11~~ D7147—2011(2018)	Specification for Testing and Establishing Allowable Loads of Joist Hangers	IBC®	
D7158/~~D7158M—16~~ D7158M—2019	Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)	IBC®	
~~D7254—15~~ D7254—2017	Standard Specification for Polypropylene (PP) Siding	IBC®	IRC®
D7655/~~D7655M—12~~ D7655M—2012(2017)	Standard Classification for Size of Aggregate Used as Ballast for Roof Membrane Systems	IBC®	

~~D7672—14~~ D7672—14E1	Standard Specification for Evaluating Structural Capacities of Rim Board Products and Assemblies	IBC®	IRC®
~~E84—16~~ E84—2018B	Standard Test Methods for Surface Burning Characteristics of Building Materials	IBC®	
~~E90—09~~ E90—2009(2016)	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements	IBC®	
~~E96/E96M—15~~ E96M—2016	Standard Test Methods for Water Vapor Transmission of Materials	IBC®	
~~E108—16~~ E108—2017	Standard Test Methods for Fire Tests of Roof Coverings	IBC® IWUIC®	IEBC®
~~E119—16~~ E119—2018B	Standard Test Methods for Fire Tests of Building Construction and Materials	IBC®	
~~E136—16~~ E136—2016A	Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C	IBC® IFGC® IWUIC®	IEBC® IMC®
~~E283—04~~ E283—2004(2012)	Standard Test Method for Determining Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences across the Specimen	IBC® IECC	IECC IRC®
~~E331—00~~ E331—2000(~~2009~~ 2016)	Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference	IBC®	IRC®
~~E492—09~~ E492—2009(2016)E1	Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-ceiling Assemblies Using the Tapping Machine	IBC®	
~~E648—15c1~~ E648—2017A	Standard Test Method for Critical Radiant Flux of Floor-covering Systems Using a Radiant Heat Energy Source	IBC®	IFC®
E736/~~E736M—00(2015)e1~~ E736M—2017	Test Method for Cohesion/Adhesion of Sprayed Fire-resistive Materials Applied to Structural Members	IBC®	
E814—2013A(2017)	Test Method for Fire Tests of Penetration Firestop Systems	IBC®	IRC®
~~E970—14~~ E970—2017	Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	IBC®	IRC®
~~E1300—12ae1~~ E1300—2016	Practice for Determining Load Resistance of Glass in Buildings	IBC®	
~~E1354—16~~ E1354—17	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter	IBC®	
~~E1592—05~~ E1592—2005(~~2012~~ 2017)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	IBC®	
~~E1602—03~~ E1602—2003(~~2010~~ 2017)e1	Guide for Construction of Solid Fuel-burning Masonry Heaters	IBC®	IRC®
~~E1886—13A~~ E1886—2013A	Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials	IBC®	IRC®
~~E1996—14a~~ E1996—2017	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes	IBC®	
~~E2174—14b~~ E2174—2018	Standard Practice for On-site Inspection of Installed Fire Stops	IBC®	
~~E2273—03(2011)~~ E2273—2018	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies	IBC®	IRC®
~~E2307—15b~~ E2307—15BE1	Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using the Intermediate-scale, Multistory Test Apparatus	IBC®	
~~E2353—14~~ E2353—2016	Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards and Balustrades	IBC®	
~~E2404—15a~~ E2404—2017	Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facing and Veneers to Assess Surface Burning Characteristics	IBC®	IFC®
E2556/~~E2556M—10~~ E2556M—2010(2016)	Standard Specification for Vapor Permeable Flexible Sheet Water-resistive Barriers Intended for Mechanical Attachment	IBC®	
~~E2568—09e1~~ E2568—	Standard Specification for PB Exterior Insulation and Finish Systems	IBC®	IRC®

~~2017A~~ E2570/E2570M—07(2014)e1	Standard Test Method for Evaluating Water-resistive Barrier (WRB) Coatings Used under Exterior Insulation and Finish Systems (EIFS) for EIFS with Drainage	IBC®	IRC®
~~E2573—12~~ E2573—2017	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	IBC®	IFC®
~~E2579—13~~ E2579—2015	Standard Practice for Specimen Preparation and Mounting of Wood Products to Assess Surface Burning Characteristics	IBC®	IFC®
~~E2599—15~~ E2599—2018	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation, Radiant Barrier and Vinyl Stretch Ceiling Materials for Building Applications to Assess Surface Burning Characteristics	IBC®	
~~E2634—11(2015)~~ E2634—2018	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	IBC®	IRC®
E2751/~~E2751M—13~~ E2751M—2017A	Practice for Design and Performance of Supported Laminated Glass Walkways	IBC®	
~~F547—06(2012)~~ F547—2017	Terminology of Nails for Use with Wood and Wood-base Materials	IBC®	
~~F1667—15~~ F1667—2018	Specification for Driven Fasteners: Nails, Spikes and Staples	IBC®	IRC®
~~F2200—14~~ F2200—2017	Standard Specification for Automated Vehicular Gate Construction	IBC®	IFC®
~~G154—12a~~ G154—2016A	Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials	IBC®	

AWC — American Wood Council

Standard Reference Number	Title	Referenced In Code(s):	
AWC ~~STJR—2015~~ STJR—2021	Span Tables for Joists and Rafters	IBC®	IRC®
ANSI/AWC ~~PWF—2015~~ PWF—2021	Permanent Wood Foundation Design Specification	IBC®	IRC®
ANSI/AWC ~~SDPWS—2015~~ SDPWS—2021	Special Design Provisions for Wind and Seismic	IBC®	

AWPA — American Wood Protection Association

Standard Reference Number	Title	Referenced In Code(s):	
~~M4—16~~ M4—15	Standard for the Care of Preservative-treated Wood Products	IBC®	IRC®
~~U1—16~~ U1—20	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Commodity Specification H	IBC®	IRC®

AWS — American Welding Society

Standard Reference Number	Title	Referenced in Code(s):
D1.4/~~D1.4M—2017~~ D1.4M—2018	Structural Welding ~~Code—Reinforcing Steel Including Metal Inserts and Connections in Reinforced Concrete Construction~~ Code—Steel Reinforcing Bars	IBC®

BHMA — Builders Hardware Manufacturers' Association

Standard Reference Number	Title	Referenced In Code(s):
A ~~156.10—2011~~ 156.10—2017	Power Operated Pedestrian Doors	IBC®

A ~~156.19—2013~~ 156.19—2020	Standard for Power Assist and Low Energy Power Operated Doors	IBC®
A ~~156.27—2011~~ 156.27—2019	Power and Manual Operated Revolving Pedestrian Doors	IBC®
A ~~156.38—2014~~ 156.38—2020	Low Energy Power Operated Sliding and Folding Doors	IBC®

CSA — Canadian Standards Association

Standard Reference Number	Title	Referenced In Code(s):
ASME ~~A17.1—2016~~ A17.1—2019/CSA ~~B44—16~~ B44—19	Safety Code for Elevators and Escalators	IBC®
ASME A17.7—2007/CSA B44.7—07(R2017)	Performance-based Safety Code for Elevators and Escalators	IBC®

DASMA — Door & Access Systems Manufacturers Association International

Standard Reference Number	Title	Referenced in Code(s):
ANSI/DASMA ~~115—2016~~ 115—2017	Standard Method for Testing Sectional Garage Doors, Rolling Doors and Flexible Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind Pressure	IBC®

DOC — U.S. Department of Commerce

Standard Reference Number	Title	Referenced In Code(s):	
PS ~~1—09~~ 1—19	Structural Plywood	IBC®	IRC®
PS ~~2—10~~ 2—18	Performance Standard for ~~Wood-based Structural-use~~ Wood Structural Panels	IBC®	IRC®
PS 20—05	American Softwood Lumber Standard	IBC®	IRC®

FM — FM Approvals

Standard Reference Number	Title	Referenced in Code(s):
~~4880—2015~~ 4880—2017	~~Approval~~ American National Standard for ~~Class 1 Fire Rating of Building Panels or~~ Evaluating the Fire Performance Insulated Building Panel Assemblies and Interior Finish Materials	IBC®

GA — Gypsum Association

Standard Reference Number	Title	Referenced in Code(s):
GA ~~216—2016~~ 216—2018	Application and Finishing of Gypsum Panel Products	IBC®
GA ~~600—2015~~ 600—2018	Fire-resistance and Sound Control Design Manual, ~~21st~~ 22nd Edition	IBC®

NAAMM — National Association of Architectural Metal Manufacturers

Standard Reference Number	Title	Referenced in Code(s):
FP ~~1001—17~~ 1001—18	Guide Specifications for Design of Metal Flag Poles	IBC®

NCMA	National Concrete Masonry Association	
Standard Reference Number	**Title**	**Referenced In Code(s):**
TEK ~~5—84(1996~~ 2005)	Details for Concrete Masonry Fire Walls	IBC®

NFPA	National Fire Protection Association		
Standard Reference Number	**Title**	**Referenced In Code(s):**	
~~10—18~~ 10—21	Standard for Portable Fire Extinguishers	IBC®	IFC®
11—16	Standard for ~~Low~~ Low-, Medium, and High Expansion Foam	IBC®	IFC®
~~12A—15~~ 12A—18	Standard on Halon 1301 Fire Extinguishing Systems	IBC® IPMC®	IFC®
~~13—16~~ 13—19	Standard for Installation of Sprinkler Systems	IBC® IRC®	IFC®
~~13D—16~~ 13D—19	Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes	IBC® IRC®	IFC®
~~13R—16~~ 13R—19	Standard for the Installation of Sprinkler Systems in Low-rise Residential Occupancies	IBC® IRC®	IFC®
~~14—16~~ 14—19	Standard for the Installation of Standpipe and Hose System	IBC®	IFC®
~~16—15~~ 16—19	Standard for the Installation of Foam-water Sprinkler and Foam-water Spray Systems	IBC®	IFC®
~~17—17~~ 17—20	Standard for Dry Chemical Extinguishing Systems	IBC® IPMC®	IFC®
~~17A—17~~ 17A—20	Standard for Wet Chemical Extinguishing Systems	IBC® IPMC®	IFC®
~~20—16~~ 20—19	Standard for the Installation of Stationary Pumps for Fire Protection	IBC®	IFC®
~~30—18~~ 30—21	Flammable and Combustible Liquids Code	IBC®	IFC®
~~30A—18~~ 30A—21	Code for Motor Fuel Dispensing Facilities and Repair Garages	IBC® IFGC®	IFC® IMC®
~~31—16~~ 31—20	Standard for the Installation of Oil-burning Equipment	IBC® IMC®	IFC® IRC®
32—16	Standard for ~~Dry Cleaning Plants~~ Drycleaning Facilities	IBC®	IFC®
~~40—16~~ 40—19	Standard for the Storage and Handling of Cellulose Nitrate Film	IBC®	IFC®
~~45—15~~ 45—19	Standard on Fire Protection Laboratories Using Chemicals (2015 Edition)	IBC®	IFC®
~~58—17~~ 58—20	Liquefied Petroleum Gas Code	IBC® IFGC® IRC®	IFC® IMC®
~~61—17~~ 61—20	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities	IBC®	IFC®
~~72—16~~ 72—19	National Fire Alarm and Signaling Code	IBC® IMC® IRC®	IFC® IPMC®
~~80—16~~ 80—19	Standard for Fire Doors and Other Opening Protectives	IBC® IPMC®	IFC®
~~82—14~~ 82—19	Standard on Incinerators and Waste and Linen Handling Systems and Equipment	IBC® IMC®	IFGC®
~~85—15~~ 85—19	Boiler and Combustion System Hazards Code	IBC® IFGC® IRC®	IFC® IMC®
~~92—15~~ 92—18	Standard for Smoke Control Systems	IBC® IMC®	IFC®

~~99—18~~ 99—21	Health Care Facilities Code	IBC® IPC®	IFC®
~~101—18~~ 101—21	Life Safety Code	IBC®	IFC®
~~105—16~~ 105—19	Standard for Smoke Door Assemblies and Other Opening Protectives	IBC® IPMC®	IFC®
~~110—16~~ 110—19	Standard for Emergency and Standby Power Systems	IBC®	IFC®
~~111—13~~ 111—19	Standard on Stored Electrical Energy Emergency and Standby Power Systems	IBC®	IFC®
~~120—15~~ 120—20	Standard for Fire Prevention and Control in Coal Mines	IBC®	IFC®
~~211—16~~ 211—19	Standard for Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances	IBC® IFGC® IRC®	IFC® IMC®
~~221—18~~ 221—21	Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls	IBC®	
~~253—15~~ 253—19	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	IBC®	IFC®
~~265—15~~ 265—19	Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile or Expanded Vinyl Wall Coverings on Full Height Panels and Walls	IBC®	IFC®
~~286—15~~ 286—19	Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	IBC® IMC®	IFC® IRC®
~~276—15~~ 276—19	Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-deck Roofing Components	IBC®	
~~289—18~~ 289—19	Standard Method of Fire Test for Individual Fuel Packages	IBC®	IFC®
~~484—18~~ 484—19	Standard for Combustible Metals	IBC®	
~~652—16~~ 652—19	Standard on the Fundamentals of Combustible Dust	IBC®	IFC®
~~654—17~~ 654—20	Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids	IBC®	IFC®
~~664—17~~ 664—20	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	IBC®	IFC®
~~701—15~~ 701—19	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films	IBC®	IFC®
~~750—15~~ 750—19	Standard on Water Mist Fire Protection Systems	IBC®	IFC®
~~2001—15~~ 2001—18	Standard on Clean Agent Fire Extinguishing Systems	IBC® IPMC®	IFC®
~~2010—15~~ 2010—20	Standard for Fixed Aerosol Fire-extinguishing Systems	IBC®	IFC®

PCI — Precast Prestressed Concrete Institute

Standard Reference Number	Title	Referenced In Code(s):
~~MNL-124—11~~ PCI 124—18	~~Design~~ Specification for Fire Resistance of Precast / Prestressed Concrete	IBC®
~~MNL-128—01~~ PCI 128—19	~~Recommended Practice~~ Specification for Glass Fiber Reinforced Concrete Panels	IBC®

PTI — Post-Tensioning Institute

Standard Reference Number	Title	Referenced In Code(s):
PTI ~~DC—10.5-12~~ DC—10.5-19	Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive and Stable Soils	IBC®

SBCA — Structural Building Components Association

Standard Reference Number	Title	Referenced in Code(s):
ANSI/FS 100-12(R2018)	Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating	IBC®

	Sheathing Used in Exterior Wall Covering Assemblies	

SPRI — Single-Ply Roofing Institute

Standard Reference Number	Title	Referenced In Code(s):
ANSI/SPRI/FM ~~4435-ES-1—11~~ 4435 ES-1—17	Wind Test Design Standard for Edge Systems Used with Low Slope Roofing Systems	IBC®
ANSI/SPRI ~~RP-4—13~~ RP-4—18	Wind Design Guide for Ballasted Single-ply Roofing Systems	IBC®
ANSI/SPRI ~~VF-1—16~~ VF-1—17	External Fire Design Standard for Vegetative Roofs	IBC®

TIA — Telecommunications Industry Association

Standard Reference Number	Title	Referenced In Code(s):
~~222-H—2016~~ ANSI/TIA 222-H—2017	Structural ~~Standards~~ Standard for Antenna Supporting Structures ~~and Antennas~~ , Antennas and Small Wind Turbine Support Structures	IBC®

TMS — The Masonry Society

Standard Reference Number	Title	Referenced In Code(s):
~~302—2012~~ 302—2018	Standard Method for Determining the Sound Transmission Class Rating for Masonry Walls	IBC®

UL — UL LLC

Standard Reference Number	Title	Referenced in Code(s):	
10A—2009	Tin Clad Fire Doors—with Revisions through ~~December 2013~~ July 2018	IBC®	
~~10C—2009~~ 10C—2016	Positive Pressure Fire Tests of Door ~~Assemblies—with Revisions through February 2015~~ Assemblies	IBC®	
14B—2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors—with Revisions through ~~May 2013~~ July 2017	IBC®	
~~14C—06~~ 14C—2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs—with Revisions through ~~May 2013~~ July 2017	IBC®	
~~55A—04~~ 55A—2004	Materials for Built-up Roof Coverings	IBC®	IRC®
103—2010	Factory-built Chimneys, for Residential Type and Building Heating Appliances—with Revisions through ~~July 2012~~ March 2017	IBC® IMC®	IFGC® IRC®
127—2011	Factory-built Fireplaces—with Revisions through ~~May 2015~~ July 2016	IBC® IMC®	IFGC® IRC®
~~199E—04~~ 199E—2004	Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers	IBC®	IFC®
~~217—06~~ 217—2015	Single and Multiple Station Smoke Alarms—with Revisions through ~~October 2015~~ November 2016	IBC® IRC®	IFC®
263—11	Fire Tests of Building Construction and Materials—with Revisions through ~~June 2015~~ March 2018	IBC®	
~~268—09~~ 268—2016	Smoke Detectors for Fire Alarm ~~Systems~~ Systems-with revisions through July 2016	IBC® IPMC®	IFC®
~~294—1999~~ 294—2018	Access Control System Units—with Revisions through ~~February 2015~~ October 2018	IBC®	IFC®
	Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking		

~~300—05~~ 300—2005(R2010)	Equipment—with Revisions through December 2014	IBC®	IFC®
~~300A—06~~ 300A—2006	Outline of Investigation for Extinguishing System Units for Residential Range Top Cooking Surfaces	IBC®	IFC®
305—2012	Panic Hardware—with Revisions through ~~August 2014~~ March 2017	IBC®	IFC®
~~325—02~~ 325—2017	Door, Drapery, Gate, Louver and Window Operations and ~~Systems—with Revisions through May 2015~~ Systems	IBC® IRC®	IFC®
555—2006	Fire Dampers—with Revisions through ~~May 2014~~ October 2016	IBC®	
~~555C—2006~~ 555C—2014	Ceiling Dampers—with Revisions through ~~December 2014~~ May 2017	IBC®	
~~555S—99~~ 555S—2014	Smoke Dampers—with Revisions through ~~February 2014~~ October 2016	IBC®	IMC®
580—2006	Test for Uplift Resistance of Roof Assemblies—with Revisions through October ~~2013~~ 2018	IBC®	
641—2010	Type L Low-temperature Venting Systems—with Revisions through ~~June 2013~~ April 2018	IBC® IMC®	IFGC® IRC®
~~723—2008~~ 723—2018	Test for Surface Burning Characteristics of Building ~~Materials—with Revisions through August 2013~~ Materials	IBC® IWUIC®	IMC®
~~790—04~~ 790—2004	Standard Test Methods for Fire Tests of Roof Coverings—with Revisions through ~~July 2014~~ October 2018	IBC® IFC®	IEBC® IRC®
~~793—08~~ 793—2008	Automatically Operated Roof Vents for Smoke and Heat—with Revisions through ~~September 2011~~ March 2017	IBC®	IFC®
~~864—03~~ 864—2014	Control Units and Accessories for Fire Alarm Systems—with Revisions through ~~December 2014~~ March 2018	IBC®	IFC®
~~924—06~~ 924—2016	Safety Emergency Lighting and Power Equipment—with Revisions through ~~April 2014~~ May 2018	IBC®	IFC®
~~1040—96~~ 1040—1996	Fire Test of Insulated Wall Construction—with Revisions through ~~October 2012~~ April 2017	IBC®	IRC®
1256—02	Fire Test of Roof Deck Construction—with Revisions through ~~July 2013~~ August 2018	IBC®	IRC®
~~1479—03~~ 1479—2015	Fire Tests of Penetration ~~Firestops—with Revisions through June 2015~~ Firestops	IBC® IRC®	IMC®
~~1703—02~~ 1703—2002	Flat-plate Photovoltaic Modules and Panels—with Revisions through ~~October 2015~~ September 2018	IBC®	IRC®
1715—97	Fire Test of Interior Finish Material—with Revisions through ~~January 2013~~ April 2017	IBC®	IRC®
1741—2010	Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources—with Revisions through ~~January 2015~~ February 2018	IBC®	IRC®
1777—2007	Chimney Liners—with Revisions through ~~October 2015~~ April 2014	IBC® IMC®	IFGC®
~~1784—01~~ 1784—2015	Air Leakage Tests of Door ~~Assemblies—with Revisions through February 2015~~ Assemblies	IBC®	IECC
~~1897—12~~ 1897—2015	Uplift Tests for Roof Covering ~~Systems—with Revisions through September 2015~~ Systems	IBC®	IRC®
~~1994—04~~ 1994—2015	Luminous Egress Path Marking ~~Systems—with Revisions through May 2015~~ Systems	IBC®	IFC®
~~2034—2008~~ 2034—2017	Single- and Multiple-station Carbon Monoxide Alarms—with Revisions through ~~March 2015~~ September 2018	IBC®	
2075—2013	Standard for Gas and Vapor Detectors and ~~Sensors~~ Sensors-with revisions through December 2017	IBC® IMC®	IFC® IRC®
~~2079—04~~ 2079—2015	Tests for Fire Resistance of Building Joint ~~Systems—with Revisions through August 2015~~ Systems	IBC®	IFC®
~~2196—2001~~ 2196—2017	~~Tests~~ Standard for Fire ~~Resistive Cables—with Revisions through March 2012~~ Test for Circuit Integrity of Fire- Resistive Power, Instrumentation, Control and Data Cables	IBC®	IFC®
2200—2012	Stationary Engine Generator Assemblies—with Revisions through ~~July~~ October 2015	IBC® IFGC®	IFC® IMC®
2202—2009	Electric Vehicle (EV) Charging System ~~Equipment~~ Equipment-with revisions through February 2018	IBC®	

~~2594—2013~~ 2594—2016	Electric Vehicle Supply Equipment	IBC®
2703—2014	~~Outline of Investigation for~~ Mounting Systems, Mounting Devices, Clamping/Retention Devices and Ground Lugs for Use with Flat-plate Photovoltaic Modules and ~~Panels~~ Panels-with revisions through December 2019	IBC®

ULC	Underwriters Laboratories of Canada		
Standard Reference Number	**Title**	**Referenced in Code(s):**	
CAN/ULC S ~~102.2—2010~~ 102.2—2018	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and ~~Assemblies—with 2000 Revisions~~ Assemblies	IBC®	IRC®

Reason: THIS IS THE ADMIN STANDARDS UPDATE CODE CHANGE FOR THE IBC.
The CP28 Code Development Policy, Section 4.6 requires the updating of referenced standards to be accomplished administratively, and be processed as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2018, a letter was sent to each developer of standards that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Listed are the referenced standards that are to be updated based upon responses received from standard developers.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Not applicable.

Proposal # 5823

ADM47-IBC-19

Sub Code: Energy Conservation

E8915/CE212-19

8

Date Submitted 2/12/2021	**Section** 405.8.1	**Proponent** Mo Madani
Chapter 4	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		**Staff Classification** Correlates Directly
Commission Action Pending Review		

Comments

General Comments **No**

Related Modifications

C405.8.1, C405.8.2, C405.8.2.1, C405.9, C407.2

Summary of Modification

Modifies text of C405.8.1, C405.8.2, C405.8.2.1, C405.9, adding "Mandatory" to sections. Modification to text of C407.2 to update mandatory sections.

Rationale

The provisions of C405.8.1, C405.8.2, and C405.9 are a combination of performance requirements and references to standards, with no associated performance metrics or values available to model or trade in the performance path.

For this reason C405.8.1, C405.8.2, and C405.9 are mandatory. This is consistent with the parallel provisions of ASHRAE 90.1 10.4.3, 10.4.4, and 8.4.1, which are identified as ‘mandatory.’

Note that the SEHPCAC has a proposal to eliminate the use of the labels "prescriptive “and "mandatory" in favor of a tabular method of identifying non-tradeable requirements. If that proposal is successful ICC staff have stated that sections being individually approved to be labeled as ‘mandatory’ will instead have their respective section numbers added to the new C407.2 table of requirements that are non-tradeable in the performance path.

This proposal is submitted by the ICC Sustainable, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2018-2019, the SEHPCAC has held five two- or three-day open meetings and numerous workgroup calls, to discuss and debate proposed changes and public comments. Attendees at the meetings and calls included members of the SEHPCAC as well as any interested parties. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx (http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx)

Approved as Submitted

2018 International Energy Conservation Code

Revise as follows:

C405.8.1 Elevator cabs (Mandatory). For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be not less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air-conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

C405.8.2 Escalators and moving walks (Mandatory). Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

Exception: A variable voltage drive system that reduces operating voltage in response to light loading conditions is an alternative to the reduced speed function.

C405.8.2.1 Regenerative drive (Mandatory). An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds (340 kg).

C405.9 Voltage drop in feeders and branch circuits (Mandatory). The total *voltage drop* across the combination of feeders and branch circuits shall not exceed 5 percent.

C407.2 Mandatory requirements. Compliance with this section requires compliance with Sections C402.5, C403.2, C403.3 through C403.3.2, C403.4 through C403.4.2.3, C403.5.5, C403.7, C403.8.1 through C403.8.4, C403.10.1 through C403.10.3, C403.11, C403.12, C404 and ~~C405.~~C405.1, C405.2, C405.4 through C405.9.

Code Change No: CE212-19

Original Proposal

Section(s): C405.8.1, C405.8.2, C405.8.2.1, C405.9, C407.2

Proponent: David Collins, SEHPCAC, representing SEHPCAC (SEHPCAC@iccsafe.org); David Collins, representing The American Institute of Architects (dcollins@preview-group.com)

2018 International Energy Conservation Code

Revise as follows:

C405.8.1 Elevator cabs (Mandatory). For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be not less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air-conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.

C405.8.2 Escalators and moving walks (Mandatory). Escalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.

> **Exception:** A variable voltage drive system that reduces operating voltage in response to light loading conditions is an alternative to the reduced speed function.

C405.8.2.1 Regenerative drive (Mandatory). An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds (340 kg).

C405.9 Voltage drop in feeders and branch circuits (Mandatory). The total *voltage drop* across the combination of feeders and branch circuits shall not exceed 5 percent.

C407.2 Mandatory requirements. Compliance with this section requires compliance with Sections C402.5, C403.2, C403.3 through C403.3.2, C403.4 through C403.4.2.3, C403.5.5, C403.7, C403.8.1 through C403.8.4, C403.10.1 through C403.10.3, C403.11, C403.12, C404 and ~~C405.~~ C405.1, C405.2, C405.4 through C405.9.

Reason: The provisions of C405.8.1, C405.8.2, and C405.9 are a combination of performance requirements and references to standards, with no associated performance metrics or values available to model or trade in the performance path.

For this reason C405.8.1, C405.8.2, and C405.9 are mandatory. This is consistent with the parallel provisions of ASHRAE 90.1 10.4.3, 10.4.4, and 8.4.1, which are identified as 'mandatory.'

Note that the SEHPCAC has a proposal to eliminate the use of the labels "prescriptive "and "mandatory" in favor of a tabular method of identifying non-tradeable requirements. If that proposal is successful ICC staff have stated that sections being individually approved to be labeled as 'mandatory' will instead have their respective section numbers added to the new C407.2 table of requirements that are non-tradeable in the performance path.

This proposal is submitted by the ICC Sustainable, Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance International Codes with regard to sustainability, energy and high performance as it relates to the built environment included, but not limited to, how these criteria relate to the International Green Construction Code (IgCC) and the International Energy Conservation Code (IECC). In 2018-2019, the SEHPCAC has held five two- or three-day open meetings and numerous workgroup calls, to discuss and debate proposed changes and public comments. Attendees at the meetings and calls included members of the SEHPCAC as well as any interested

parties. Related documentation and reports are posted on the SEHPCAC website at:
http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx (http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx)

Cost Impact: The code change proposal will increase the cost of construction
As commonly interpreted, these items are already considered mandatory, and therefor should have no impact on cost. However, it may increase the cost of construction for a subset of buildings designed to comply with Section C407 that do not include the specifications for vertical and horizontal transportation systems as included in Section C405.8 and C405.9.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies these should be mandatory since they are not tradeable (Vote: 14-1).

Assembly Action: **None**

Final Action

CE212-19 **AS**

E8917/CE214-19

9

Date Submitted	2/12/2021	**Section**	405.9	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

C405.9

FBC-EC/C405.5.3

Summary of Modification

The current requirement for voltage drop in feeder conductors does not include customer-owned service conductors. Proposal to add language concerning this.

Rationale

Revising this language will:

1. Increase energy efficiency
2. Reduce inconsistency and application confusion in compliance

The current requirement for voltage drop in feeder conductors does not include customer-owned service conductors. These are runs, owned by customers, from the utility service to the building main disconnect. These runs can be quite long which result in significant voltage drop and efficiency losses.
An editorial change adding the word "conductors" to feeder and branch circuits, provides greater clarity.

Comment Period History

E8917-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by CE214 in section C405.10 and related to voltage drop based on the reason statements made by the original submitter (NEMA).

Approved as Submitted

2018 International Energy Conservation Code

Revise as follows:

C405.9 Voltage drop ~~in feeders and branch circuits.~~The total *voltage drop* across the combination of ~~feeders~~ customer-owned service conductors, feeder conductors and branch ~~circuits~~ circuit conductors shall not exceed 5 percent.

Code Change No: CE214-19

Original Proposal

Section(s): C405.9

Proponent: Marilyn Williams, representing National Electrical Manufacturers Association (mar_williams@nema.org)

2018 International Energy Conservation Code

Revise as follows:

C405.9 Voltage drop ~~in feeders and branch circuits.~~ The total *voltage drop* across the combination of ~~feeders~~ customer-owned service conductors, feeder conductors and branch ~~circuits~~ circuit conductors shall not exceed 5 percent.

Reason: Revising this language will:

1. Increase energy efficiency
2. Reduce inconsistency and application confusion in compliance

The current requirement for voltage drop in feeder conductors does not include customer-owned service conductors. These are runs, owned by customers, from the utility service to the building main disconnect. These runs can be quite long which result in significant voltage drop and efficiency losses.

An editorial change adding the word "conductors" to feeder and branch circuits, provides greater clarity.

Cost Impact: The code change proposal will increase the cost of construction

The increased cost in construction would only apply when the service feeder conductors are customer-owned and only if they would not have been designed to the 5% voltage drop allowance of the present code. This should represent a small subset of building construction projects. Additionally, the cost effectiveness of this code change remains the same as for all other service conductors under the present provision. This is not adding to stringency of this requirement. It only expands the conditions where the requirement is applied and maintains the cost effectiveness, as has been the case for the current voltage drop requirement.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This change appropriately includes customer owned service conductors for additionally energy savings (Vote: 15-0).

Assembly Action: **None**

Final Action

CE214-19 **AS**

E8918/CE215-19

10

Date Submitted	2/12/2021	**Section**	405.10	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Energy Standard Needed

Comments

General Comments **Yes**

Related Modifications

C405.10, C405.10.1, C405.10.2, TABLE C405.10.2, C405.10.2, C405.10.4, C405.10.5

Correlates Directly

Summary of Modification

Modification to add new Section C405.10 "Energy Monitoring (Mandatory)", proposal concerning same.

Rationale

: The investment made for the infrastructure of a building to comply with the IECC is significant. The assumption that is currently made upon commissioning a facility is that energy efficiency measures will not degrade, or go out of calibration, over time and their energy consumption will not increase as time passes from the time they were commissioned. Such as assumption is completely inaccurate and any payback assumed for energy efficient infrastructure investments will be lengthened, thereby reducing the ROI and increasing the payback period. The only means to retain the energy performance of a building is to continously monitor energy consumption levels of various energy consuming systems and compare them to previous levele. Monitorin sub-systems provides key indications when changes have been made or systems are not operating to specification, which increases energy consumption. Examples include, but are not limited to
(Please see uploaded mod CE215-19 for the complete text)

Comment Period History

E8918-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by CE215 in section C405.12 and related to energy monitoring based on the reason statements made by the original submitter (NEMA).

Approved as Modified

Original Proposal:

2018 International Energy Conservation Code

Add new text as follows:

C405.10 Energy Monitoring (Mandatory). New buildings with a gross conditioned floor area of 25,000 square feet or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section C406.10.1 through C406.10.5.

Exception: Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

C405.10.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.10.2.

C405.10.2 End-use metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category indicated in Table 405.10.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories indicated in Table 405.10.2 shall be permitted to be from a load that is not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit shall not require end-use metering.
2. End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.10.3 is provided.

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(Please see uploaded mod CE215-19 for complete Table)

TABLE C405.10.2

ENERGY USE CATEGORIES

C405.10.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.10.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of plus or minus 2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.10.4 and C405.10.5.

C405.10.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.10.2.

C405.10.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.10.2 at least every hour, day, month, and year for the previous 36 months.

Modified Proposal:

C405.10 Energy Monitoring (Mandatory). New buildings with a gross conditioned floor area of 25,000 square feet or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section ~~C406.10.1~~ C405.10.1 through ~~C406.10.5~~ C405.10.5.

Exception: R-2 occupancies and Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

Code Change No: CE215-19

Original Proposal

Section(s): C405.10 (New), C405.10.1 (New), C405.10.2 (New), TABLE C405.10.2 (New), C405.10.2 (New), C405.10.4 (New), C405.10.5(New)

Proponents: Marilyn Williams, representing National Electrical Manufacturers Association (mar_williams@nema.org)

2018 International Energy Conservation Code

Add new text as follows:

C405.10 Energy Monitoring (Mandatory). New buildings with a gross conditioned floor area of 25,000 square feet or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section C406.10.1 through C406.10.5.

Exception: Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

C405.10.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C405.10.2.

C405.10.2 End-use metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category indicated in Table 405.10.2. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories indicated in Table 405.10.2 shall be permitted to be from a load that is not within that category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit shall not require end-use metering.
2. End-use metering shall not be required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.
3. End-use metering shall not be required for an individual tenant space having a floor area not greater than 2,500 square feet where a dedicated source meter complying with Section C405.10.3 is provided.

TABLE C405.10.2
ENERGY USE CATEGORIES

LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Total HVAC System	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers, and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.
Interior Lighting	Lighting systems located withing the building.
Exterior Lighting	Lighting systems located on the building site but not within the building.

Plug Loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process Loads	Any single load that is not included in a HVAC, lighting or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.
Building Operations and other miscellaneous loads	The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains, ornamental fireplaces, swimming pools, in-ground spas, and snow-melt systems.

C405.10.3 Meters. Meters or other measurement devices required by this section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C405.10.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of plus or minus 2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections C405.10.4 and C405.10.5.

C405.10.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the required meters and other sensing devices for minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C405.10.2.

C405.10.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C405.10.2 at least every hour, day, month, and year for the previous 36 months.

Reason: The investment made for the infrastructure of a building to comply with the IECC is significant. The assumption that is currently made upon commissioning a facility is that energy efficiency measures will not degrade, or go out of calibration, over time and their energy consumption will not increase as time passes from the time they were commissioned. Such as assumption is completely inaccurate and any payback assumed for energy efficient infrastructure investments will be lengthened, thereby reducing the ROI and increasing the payback period. The only means to retain the energy performance of a building is to continously monitor energy consumption levels of various energy consuming systems and compare them to previous levele. Monitorin sub-systems provides key indications when changes have been made or systems are not operating to specification, which increases energy consumption. Examples include, but are not limited to:

1. Increase energy consumption in HVAC system loads will point to failures in motors, drive systems, bearings, etc.
2. Degrading building envelope.
3. Configuration changes to the building that may drive increased energy consumption.
4. Increase of energy consumption from lighting loads may indicate changes in arrangement of the office space that resulted in reduced lighting driving the installation of more lighting above permitted energy code levels, failure of occupant sensors, inappropriate lighting schedules, lamps that need to be replaced or cleaned, etc.
5. Monitoring plug loads will indicate when computer equipment is left on during non-working hours and use of space heaters that compromise the efficiency of the facility due to set points on the HVAC system.

The requirements in this proposal save energy by continually monitoring and reporting actionable energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plus loads). There are well documented studies that demonstrates the energy savings from metering and monitoring systems. The 2013 version of ASHRAE Std. 90.1 and several state energy codes have recognized the benefits and require energy monitoring to support a continual high level of performance from the energy efficienct investment.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal "will" increase the cost of construction because it will require additional hardware, software and labor during installation. Providing specific cost would violate antitrust laws, however the following link to a report provided by the GSA demonstrates an example of cost and savings:
https://www.gsa.gov/cdnstatic/Energy_Submetering_Finance_Paper_Knetwork_2012_11_269%28508%29.pdf

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

C405.10 Energy Monitoring (Mandatory). New buildings with a gross conditioned floor area of 25,000 square feet or larger shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section ~~C406.10.1~~ C405.10.1 through ~~C406.10.5~~ C405.10.5.

> **Exception:** R-2 occupancies and Individual tenant spaces are not required to comply with this section provided the space has its own utility services and meters and has less than 5,000 square feet of conditioned floor area.

Committee Reason: Monitoring is important, building owners and operators need to know what energy is being used, the change supports the cities benchmarking requirements. A public comment would be advised lining up dwelling unit language. The modifications clarify exemptions and correct errors in citations (Vote: 10-5).

Assembly Action: **None**

Final Action

CE215-19	**AM**

E8919/CE216-19

11

Date Submitted	2/12/2021	**Section**	405.10	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Energy Standard Needed

Comments

General Comments **Yes**

Related Modifications

C405.10

Correlates Directly

Summary of Modification

Adds new Section C405.10 "Automatic Receptacle Control", and provides requirements for Automatic Receptacle Control.

Rationale

This proposal will:

1. Increase building energy efficiency
2. Offer a well-studied, cost effective efficiency measure
3. Maintain building occupant's safe usability
4. Keep enforceability simple
5. Align with other energy efficiency codes, increasing design compliance.

Although commercial buildings continue to decrease their energy use through more efficient lighting, mechanical, and domestic water systems, the Miscellaneous Electrical Loads (MELs) energy segment continues to rise. More and more electrical power consuming devices are being plugged into building electrical systems. Some, such as fans, space heaters, printers, monitors, plug in lamps are left on, when spaces are unoccupied. Other devices may be left plugged in and continue to draw power even when inactive or in standby modes. This wastes energy and is counter to the energy efficiency aim of the IECC.
Some jurisdictions which adopt the IECC for their commercial buildings, like Florida and Washington, have amended the IECC to include automatic receptacle control, thereby addressing the growing energy consumption concern of these loads. For more than eight years, other energy efficiency codes have included automatic receptacle control provisions to reduce the wasted energy. Yet, the IECC lags behind offering no viable solution to the growing receptacle and miscellaneous loads on commercial building electrical systems. The Annual Energy Outlook of 2015 from the US EIA, indicate that these load categories will grow from 36% of a commercial buildings energy use, to 43% over the next 15 years.
(Please see uploaded CE216-19 for the complete text)

Comment Period History

E8919-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by C216 in section C405.11 and related to ARC based on the reason statements provided by the original submitter.

Approved as Modified

Original Proposal:

2018 International Energy Conservation Code

Add new text as follows:

C405.10 Automatic Receptacle Control.The following shall be automatically controlled:

1. At least 50% of all 125 V, 15 and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.
3. Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.

This control shall function on:

1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5000 ft^2 and not more than one floor. The occupant shall be able to manually override an area for not more than two hours. Any individual override switch shall control the receptacles of not more than 5000 ft.
2. An occupant sensor control that shall turn receptacles off within 20 minutes of all occupants leaving a space; or
3. An automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space. Plug-in devices shall not comply.

Exceptions: Receptacles for the following shall not require an automatic control device:

1. Receptacles specifically designated for equipment requiring continuous operation (24/day, 365 days/year).
2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.
3. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches from the controlled receptacles serving that workstation.

Modified Proposal:

C405.10 Automatic Receptacle Control (Mandatory). The following shall have ~~be~~ automatically receptacle controls ~~led~~ complying with Section C405.10.1:

-

1. At least 50% of all 125 V, 15 and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.

2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.

3. ~~Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.~~

~~This control shall function on~~

-

C405.10.1 Automatic receptacle control function. Automatic receptacle controls shall comply with the following:

-

1. Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.

2. Shall be controlled by one of the following methods:

   2.1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5000 ft2 and not more than one floor. The occupant shall be able to manually override an area for not more than two hours. Any individual override switch shall control the receptacles of not more than 5000 ft.

   2.2. An occupant sensor control that shall turn receptacles off within 20 minutes of all occupants leaving a space.; or

   2.3. An automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.

4. Plug-in devices shall not comply.

Exceptions: Automatic R~~r~~eceptacles controls are not required for the following ~~shall not require an automatic control device~~:

1. Receptacles specifically designated for equipment requiring continuous operation (24/day, 365 days/year).

2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.

3. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches from the controlled receptacles serving that workstation.

Code Change No: CE216-19

Original Proposal

Section(s): C405.10 (New)

Proponent: Marilyn Williams, representing National Electrical Manufacturers Association

2018 International Energy Conservation Code

Add new text as follows:

C405.10 Automatic Receptacle Control. The following shall be automatically controlled:

1. At least 50% of all 125 V, 15 and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.
3. Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.

This control shall function on:

1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5000 ft^2 and not more than one floor. The occupant shall be able to manually override an area for not more than two hours. Any individual override switch shall control the receptacles of not more than 5000 ft.
2. An occupant sensor control that shall turn receptacles off within 20 minutes of all occupants leaving a space; or
3. An automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space. Plug-in devices shall not comply.

Exceptions: Receptacles for the following shall not require an automatic control device:

1. Receptacles specifically designated for equipment requiring continuous operation (24/day, 365 days/year).
2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.
3. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches from the controlled receptacles serving that workstation.

Reason: This proposal will:

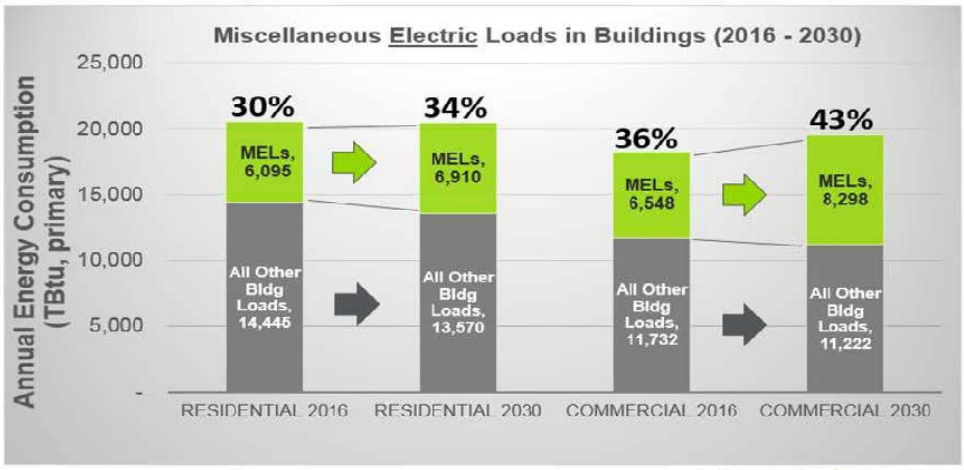
1. Increase building energy efficiency
2. Offer a well-studied, cost effective efficiency measure
3. Maintain building occupant's safe usability
4. Keep enforceability simple
5. Align with other energy efficiency codes, increasing design compliance.

Although commercial buildings continue to decrease their energy use through more efficient lighting, mechanical, and domestic water systems, the Miscellaneous Electrical Loads (MELs) energy segment continues to rise. More and more electrical power consuming devices are being plugged into building electrical systems. Some, such as fans, space heaters, printers, monitors, plug in lamps are left on, when spaces are unoccupied. Other devices may be left plugged in and continue to draw power even when inactive or in standby modes. This wastes energy and is counter to the energy efficiency aim of the IECC.

Some jurisdictions which adopt the IECC for their commercial buildings, like Florida and Washington, have amended the IECC to include automatic receptacle control, thereby addressing the growing energy consumption concern of these loads. For more than eight years, other energy efficiency codes have included automatic receptacle control provisions to reduce the wasted energy. Yet, the IECC lags behind offering no viable solution to the growing receptacle and miscellaneous loads on commercial building electrical systems. The Annual Energy Outlook of 2015 from the US EIA, indicate that these load categories will grow from 36% of a commercial buildings energy use, to 43% over the next 15 years.

Miscellaneous Electric Loads vs Total Building Energy Use

According to EIA Annual Energy Outlook (AEO, 2015), under business-as-usual scenario, contribution of Miscellaneous Electric Loads (MELs, electric) to total building energy consumption is projected to increase from **30% to 34%** for the residential sector and from **36% to 43%** for the commercial sector for 2016 – 2030.



7 *EIA Annual Energy Outlook, 2015*

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

This provision simply assures receptacle loads that are not needed when building occupants leave high receptacle load use areas, are automatically turned off, saving the energy that would otherwise be wasted. It requires that controlled receptacles clearly be marked as required by NFPA 70, to eliminate user confusion of proper use, and provides good practice exceptions where controlling receptacles would endanger safety and security, or areas of continuous operation.

Expressed safety concerns where extensive use of extension cords and plug strips would be used are unfounded. There are no documented studies validating this problem exists. The proposed language requires either a split duplex receptacle with a controlled or uncontrolled receptacle in the same device, or an uncontrolled receptacle be located no more than 12 inches from a controlled receptacle. This provides occupants in an automatic receptacle-controlled space, clear access to both label marked controlled receptacles and uncontrolled receptacles.

Although there are no requirements for receptacle density in commercial buildings, a design professional will ensure there is an appropriate distribution of receptacles to effectively accomplish the mission of the building. There's no evidence that the distribution of receptacle outlets and controlling some of them has any adverse impact on the utility of this requirement.

Enforceability of this provision is straight forward for building departments and their inspectors. Construction drawings indicate which receptacles are controlled and which are uncontrolled. Onsite inspection will clearly show complying labelled receptacles and operation is easily varied with the shut-off controls already in place with the lighting system.

There have been a considerable number of studies over the years that share the viability and cost effectiveness of automatic receptacle control. Some noted here.

1. One study demonstrated effectiveness (e.g. Zhang2012) with simply payback on this type of equipment between 1.5 and 9 years for small and large offices. This considers the most comprehensive information on office plug load types, installation densities, usage patterns, and power states based on field surveys and monitoring (Kawamoto 2000, 2001; Moorefield, Frazer & Bendt 2011; Roberson 2002, 2004; Roth 2002, 2004; Sanchez 2007; Webber 2001, 2005).
2. A CASE initiative study for CA Title 24-2013 found that smaller office buildings (10,000 sqft) had an annual electrical savings of 4,900 kwh/year and a demand savings of 1.97 kW. Based on installed costs and utilization of lighting control system elements already installed. The simple payback was 4.2 years. For larger office buildings (175,000 sqft) the annual electrical savings were 107,000 kwh/year and a demand savings of 23.6 kW for a simple payback of 2.4 years.
3. A GSA Green Proving Ground Program study conducted in 8 buildings with monitored receptacle control through market available plug strips found "Results underscored the effectiveness of schedule-based functionality, which reduce plug loads at workstations by 26%, even though advanced computer power management was already in place, and nearly 50% in printer room and kitchens." In the study buildings, receptacle loads averaged 21% of building energy use and monitored more than 295 devices over three different test periods to validate the findings. It found payback through timer scheduled control of kitchens of 0.7 years, printer rooms of 1.1 years and miscellaneous devices in 4.1 years. At workstations, the payback was 7.8 years.
4. A study done on "Office Space Plug Load Profiles and Energy Savings Interventions" at the University of Idaho and presented at the ACEEE summer Study in 2012 found that average savings of 0.60 kWh/SF Yr. with plug strip control interventions. This study provided guidance for utility programs to assist with development of plug load efficiency measures and was based on a more detailed report, "Plug Load Profiles" (Acker, B. et. al. 2012).
5. The DOE Better Buildings program issued a December 2015 "Decision Guides for Plug and Process Loads Controls" to help educate and guide decision processes for effective receptacle-based load control. It highlights that "Plug and Process Loads" account for 33% of the total energy consumed by commercial buildings. It sites seven decision strategies including that of Integrated plug load controls with other building systems as one of the largest for energy savings across most building types for whole-building retrofit and new construction categories.
6. A study performed "Advancing the Last Frontier – Reduction of Commercial Plug Loads" presented at the ACEEE summer study of 2016, indicated field study results demonstrating savings of 19% when deploying plug in control strategies in office workstation environments.

Cost Impact: The code change proposal will increase the cost of construction
Costs estimated to be $0.26/ft[2] for small office implementation and $0.19/ft[2] for large office. Payback estimated at 4.2 years for small office buildings (10,000sqft) and 2.4 years for large office buildings (100,000sqft). Source: 2013 California Building Energy Efficiency Standards CASE report.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

C405.10 Automatic Receptacle Control (Mandatory). The following shall have ~~be~~ automatically receptacle controls ~~led~~ complying with Section C405.10.1:

1. At least 50% of all 125 V, 15 and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms, and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents.
3. ~~Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.~~

~~This control shall function on~~

C405.10.1 Automatic receptacle control function. Automatic receptacle controls shall comply with the following:

1. Either split controlled receptacles shall be provided, with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches of each uncontrolled receptacle.
2. Shall be controlled by one of the following methods:
   2.1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5000 ft2 and not more than one floor. The occupant shall be able to manually override an area for not more than two hours. Any individual override switch shall control the receptacles of not more than 5000 ft.
   2.2. An occupant sensor control that shall turn receptacles off within 20 minutes of all occupants leaving a space.; or
   2.3. An automated signal from another control or alarm system that shall turn receptacles off within 20 minutes after determining that the area is unoccupied.

3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.
4. Plug-in devices shall not comply.

Exceptions: Automatic ~~R~~receptacles controls are not required for the following ~~shall not require an automatic control device~~:

1. Receptacles specifically designated for equipment requiring continuous operation (24/day, 365 days/year).
2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.
3. Within a single modular office workstation, non-controlled receptacles are permitted to be located more than 12 inches, but not more than 72 inches from the controlled receptacles serving that workstation.

Committee Reason: This is a nice solution and adds efficacy to another building system. the modification clarifies the original language in ICC format (Vote: 10-5).

Assembly Action: **None**

Final Action

CE216-19 **AM**

E8921/CE217-19 Part I

12

Date Submitted	2/12/2021	**Section**	405.10	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

C202, C405.10, C405.10.1, TABLE C405.10.1, C405.10.

ICC - this code change was overturned by the ICC Board of Directors and for that it was not included in the 2021 IECC.

Summary of Modification

Adds new Section C405.10 "Electric Vehicle (EV) charging for new construction". Adds requirements for Electric Vehicle Infrastructure.

Rationale

In the United States, electric vehicle (EV) sales increased by 80 percent from 2017 to 2018 (1). According to a November 2018 forecast from the Edison Electric Institute, the number of EVs on U.S. roads is projected to grow from 1 million vehicles at the end of 2018, to 18.7 million by 2030. To recharge these new EVs, the U.S. will need 9.6 million charge ports, a substantial portion of which will be installed in workplace and commercial buildings (2).

EVs provide significant economic benefits for consumers through fuel and maintenance cost savings, and have been identified as a key climate strategy to reduce GHG emissions from the U.S. transportation sector. The interest in EVs has grown alongside greater EV model availability and increased vehicle range. Every major auto manufacturer in the world has announced a plan to electrify a significant portion of their vehicle fleets over the next 3-5 years. Ford recently announced an $11 billion investment to reach their goal of 40 EV models by 2022 (3). The goal for GM: 20 EV models by 2023 (4); for VW: 27 EV models by 2022 (5); for Toyota: 10 BEVs by the early 2020's (6); and similar goals for Volvo, Daimler, Nissan, BMW, and Fiat-Chrysler.

(Please see uploaded mod CE217-19 Part I for complete text)

Comment Period History

E8921-G1

Proponent Joseph Belcher **Submitted** 6/27/2021 **Attachments** No

Comment:

The Florida Home Builders Association (FHBA) requests denial of this code change. This change was overturned by the ICC Board of Directors and is not included in the 2021 IECC.

Approved as Submitted

2018 International Energy Conservation Code

Add new definition as follows:

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

EV CAPABLE SPACE. Electrical panel capacity and space to support a minimum 40-ampere, 208/240-volt branch circuit for each EV parking space, and the installation of raceways, both underground and surface mounted, to support the *EVSE*.

EV READY SPACE. A designated parking space which is provided with one 40-ampere, 208/240-volt dedicated branch circuit for EVSE servicing *Electric Vehicles*. The circuit shall terminate in a suitable termination point such as a receptacle, junction box, or an *EVSE*, and be located in close proximity to the proposed location of the EV parking spaces.

Add new text as follows:

C405.10. Electric Vehicle (EV) charging for new construction. New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)* in accordance with the NFPA 70.

C405.10.1. New commercial buildings.*EV Ready Spaces* and *EV Capable Spaces* shall be provided in accordance with Table C405.10.1. Where the calculation of percent served results in a fractional parking space, it shall be shall rounded up to the next whole number. The service panel or sub panel circuit directory shall identify the spaces reserved to support EV charging as "EV Capable" or "EV Ready". The raceway location shall be permanently and visibly marked as "EV Capable".

TABLE C405.10.1.
***EV READY SPACE* AND *EV CAPABLE SPACE* REQUIREMENTS**

Total Number of Parking Spaces	Minimum number of *EV Ready Spaces*	Minimum number of *EV Capable Spaces*
1	1	-
2 – 10	2	-
11 – 15	2	3
16 – 19	2	4
21 - 25	2	5
26+	2	20% of total parking spaces

C405.10.2. Identification.Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EV chargers. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the *EVSE*.

Code Change No: CE217-19 Part I

Original Proposal

Section(s): C202, C405.10 (New), C405.10.1 (New), TABLE C405.10.1 (New), C405.10.2 (New)

Proponents: Matt Frommer, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project (mfrommer@swenergy.org); Eric Makela, New Buildings Institute, representing New Buildings Institute (ericM@newbuildings.org); jim edelson, representing New Buildings Institute (jim@newbuildings.org); Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org); Francesca Wahl (fwahl@tesla.com); Daniel Bresette, Alliance to Save Energy, representing Alliance to Save Energy (dbresette@ase.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC- COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2018 International Energy Conservation Code

Add new definition as follows:

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

EV CAPABLE SPACE. Electrical panel capacity and space to support a minimum 40-ampere, 208/240-volt branch circuit for each EV parking space, and the installation of raceways, both underground and surface mounted, to support the *EVSE*.

EV READY SPACE. A designated parking space which is provided with one 40-ampere, 208/240-volt dedicated branch circuit for EVSE servicing *Electric Vehicles*. The circuit shall terminate in a suitable termination point such as a receptacle, junction box, or an *EVSE*, and be located in close proximity to the proposed location of the EV parking spaces.

Add new text as follows:

C405.10. Electric Vehicle (EV) charging for new construction. New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)* in accordance with the NFPA 70.

C405.10.1. New commercial buildings. *EV Ready Spaces* and *EV Capable Spaces* shall be provided in accordance with Table C405.10.1. Where the calculation of percent served results in a fractional parking space, it shall be shall rounded up to the next whole number. The service panel or sub panel circuit directory shall identify the spaces reserved to support EV charging as “EV Capable” or “EV Ready”. The raceway location shall be permanently and visibly marked as “EV Capable”.

TABLE C405.10.1.
***EV READY SPACE* AND *EV CAPABLE SPACE* REQUIREMENTS**

Total Number of Parking Spaces	Minimum number of *EV Ready Spaces*	Minimum number of *EV Capable Spaces*
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21 - 25	2	5
26+	2	20% of total parking spaces

C405.10.2. Identification. Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EV chargers. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the *EVSE*.

Reason: In the United States, electric vehicle (EV) sales increased by 80 percent from 2017 to 2018 (1). According to a November 2018 forecast from the Edison Electric Institute, the number of EVs on U.S. roads is projected to grow from 1 million vehicles at the end of 2018, to 18.7 million by 2030. To recharge these new EVs, the U.S. will need 9.6 million charge ports, a substantial portion of which will be installed in workplace and commercial buildings (2).

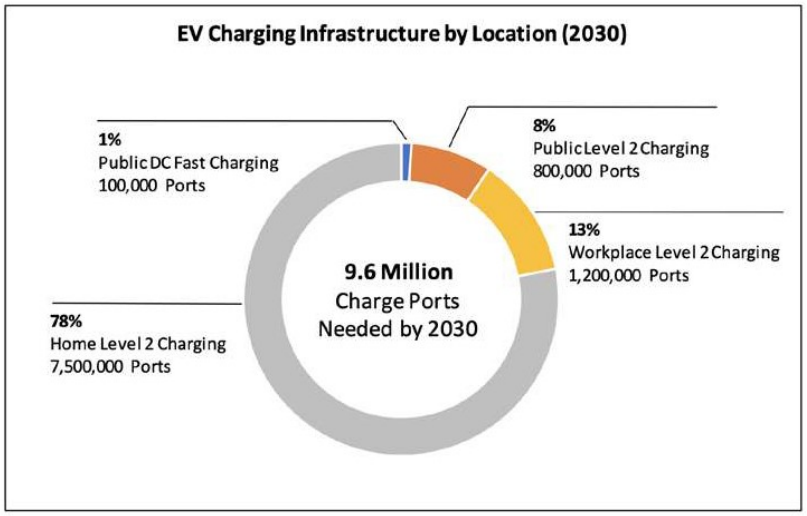

Figure 1. EV Charging Infrastructure in 2030 Based on EEI/IEI Forecast.

EVs provide significant economic benefits for consumers through fuel and maintenance cost savings, and have been identified as a key climate strategy to reduce GHG emissions from the U.S. transportation sector. The interest in EVs has grown alongside greater EV model availability and increased vehicle range. Every major auto manufacturer in the world has announced a plan to electrify a significant portion of their vehicle fleets over the next 3-5 years. Ford recently announced an $11 billion investment to reach their goal of 40 EV models by 2022 (3). The goal for GM: 20 EV models by 2023 (4); for VW: 27 EV models by 2022 (5); for Toyota: 10 BEVs by the early 2020's (6); and similar goals for Volvo, Daimler, Nissan, BMW, and Fiat-Chrysler.

However, the lack of access to EV charging stations continues to be a critical barrier to EV adoption. In particular, there are significant logistical barriers for commercial building tenants to upgrade existing electrical infrastructure and install new EV charging stations.

A lack of pre-existing EV charging infrastructure, such as electrical panel capacity, raceways, and pre-wiring, can make the installation of a new charging station cost-prohibitive for a potential EV-owner. The installation of an EV charging station is made three to four times less expensive when the infrastructure is installed during the initial construction phase as opposed to retrofitting existing buildings to accommodate the new electrical equipment.

New commercial buildings are constructed to last for decades, and so it is critical that EV charging infrastructure is incorporated at the pre-construction stage to ensure that new buildings can accommodate the charging needs of future EV-owners.

Bibliography:

1. "Monthly Plug-In EV Sales Scorecard." Inside EVs: Monthly U.S. Plug-in EV Sales Report Card. Accessed January 2019. https://insideevs.com/monthly-plug-in-sales-scorecard/.
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6. Kageyama, Yuri. "Toyota Planning 10 Purely Electric Vehicles by 2020s." USA Today. December 18, 2017. Accessed January 2019. https://www.usatoday.com/story/money/cars/2017/12/18/toyota-planning-10-purely-electric-vehicles-2020-s/960486001/.
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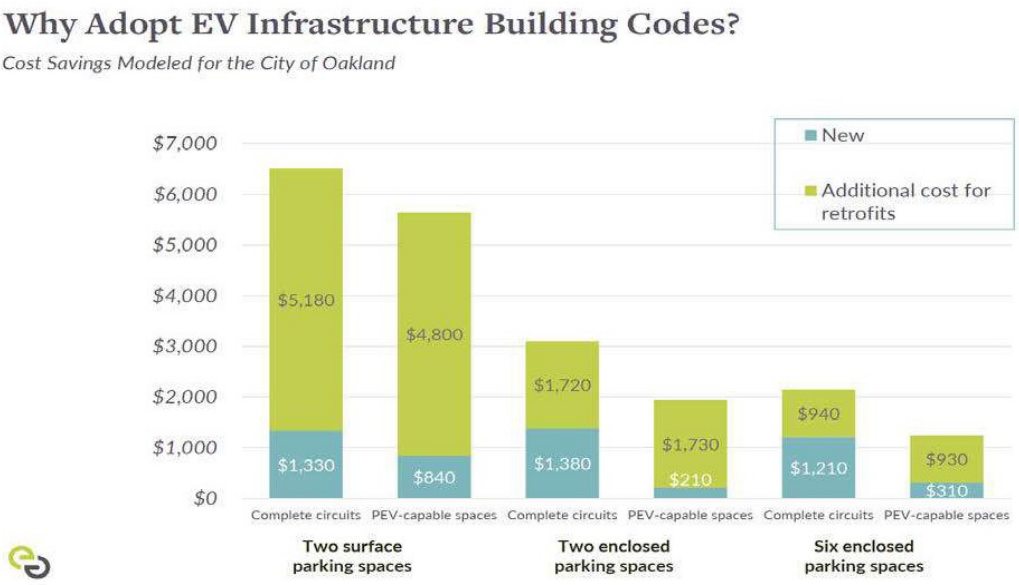
9. "NFPA 70®." NFPA Reports - Fires in the United States. Accessed January 2019. https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70.

Cost Impact: The code change proposal will increase the cost of construction

The code change proposal will increase the cost of initial construction, but provide long-term savings for EV owners through the avoided retrofit costs of installing EV charging infrastructure.

The chart below compares the cost of installing the necessary electrical infrastructure to support EV-Ready spaces (complete circuit) and an EV-Capable spaces (PEV-capable) at the time of new construction versus a building retrofit. In one example, the cost to retrofit an existing building with two EV-Capable spaces is $5,640, and $4,800 or 85 percent of that cost would be avoided if EV-Capable infrastructure was included during the initial construction of the parking lot. These additional retrofit costs typically include labor expenses for demolition, treching and boring, balancing the circuits, and new permitting costs.



In April, 2018, the California Air Resources Board published a cost analysis for a proposed code change to increase the required percentage of EV-Capable spaces. (8)

"**Avoided Retrofit Costs:** Significant retrofit costs can be avoided by installing EV charging infrastructure in new construction. CARB staff reviewed multiple sources to obtain average retrofit costs of installing infrastructure to support Level 2 charging stations in existing buildings. An estimated $7,000 per parking space can be avoided with multiple installations of Level 2 charging stations. An estimated $8,000 per parking space can be avoided when an individual Level 2 charging station is installed. These retrofit costs do not include the cost of the electrical vehicle supply equipment (EVSE). Retrofit costs are

focused on parking lot trenching, adding electrical service and/or panel upgrades. The 10 percent requirement would result in the installation of an additional 38,000 to 47,000 parking spaces with EV charging infrastructure beyond the current 3 percent requirement. If the proposed 10% requirement is not adopted, CARB staff assumed that every one of these parking spaces would need the basic EV charging infrastructure (raceway and panel capacity) to become EV Capable and support future installation of Level 2 charging stations. CARB staff estimates that the avoided retrofit costs range from $272 million to $386 million between 2020 and 2025."

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

Electric Vehicle. An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

EV READY SPACE. A designated parking space which is provided with one ~~40~~ 50-ampere, 208/240-volt dedicated branch circuit for a future dedicated Level 2 EVSE servicing *Electric Vehicles*. The circuit shall terminate in a ~~suitable termination~~ NEMA 6-50 or NEMA 14-50 receptacle or a suitable electrical connector rated for 208/240 or greater service. The circuit shall have no other outlets. The service panel shall include an over-current protective device and provide sufficient capacity and space to accommodate the circuit and over-current protective device ~~point such as a receptacle, junction box, or an *EVSE*,~~ and be located in close proximity to the proposed location of the EV parking spaces.

C405.10 Electric Vehicle (EV) charging for new construction (Mandatory). New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)*in accordance with the NFPA 70.

C405.10.2. Identification. Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EVSEs ~~chargers~~. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the *EVSE*.

C405.10.1. New ~~commercial~~ buildings. EV Ready Spaces and EV Capable Spaces shall be provided in accordance with Table C405.10.1. Where the calculation of percent served results in a fractional parking space, it shall be shall rounded up to the next whole number. The service panel or sub panel circuit directory shall identify the spaces reserved to support EV charging as "EV Capable" or "EV Ready". The raceway location shall be permanently and visibly marked as "EV Capable".

Committee Reason: This is a health and safety issue so people do not run power cords out their windows to power vehicles. The cost assessment was very modest. The modification clarified application (Vote: 12-3).

Assembly Action: **None**

Final Action

CE217-19 Part I **AS**

E8927/CE237-19

13

Date Submitted 2/12/2021	**Section** 406.10	**Proponent** Mo Madani
Chapter 4	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		**Staff Classification** Correlates Directly
Commission Action Pending Review		

Comments

General Comments **Yes**

Related Modifications

C406.1, Table C406.1(1), TABLE C406.1(2), TABLE C406.1(3), TABLE C406.1(4), TABLE C406.1(5), C406.10, TABLE 406.10.2

Summary of Modification

Adds new Section 406.10 "Energy Monitoring". The only means to retain the energy performance of a building is to continuously monitor energy consumption levels of and compare them to previous levels

Rationale

The investment made for the infrastructure of a building in order to comply with the IECC is significant. The assumption that is currently made upon commissioning a facility is that energy efficiency measures will not degrade, or go out of calibration, over time and their energy consumption will not increase as time passes from the time they were commissioned. Such an assumption is completely inaccurate and any payback assumed for energy efficient infrastructure investments will be lengthened, thereby reducing the ROI and increasing the payback period. The only means to retain the energy performance of a building is to continuously monitor energy consumption levels of various energy consuming systems and compare them to previous levels. Monitoring sub-systems provides key indications when changes have been made or systems are not operating to specification, which increases energy consumption. Examples include, but are not limited to:

1. Increased energy consumption in HVAC system loads will point to failures in motors, drive systems, bearings, etc.
2. Degrading building envelope
3. Configuration changes to the building that may drive increased energy consumption.
4. Increase of energy consumption from lighting loads may indicate changes in arrangement of the office space that resulted in reduced lighting loads may indicate change in arrangement of the office space that resulted in reduced lighting driving the installation of more lighting above permitted energy code levels, failure of occupant sensors, inappropriate lighting schedules, lamps that need to be replaced or cleaned, etc.

(Please see the uploaded CE237-19 for the complete text)

Comment Period History

E8927-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by CE237 to C406.1(9) and related to energy monitoring. Please make note the requirements in C406 have been converted from a compliance selection method to a points system.

Approved as Modified

Original Proposal:

2018 International Energy Conservation Code

Revise as follows:

C406.1 Requirements.Buildings shall comply with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Include an energy monitoring system in accordance with C406.10

Add new text as follows:

C406.10 Energy Monitoring. Buildings shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section C406.10.1 through C406.10.5.

C406.10.1 Electrical energy metering.For electrical energy, including all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C406.10.2.

C406.10.2 End-use metering categories.Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category listed in Table 406.10.2. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories listed in Table 406.10.2 is permitted to be from a load not withing the category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.

2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.

(Please see the uploaded mod CE237-19 for complete Table)

TABLE 406.10.2
ENERGY USE CATEGORIES

C406.10.3 Meters. Meters or other measurement devices required by this Section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C406.10.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections 406.10.4 and C406.10.5.

C406.10.4 Data acquisition system.A data acquisition system shall have the capability to store the data from the rquired meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C406.10.2.

C406.10.5 Graphical energy report.A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C406.10.2 at least every hour, day, month and year for the previous 36 months.

Modified Proposal:

C406.1 Additional energy efficiency credit ~~R~~requirements. ~~Buildings shall comply~~ New buildings shall achieve a total of 10 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9.
9. Where not required by Section C405.10 include an energy monitoring system in accordance with C406.10.

(Please see uploaded mod CE237-19 for complete Table changes)

Table C406.1(1)

Additional Energy Efficiency Credits for Group B Occupancies

Table C406.1(2)

Additional Energy Efficiency Credits for Group R and I Occupancies

Table C406.1(3)

Additional Energy Efficiency Credits for Group E Occupancies

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Table C406.1(4)

Additional Energy Efficiency Credits for Group M Occupancies

Table C406.1(5)

Additional Energy Efficiency Credits for Other[a] Occupancies

Code Change No: CE237-19

Original Proposal

Section(s): C406.1, Table C406.1(1) (New), TABLE C406.1(2) (New), TABLE C406.1(3) (New), TABLE C406.1(4) (New), TABLE C406.1(5) (New), C406.10 (New), C406.10.1 (New), C406.10.2 (New), TABLE 406.10.2 (New), C406.10.3 (New), C406.10.4 (New), C406.10.5 (New)

Proponents: Harold Jepsen, representing National Electrical Manufacturers Association (harold.jepsen@legrand.us)

2018 International Energy Conservation Code

Revise as follows:

C406.1 Requirements. Buildings shall comply with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Include an energy monitoring system in accordance with C406.10

Add new text as follows:

C406.10 Energy Monitoring. Buildings shall be equipped to measure, monitor, record and report energy consumption data in compliance with Section C406.10.1 through C406.10.5.

C406.10.1 Electrical energy metering. For electrical energy, including all electrical energy supplied to the building and its associated site, including but not limited to site lighting, parking, recreational facilities, and other areas that serve the building and its occupants, meters or other measurement devices shall be provided to collect energy consumption data for each end-use category required by Section C406.10.2.

C406.10.2 End-use metering categories. Meters or other approved measurement devices shall be provided to collect energy use data for each end-use category listed in Table 406.10.2. These meters shall have the capability to collect energy consumption data for the whole building or for each separately metered portion of the building. Where multiple meters are used to measure any end-use category, the data acquisition system shall total all of the energy used by that category. Not more than 5 percent of the measured load for each of the end-use categories listed in Table 406.10.2 is permitted to be from a load not withing the category.

Exceptions:

1. HVAC and water heating equipment serving only an individual dwelling unit does not require end-use metering.
2. End-use metering is not required for fire pumps, stairwell pressurization fans or any system that operates only during testing or emergency.

TABLE 406.10.2
ENERGY USE CATEGORIES

LOAD CATEGORY	DESCRIPTION OF ENERGY USE
Total HVAC system	Heating, cooling and ventilation including, but not limited to fans, pumps, boilers, chillers and water heating. Energy used by 120 volt equipment, or by 208/120 volt equipment that is located in a building where the main service is 480/277 volt power, is permitted to be excluded from Total HVAC system energy use.
Interior lighting	Lighting systems located within the *building.*
Exterior lighting	Lighting systems located on the building site but not within the building.
Plug loads	Devices, appliances and equipment connected to convenience receptacle outlets.
Process loads	Any single load that is not included in a HVAC, lighting, or plug load category and that exceeds 5 percent of the peak connected load of the whole building including, but not limited to data centers, manufacturing equipment and commercial kitchens.
Building operations and other miscellaneous loads	The remaining loads not included elsewhere in this table including, but not limited to, vertical transportation systems, automatic doors,

C406.10.3 Meters. Meters or other measurement devices required by this Section shall be configured to automatically communicate energy consumption data to the data acquisition system required by Section C406.10.4. Source meters shall be allowed to be any digital-type meter. Lighting, HVAC, or other building systems that can monitor their energy consumption shall be permitted instead of meters. Current sensors shall be permitted, provided that they have a tested accuracy of +/-2 percent. Required metering systems and equipment shall have the capability to provide at least hourly data that is fully integrated into the data acquisition system and graphical energy report in accordance with Sections 406.10.4 and C406.10.5.

C406.10.4 Data acquisition system. A data acquisition system shall have the capability to store the data from the rquired meters and other sensing devices for a minimum of 36 months. The data acquisition system shall have the capability to store real-time energy consumption data and provide hourly, daily, monthly, and yearly logged data for each end-use category required by Section C406.10.2.

C406.10.5 Graphical energy report. A permanent and readily accessible reporting mechanism shall be provided in the building that is accessible by building operation and management personnel. The reporting mechanism shall have the capability to graphically provide the energy consumption for each end-use category required by Section C406.10.2 at least every hour, day, month and year for the previous 36 months.

Reason: The investment made for the infrastructure of a building in order to comply with the IECC is significant. The assumption that is currently made upon commissioning a facility is that energy efficiency measures will not degrade, or go out of calibration, over time and their energy consumption will not increase as time passes from the time they were commissioned. Such an assumption is completely inaccurate and any payback assumed for energy efficient infrastructure investments will be lengthened, thereby reducing the ROI and increasing the payback period. The only means to retain the energy performance of a building is to continuously monitor energy consumption levels of various energy consuming systems and compare them to previous levels. Monitoring sub-systems provides key indications when changes have been made or systems are not operating to specification, which increases energy consumption. Examples include, but are not limited to:

1. Increased energy consumption in HVAC system loads will point to failures in motors, drive systems, bearings, etc.
2. Degrading building envelope
3. Configuration changes to the building that may drive increased energy consumption.
4. Increase of energy consumption from lighting loads may indicate changes in arrangement of the office space that resulted in reduced lighting loads may indicate change in arrangement of the office space that resulted in reduced lighting driving the installation of more lighting above permitted energy code levels, failure of occupant sensors, inappropriate lighting schedules, lamps that need to be replaced or cleaned, etc.
5. Monitoring plug loads will indicate then computer equipment is left on during non-working hours and use of space heaters that compromise the efficiency of the facility due to set points on the HVAC system.

The requirements in this proposal save energy by continually monitoring and reporting actionable energy consumption data to building owners and operators. For large buildings, this data is further broken out by the major sub-systems (HVAC, lighting, process loads, and plug loads). There are well documented studies that demonstrate the energy savings from metering and monitoring systems. Several state energy codes have recognized the benefits and require energy monitoring to support a continual high level of performance from the energy efficient investment.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
The code change proposal "will" increase the cost of construction because it will require additional hardware, software and labor during installation. Providing specific cost would violate antitrust laws, however the following link to a report provided by the GSA demonstrates an example of cost and savings:
https://www.gsa.gov/cdnstatic/Energy_Submetering_Finance_Paper_Knetwork_2012_11_269%28508%29.pdf

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

C406.1 Additional energy efficiency credit ~~R~~requirements. ~~Buildings shall comply~~ New buildings shall achieve a total of 10 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9.
9. Where not required by Section C405.10 include an energy monitoring system in accordance with C406.10.

Table C406.1(1)
Additional Energy Efficiency Credits for Group B Occupancies

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Energy Monitoring	4	4	4	4	3	3	3	3	3	3	2	3	2	2	2	2	2

Table C406.1(2)
Additional Energy Efficiency Credits for Group R and I Occupancies

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Energy Monitoring	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table C406.1(3)
Additional Energy Efficiency Credits for Group E Occupancies

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Energy Monitoring	3	3	3	3	3	3	3	3	3	2	2	3	2	2	2	2	2

Table C406.1(4)
Additional Energy Efficiency Credits for Group M Occupancies

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Energy Monitoring	4	5	5	5	5	4	4	4	4	3	3	4	3	4	4	4	3

Table C406.1(5)
Additional Energy Efficiency Credits for Other[a] Occupancies

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Energy Monitoring	3	3	3	3	3	3	3	3	3	3	2	3	2	2	2	3	2

a. Other occupancy groups include all Groups except for Groups B, R, I, E, and M.

Committee Reason: This is consistent with actions on CE215 but for smaller buildings. Suggested a public comment to include tenant access to reports in Section C406.10.5. The modification corrects language of the proposal to align with CE215 (Vote: 11-4).

Assembly Action: **None**

Final Action

CE237-19 **AM**

E8928/CE239-19

14

Date Submitted	2/12/2021	**Section**	406.10	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

C202, C406.1, C406.10

Summary of Modification

The proposed requirement will reduce degradation by detecting HVAC system faults and notifying building operators so that actions may be taken to reduce energy consumption of the building.

Rationale

Energy efficiency of a new building's HVAC system will degrade over time caused by poorly maintained, failing and improperly controlled equipment. The proposed FDD requirement will reduce that degradation by detecting HVAC system faults and notifying building operators so that actions may be taken to reduce energy consumption of the building. Additionally, FDD systems are being utilized to drive operational efficiency, make better use of maintenance personnel, and resolve comfort issues.

Comment Period History

E8928-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the changes made by CE239 to C406.1(10) and related to FDD. Please make note the requirements in C406 have been converted from a compliance selection method to a points system.

Approved as Modified

Original Proposal:

2018 International Energy Conservation Code

Add new definition as follows:

FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM.A software platform that utilizes building analytic algorithms to convert data provided by sensors and devices to automatically identify faults in building systems and provide a prioritized list of actionable resolutions to those faults based on cost or energy avoidance, comfort and maintenance impact.

Revise as follows:

C406.1 Requirements.Buildings shall comply with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Include a fault detection and diagnostics (FDD) system in accordance with Section C406.10.

Add new text as follows:

C406.10 Fault detection and diagnostics system.A fault detection and diagnostics system shall be installed to monitor the HVAC system's performance and automatically identify faults. The system shall:

1. Include permanently installed sensors and devices to monitor the HVAC system's performance;
2. Sample the HVAC system performance at least once per 15 minutes;
3. Automatically identify and report HVAC system faults;
4. Automatically notify authorized personnel of identified HVAC system faults;
5. Automatically provide prioritized recommendations for repair of identified faults based on analysis of data collected from the sampling of the HVAC system performance; and
6. Be capable of transmitting the prioritized fault repair recommendations to remotely located authorized personnel.

Modified Proposal:

C406.1 Additional energy efficiency credit Rrequirements. ~~Buildings shall comply~~ New buildings shall achieve a total of 10 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Where not required by Section C403.2.3 include a fault detection and diagnostics (FDD) system in accordance with Section C406.10.

(Please see the uploaded mod CE239-19 for the complete Tables)

TABLE C406.1(1)

ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP B OCCUPANCIES

TABLE C406.1(2)

ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP R AND I OCCUPANCIES

TABLE C406.1(3)

ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP E OCCUPANCIES

TABLE C406.1(4)

ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP M OCCUPANCIES

TABLE C406.1(5)

ADDITIONAL ENERGY EFFICIENCY CREDITS FOR OTHER[A] OCCUPANCIES

Code Change No: CE239-19

Original Proposal

Section(s): C202, C406.1, C406.10 (New)

Proponent: Marilyn Williams, representing National Electrical Manufacturers Association (mar_williams@nema.org)

2018 International Energy Conservation Code

Add new definition as follows:

FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM. A software platform that utilizes building analytic algorithms to convert data provided by sensors and devices to automatically identify faults in building systems and provide a prioritized list of actionable resolutions to those faults based on cost or energy avoidance, comfort and maintenance impact.

Revise as follows:

C406.1 Requirements. Buildings shall comply with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Include a fault detection and diagnostics (FDD) system in accordance with Section C406.10.

Add new text as follows:

C406.10 Fault detection and diagnostics system. A fault detection and diagnostics system shall be installed to monitor the HVAC system's performance and automatically identify faults. The system shall:

1. Include permanently installed sensors and devices to monitor the HVAC system's performance;
2. Sample the HVAC system performance at least once per 15 minutes;
3. Automatically identify and report HVAC system faults;
4. Automatically notify authorized personnel of identified HVAC system faults;
5. Automatically provide prioritized recommendations for repair of identified faults based on analysis of data collected from the sampling of the HVAC system performance; and
6. Be capable of transmitting the prioritized fault repair recommendations to remotely located authorized personnel.

Reason: Energy efficiency of a new building's HVAC system will degrade over time caused by poorly maintained, failing and improperly controlled equipment. The proposed FDD requirement will reduce that degradation by detecting HVAC system faults and notifying building operators so that actions may be taken to reduce energy consumption of the building. Additionally, FDD systems are being utilized to drive operational efficiency, make better use of maintenance personnel, and resolve comfort issues.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
If the alternative being proposed to the list of additional energy efficiency measures by this proposal is selected, it "will" increase the cost of construction because it will require additional hardware, software and labor during installation. Providing specific cost would violate antitrust laws, however a published example of cost and savings is provided from the following link https://ecobuilding.schneider-electric.com/documents/10807/217223/Lab+Project+Building+Analytics+Case+Study/a6d8b9b6-7fdd-4e87-a90b-c98ece595a25: Setup/install cost - $23,190, Annual maintenance cost - $35,407, and Annual savings - $286,000.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Modify proposal as follows:

C406.1 Additional energy efficiency credit ~~Requirements~~. ~~Buildings shall comply~~ New buildings shall achieve a total of 10 credits from Tables C406.1(1) through C406.1(5) where the table is selected based on the use group of the building and from credit calculations as specified in relevant subsections of C406. Where a building contains multiple use groups, credits from each use group shall be weighted by floor area of each group to determine the weighted average building credit. Credits from the tables or calculation shall be achieved where a building complies with one or more of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.
7. Enhanced envelope performance in accordance with Section C406.8.
8. Reduced air infiltration in accordance with Section C406.9
9. Where not required by Section C403.2.3 include a fault detection and diagnostics (FDD) system in accordance with Section C406.10.

TABLE C406.1(1)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP B OCCUPANCIES

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

TABLE C406.1(2)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP R AND I OCCUPANCIES

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Fault Detection	1	1	1	1	1	1	NA	1	1	NA	1	1	NA	1	1	1	1

TABLE C406.1(3)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP E OCCUPANCIES

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Fault Detection	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2

TABLE C406.1(4)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR GROUP M OCCUPANCIES

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2

TABLE C406.1(5)
ADDITIONAL ENERGY EFFICIENCY CREDITS FOR OTHER[A] OCCUPANCIES

Climate Zone:	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.10 Fault Detection	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

a. Other occupancy groups include all Groups except for Groups B, R, I, E, and M.

Committee Reason: This aligns with 218 14-0 This allows credit for this provision in those buildings that aren't required to have it. The modification provides alignment with CE218 (Vote 14-1).

Assembly Action: **None**

Final Action

CE239-19 **AM**

E8922/CE217-19 Part II

15

Date Submitted	2/12/2021	**Section**	404.2	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

R202 (IRC N1101.6), R404.2 (IRC N1104.2), R404.2.1 (IRC N1104.2.1), R404.2.2 (IRC N1104.2.2), Table R404.2.2 (IRC N1104.2.2), R404.2.3 (IRC N1104.2.3)

ICC - this code change was overturned by the ICC Board of Directors and for that it was not included in the 2021 IECC.

Summary of Modification

Adds new Sections R404.2 "Electric Vehicle (EV) charging for new construction". Proposal concerning infrastructure for Electric Vehicles.

Rationale

: In the United States, electric vehicle (EV) sales increased by 80 percent from 2017 to 2018 (1). According to a November 2018 forecast from the Edison Electric Institute, the number of EVs on U.S. roads is projected to grow from 1 million vehicles at the end of 2018, to 18.7 million by 2030. To recharge these new EVs, the U.S. will need 9.6 million charge ports, a substantial portion of which will be installed in workplace and commercial buildings (2).
EVs provide significant economic benefits for consumers through fuel and maintenance cost savings, and have been identified as a key climate strategy to reduce GHG emissions from the U.S. transportation sector. The interest in EVs has grown alongside greater EV model availability and increased vehicle range. Every major auto manufacturer in the world has announced a plan to electrify a significant portion of their vehicle fleets over the next 3-5 years. Ford recently announced an $11 billion investment to reach their goal of 40 EV models by 2022 (3). The goal for GM: 20 EV models by 2023 (4); for VW: 27 EV models by 2022 (5); for Toyota: 10 BEVs by the early 2020's (6); and similar goals for Volvo, Daimler, Nissan, BMW, and Fiat-Chrysler.
However, the lack of access to EV charging stations continues to be a critical barrier to EV adoption. In particular, there are significant logistical barriers for commercial building tenants to upgrade existing electrical infrastructure and install new EV charging stations.
(Please see uploaded mod CE217-19 Part II for complete text)

Comment Period History

E8922-G1

Proponent Drew Smith **Submitted** 6/23/2021 **Attachments** No

Comment:

Will increase construction costs from $1,000 - at least $1,500/home

Comment Period History

E8922-G2

Proponent Amanda Hickman **Submitted** 6/24/2021 **Attachments** No

Comment:

Leading Builders of America (LBA) does not support this proposal on the basis that it will either lead to confusion and/or is not cost justified and therefore is inappropriate for Florida. We respectfully urge the TAC and Commission to reject.

Comment Period History

E8922-G3

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports the inclusion of EV-Ready provisions in the FBC-EC as we believe the "effective use of energy" as specified in the scope of the energy conservation code includes the electrification of transportation supplied by or that is capable of supplying electrical energy to a building or structure.

Comment Period History

E8922-G4

Proponent Mo Madani **Submitted** 6/30/2021 **Attachments** No

Comment:

This is a follow-up comment to G1 – the analysis in G1 is based on 2000 sq ft home.

Approved as Submitted

2018 International Energy Conservation Code

Revise as follows:

SECTION R202 (IRC N1101.6)
GENERAL DEFINITIONS

Add new definition as follows:

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

EV CAPABLE SPACE. Electrical panel capacity and space to support a minimum 40-ampere, 208/240-volt branch circuit for each EV parking space, and the installation of raceways, both underground and surface mounted, to support the *EVSE*.

EV READY SPACE. A designated parking space which is provided with one 40-ampere, 208/240-volt dedicated branch circuit for *EVSE* servicing Electric Vehicles. The circuit shall terminate in a suitable termination point such as a receptacle, junction box, or an *EVSE*, and be located in close proximity to the proposed location of the EV parking spaces.

Add new text as follows:

R404.2 (IRC N1104.2) Electric Vehicle (EV) charging for new construction.New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)* in accordance with the *National Electrical Code (NFPA 70).*

R404.2.1 (IRC N1104.2.1) One- to two-family dwellings and townhouses.For each dwelling unit, provide at least one *EV Ready Space*. The branch circuit shall be identified as "EV Ready" in the service panel or subpanel directory, and the termination location shall be marked as "EV Ready".

Exception: *EV Ready Spaces* are not required where no parking spaces are provided.

R404.2.2 (IRC N1104.2.2) Multifamily dwellings (three or more units).*EV Ready Spaces* and *EV Capable Spaces* shall be provided in accordance with Table R404.2.2. Where the calculation of percent served results in a fractional parking space, it shall round up to the next whole number. The service panel or subpanel circuit directory shall identify the spaces reserved to support EV charging as "EV Capable" or "EV Ready". The raceway location shall be permanently and visibly marked as "EV Capable".

Table R404.2.2 (IRC N1104.2.2)
***EV Ready Space* and *EV Capable Space* requirements.**

Total Number of Parking Spaces	Minimum number of *EV Ready Spaces*	Minimum number of *EV Capable Spaces*
1	1	-
2 – 10	2	-
11 – 15	2	3
16 – 19	2	4
21 – 25	2	5
26+	2	20% of total parking spaces

E8922 Text Modification

R404.2.3 (IRC N1104.2.3) Identification.Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EV chargers. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the *EVSE*.

Code Change No: **CE217-19 Part II**

Original Proposal

Section(s): Part II: R202 (IRC N1101.6), R404.2 (IRC N1104.2) (New), R404.2.1 (IRC N1104.2.1) (New), R404.2.2 (IRC N1104.2.2) (New), Table R404.2.2 (IRC N1104.2.2) (New), R404.2.3 (IRC N1104.2.3) (New)

Proponents: Matt Frommer, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project (mfrommer@swenergy.org); Eric Makela, New Buildings Institute, representing New Buildings Institute (ericM@newbuildings.org); jim edelson, representing New Buildings Institute (jim@newbuildings.org); Steven Rosenstock, representing Edison Electric Institute (srosenstock@eei.org); Francesca Wahl (fwahl@tesla.com); Daniel Bresette, Alliance to Save Energy, representing Alliance to Save Energy (dbresette@ase.org)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC- COMMERCIAL COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMITTEES.

2018 International Energy Conservation Code

Revise as follows:

SECTION R202 (IRC N1101.6)
GENERAL DEFINITIONS

Add new definition as follows:

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). The conductors, including the ungrounded, grounded, and equipment grounding conductors, and the Electric Vehicle connectors, attachment plugs, and all other fittings, devices, power outlets, or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the Electric Vehicle.

EV CAPABLE SPACE. Electrical panel capacity and space to support a minimum 40-ampere, 208/240-volt branch circuit for each EV parking space, and the installation of raceways, both underground and surface mounted, to support the *EVSE*.

EV READY SPACE. A designated parking space which is provided with one 40-ampere, 208/240-volt dedicated branch circuit for *EVSE* servicing Electric Vehicles. The circuit shall terminate in a suitable termination point such as a receptacle, junction box, or an *EVSE*, and be located in close proximity to the proposed location of the EV parking spaces.

Add new text as follows:

R404.2 (IRC N1104.2) Electric Vehicle (EV) charging for new construction. New construction shall facilitate future installation and use of *Electric Vehicle Supply Equipment (EVSE)* in accordance with the *National Electrical Code (NFPA 70)*.

R404.2.1 (IRC N1104.2.1) One- to two-family dwellings and townhouses. For each dwelling unit, provide at least one *EV Ready Space*. The branch circuit shall be identified as "EV Ready" in the service panel or subpanel directory, and the termination location shall be marked as "EV Ready".

Exception: *EV Ready Spaces* are not required where no parking spaces are provided.

R404.2.2 (IRC N1104.2.2) Multifamily dwellings (three or more units). *EV Ready Spaces* and *EV Capable Spaces* shall be provided in accordance with Table R404.2.2. Where the calculation of percent served results in a fractional parking space, it shall round up to the next whole number. The service panel or subpanel circuit directory shall identify the spaces reserved to support EV charging as "EV Capable" or "EV Ready". The raceway location shall be permanently and visibly marked as "EV Capable".

Table R404.2.2 (IRC N1104.2.2)
***EV Ready Space* and *EV Capable Space* requirements.**

Total Number of Parking Spaces	Minimum number of *EV Ready Spaces*	Minimum number of *EV Capable Spaces*
1	1	-
2 – 10	2	-
11 – 15	2	3
16 – 19	2	4
21 – 25	2	5
26+	2	20% of total parking spaces

R404.2.3 (IRC N1104.2.3) Identification. Construction documents shall indicate the raceway termination point and proposed location of future EV spaces and EV chargers. Construction documents shall also provide information on amperage of future *EVSE*, raceway methods, wiring schematics and electrical load calculations to verify that the electrical panel service capacity and electrical system, including any on-site distribution transformers, have sufficient capacity to simultaneously charge all EVs at all required EV spaces at the full rated amperage of the *EVSE*.

Reason: In the United States, electric vehicle (EV) sales increased by 80 percent from 2017 to 2018 (1). According to a November 2018 forecast from the Edison Electric Institute, the number of EVs on U.S. roads is projected to grow from 1 million vehicles at the end of 2018, to 18.7 million by 2030. To recharge these new EVs, the U.S. will need 9.6 million charge ports, a substantial portion of which will be installed in workplace and commercial buildings (2).

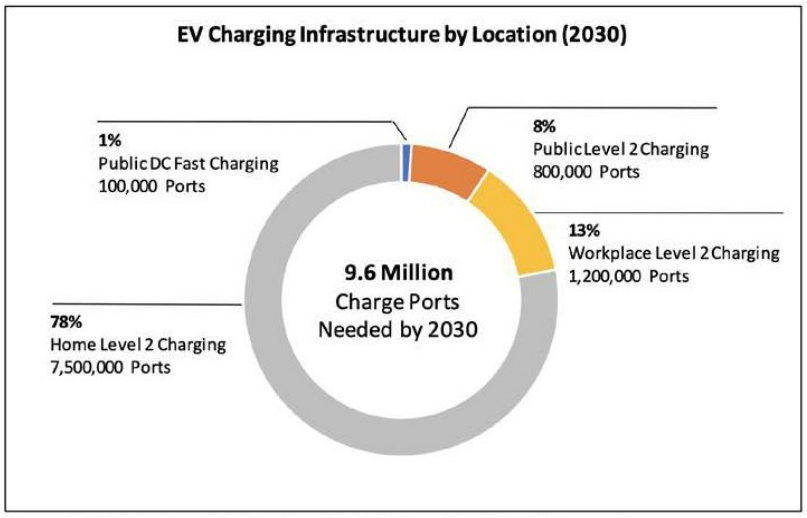

Figure 1. EV Charging Infrastructure in 2030 Based on EEI/IEI Forecast.

EVs provide significant economic benefits for consumers through fuel and maintenance cost savings, and have been identified as a key climate strategy to reduce GHG emissions from the U.S. transportation sector. The interest in EVs has grown alongside greater EV model availability and increased vehicle range. Every major auto manufacturer in the world has announced a plan to electrify a significant portion of their vehicle fleets over the next 3-5 years. Ford recently announced an $11 billion investment to

reach their goal of 40 EV models by 2022 (3). The goal for GM: 20 EV models by 2023 (4); for VW: 27 EV models by 2022 (5); for Toyota: 10 BEVs by the early 2020's (6); and similar goals for Volvo, Daimler, Nissan, BMW, and Fiat-Chrysler.

However, the lack of access to EV charging stations continues to be a critical barrier to EV adoption. In particular, there are significant logistical barriers for commercial building tenants to upgrade existing electrical infrastructure and install new EV charging stations.

A lack of pre-existing EV charging infrastructure, such as electrical panel capacity, raceways, and pre-wiring, can make the installation of a new charging station cost-prohibitive for a potential EV-owner. The installation of an EV charging station is made three to four times less expensive when the infrastructure is installed during the initial construction phase as opposed to retrofitting existing buildings to accommodate the new electrical equipment.

New commercial buildings are constructed to last for decades, and so it is critical that EV charging infrastructure is incorporated at the pre-construction stage to ensure that new buildings can accommodate the charging needs of future EV-owners.

Bibliography:

1. "Monthly Plug-In EV Sales Scorecard." Inside EVs: Monthly U.S. Plug-in EV Sales Report Card. Accessed January 2019. https://insideevs.com/monthly-plug-in-sales-scorecard/.
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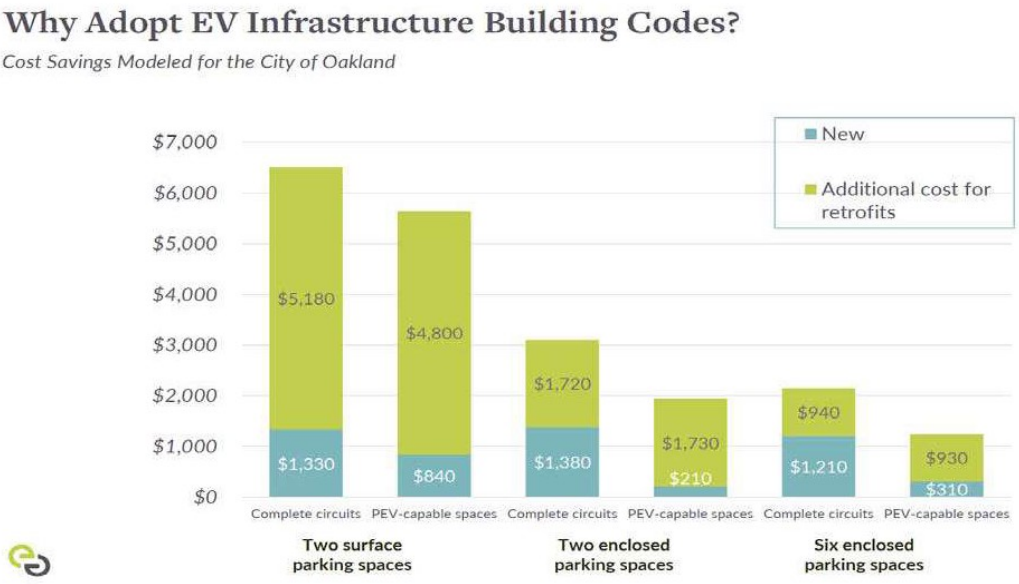
8. ELECTRIC VEHICLE (EV) CHARGING INFRASTRUCTURE: MULTIFAMILY BUILDING STANDARDS. Report. April 2018. Accessed January 2019. https://arb.ca.gov/cc/greenbuildings/pdf/tcac2018.pdf.
9. "NFPA 70®." NFPA Reports - Fires in the United States. Accessed January 2019. https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70.

Cost Impact: The code change proposal will increase the cost of construction

The code change proposal will increase the cost of initial construction, but provide long-term savings for EV owners through the avoided retrofit costs of installing EV charging infrastructure.

The chart below compares the cost of installing the necessary electrical infrastructure to support EV-Ready spaces (complete circuit) and an EV-Capable spaces (PEV-capable) at the time of new construction versus a building retrofit. In one example, the cost to retrofit an existing building with two EV-Capable spaces is $5,640, and $4,800 or 85 percent of that cost would be avoided if EV-Capable infrastructure was included during the initial construction of the parking lot. These additional retrofit costs typically include labor expenses for demolition, treching and boring, balancing the circuits, and new permitting costs.



In April, 2018, the California Air Resources Board published a cost analysis for a proposed code change to increase the required percentage of EV-Capable spaces. (8)

"**Avoided Retrofit Costs:** Significant retrofit costs can be avoided by installing EV charging infrastructure in new construction. CARB staff reviewed multiple sources to obtain average retrofit costs of installing infrastructure to support Level 2 charging stations in existing buildings. An estimated $7,000 per parking space can be avoided with multiple installations of Level 2 charging stations. An estimated $8,000 per parking space can be avoided when an individual Level 2 charging station is installed. These retrofit costs do not include the cost of the electrical vehicle supply equipment (EVSE). Retrofit costs are focused on parking lot trenching, adding electrical service and/or panel upgrades. The 10 percent requirement would result in the installation of an additional 38,000 to 47,000 parking spaces with EV charging infrastructure beyond the current 3 percent requirement. If the proposed 10% requirement is not adopted, CARB staff assumed that every one of these parking spaces would need the basic EV charging infrastructure (raceway and panel capacity) to become EV Capable and support future installation of Level 2 charging stations. CARB staff estimates that the avoided retrofit costs range from $272 million to $386 million between 2020 and 2025."

Report of Committee Action Hearings

Committee Action: **Disapproved**

Committee Reason: It may be commendable but there is no demonstration of energy savings or relationship to building energy efficiency. It does not belong in energy codes (Vote: 8-3).

Assembly Action: **None**

Final Action

CE217-19 Part II **AS**

Sub Code: Existing Building

E9758/EB46-19

16

Date Submitted	3/15/2021	**Section**	406.1.4	**Proponent**	Mo Madani
Chapter	4	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Overlap

Comments

General Comments **Yes**

Related Modifications

406.1.4 (New), 408.3

Original text of this code change is not consistent with that of the 2020 FBC-EB/407.1.4.

Summary of Modification

NFPA 99 specifies broader requirements for existing buildings beyond just hospital grade receptacles. This change will align the electrical and medical gas systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.

Rationale

NFPA 99 specifies broader requirements for electrical systems in existing buildings beyond just hospital grade receptacles in bed locations. This includes requirements tamperproof receptacles in pediatrics, and additional requirements for surgery. NFPA 99 defines requirements for existing facilities. In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment and medical gas systems must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K912, and K917). This change will align the electrical and medical gas (K909 and K910) systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities. NFPA 99 defines when repairs are made to these systems requirement for component replacement, means and methods of repairs and safety requirements.
NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.

(Please see the uploaded mod EB46-19 for the complete text)

Comment Period History

E9758-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports replacing 407.1.4 of the 2020 FBC-EB with the new language in 406.1.4 of the 2021 IEBC as this will ensure that all electrical system repairs will comply with the NFPA 99 and NFPA 70 and not just Group I-2 receptacle replacement.

Approved as Submitted

2018 International Existing Building Code

Delete and substitute as follows:

~~**406.1.4 Group I-2 receptacles.Receptacles in patient bed locations of Group I-2 that are not "hospital grade" shall be replaced with "hospital grade" receptacles, as required by NFPA 99 and Article 517 of NFPA 70.**~~

406.1.4 Healthcare facilities.Portions of electrical systems being repaired in Group I-2, ambulatory care facilities and outpatient clinics shall comply with NFPA 99 requirements for repairs.

Add new text as follows:

408.3 Healthcare facilities.Portions of Medical Gas systems being repaired in Group I-2, ambulatory care facilities and outpatient clinics shall comply with NFPA 99 requirements for repairs.

Code Change No: EB46-19

Original Proposal

Section(s): 406.1.4 (New), 408.3 (New)

Proponents: John Williams, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Existing Building Code

Delete and substitute as follows:

~~**406.1.4 Group I-2 receptacles.** Receptacles in patient bed locations of Group I-2 that are not "hospital grade" shall be replaced with "hospital grade" receptacles, as required by NFPA 99 and Article 517 of NFPA 70.~~

406.1.4 Healthcare facilities. Portions of electrical systems being repaired in Group I-2, ambulatory care facilities and outpatient clinics shall comply with NFPA 99 requirements for repairs.

Add new text as follows:

408.3 Healthcare facilities. Portions of Medical Gas systems being repaired in Group I-2, ambulatory care facilities and outpatient clinics shall comply with NFPA 99 requirements for repairs.

Reason: NFPA 99 specifies broader requirements for electrical systems in existing buildings beyond just hospital grade receptacles in bed locations. This includes requirements tamperproof receptacles in pediatrics, and additional requirements for surgery. NFPA 99 defines requirements for existing facilities. In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment and medical gas systems must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K912, and K917). This change will align the electrical and medical gas (K909 and K910) systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities. NFPA 99 defines when repairs are made to these systems requirement for component replacement, means and methods of repairs and safety requirements.

NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.
(3) Category 3: Normal building system reliabilities are expected. Such systems support patient needs, but failure of such equipment or systems would not immediately affect patient care and are not critical for life support.
(4) Category 4: Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.

The category definitions apply to equipment and systems operations.

A risk assessment should be conducted to evaluate the risk to the patients, staff, and visitors in all healthcare facilities. These categories are not always aligned to occupancy classification. Potential examples of areas/systems and their categories of risk;

(1) Ambulatory surgical center, where patients undergo general anesthesia, Category 1
(2) Reconstructive surgeon's office with general anesthesia, Category 1
(3) Procedural sedation site for outpatient services, Category 2
(4) Cooling systems in Houston, TX, Category 2
(5) Cooling systems in Seattle, WA, Category 3
(6) Heating systems in Chicago, IL Category 2
(7) Dental office, no general anesthesia, Category 3
(8) Typical doctor's office/exam room, Category 4
(9) Group I-2 Condition 2 facilities most systems would be Category 1

This approach more closely aligns system design, performance and maintenance to the safety risk to the public. It does not create significant additional costs.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 and 2018 the CHC held 4 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes*. Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change aligns with existing federal requirements for the healthcare industry.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal is necessary to link with the required regulations for healthcare occupancies which requires compliance with NFPA 99 for repairs of electrical and medical gas systems. (Vote: 13-0)

Assembly Action: **None**

Final Action

EB46-19 **AS**

E976o/EB49-19

17

Date Submitted	3/15/2021	**Section**	501.3	**Proponent**	Mo Madani
Chapter	5	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **No**

Related Modifications

501.3 (New), SECTION 706 (New), 706.1 (New), 807.3 (New), 809.2

Summary of Modification

This change will align the electrical and medical gas systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities. Adds new Sections 501.3, 706.1, 807.3, 809.2. "Healthcare facilities".

Rationale

In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment and medical gas systems and equipment must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K 323, K901, K902, K903, K904, K905, K909, K910, K913, K915, K916 K923, K925 and K927). This change will align the electrical and medical gas systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.
NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.
(Please see the uploaded mod EB49-19 for the complete text)

Approved as Submitted

2018 International Existing Building Code

Add new text as follows:

501.3 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any altered or added portion of an existing electrical or medical gas systems shall be required to meet installation and equipment requirements in NFPA 99.

SECTION 706
ELECTRICAL

706.1 Healthcare facilities.In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any altered, portion of an existing electrical systems shall be required to meet installation and equipment requirements in NFPA 99

807.3 Healthcare facilities.In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any added portion of an existing electrical systems shall be required to meet installation and equipment requirements in NFPA 99.

809.2 Healthcare facilities.In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any added portion of an existing medical gas systems shall be required to meet installation and equipment requirements in NFPA 99.

Code Change No: EB49-19

Original Proposal

Section(s): 501.3 (New), SECTION 706 (New), 706.1 (New), 807.3 (New), 809.2 (New)

Proponents: John Williams, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Existing Building Code

Add new text as follows:

501.3 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any altered or added portion of an existing electrical or medical gas systems shall be required to meet installation and equipment requirements in NFPA 99.

SECTION 706
ELECTRICAL

706.1 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any altered, portion of an existing electrical systems shall be required to meet installation and equipment requirements in NFPA 99

807.3 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any added portion of an existing electrical systems shall be required to meet installation and equipment requirements in NFPA 99.

809.2 Healthcare facilities. In Group I-2 facilities, ambulatory care facilities and outpatient clinics, any added portion of an existing medical gas systems shall be required to meet installation and equipment requirements in NFPA 99.

Reason: In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment and medical gas systems and equipment must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K 323, K901, K902, K903, K904, K905, K909, K910, K913, K915, K916 K923, K925 and K927). This change will align the electrical and medical gas systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.

NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.
(3) Category 3: Normal building system reliabilities are expected. Such systems support patient needs, but failure of such equipment or systems would not immediately affect patient care and are not critical for life support.
(4) Category 4: Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.

The category definitions apply to equipment and systems operations.

A risk assessment should be conducted to evaluate the risk to the patients, staff, and visitors in all healthcare facilities. These categories are not always aligned to occupancy classification. Potential examples of areas/systems and their categories of risk;

(1) Ambulatory surgical center, where patients undergo general anesthesia, Category 1
(2) Reconstructive surgeon's office with general anesthesia, Category 1
(3) Procedural sedation site for outpatient services, Category 2
(4) Cooling systems in Houston, TX, Category 2
(5) Cooling systems in Seattle, WA, Category 3

(6) Heating systems in Chicago, IL Category 2
(7) Dental office, no general anesthesia, Category 3
(8) Typical doctor's office/exam room, Category 4
(9) Group I-2 Condition 2 facilities most systems would be Category 1

This approach more closely aligns system design, performance and maintenance to the safety risk to the public. It does not create significant additional costs.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 and 2018 the CHC held 4 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes.* Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change aligns with existing federal requirements for the healthcare industry.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal correlates the IEBC alteration requirements with federal requirements for healthcare with regard to medical gases and electrical systems. (Vote: 13-0)

Assembly Action: **None**

Final Action

EB49-19 **AS**

E9693/EB99-19

18

Date Submitted 3/12/2021	**Section** 1007.1	**Proponent** Mo Madani
Chapter 10	**Affects HVHZ** Yes	**Attachments** Yes
TAC Recommendation Pending Review		**Staff Classification** Correlates Directly
Commission Action Pending Review		

Comments

General Comments **Yes**

Related Modifications

1007.1

FBC-EB/ Section 1008

Summary of Modification

This change will align the electrical systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities. NFPA 99

Rationale

NFPA 99 specifies additional requirements for electrical systems in health care facilities than just NFPA 70. In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K901, K911, and K916). This change will align the electrical systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.
NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.
(3) Category 3: Normal building system reliabilities are expected. Such systems support patient needs, but failure of such equipment or systems would not immediately affect patient care and are not critical for life support.
(4) Category 4: Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.

(Please see the uploaded mod EB99-19 for the complete text)

Comment Period History

E9693-G1

Proponent Bryan Holland **Submitted** 6/28/2021 **Attachments** No

Comment:

NEMA fully supports adding this new language related to health care facilities and the pointer to the NFPA 99 to the FBC-EB.

Comment Period History

E9693-G2

Proponent John Hall **Submitted** 6/29/2021 **Attachments** No

Comment:

I support adding this new language related to health care facilities and the reference to NFPA 99 as it would apply to the Florida Building Code, Existing Building.

Approved as Submitted

2018 International Existing Building Code

Revise as follows:

1007.1 Special occupancies.Where the occupancy of an *existing building* or part of an *existing building* is changed to one of the following special occupancies as described in NFPA 70, the electrical wiring and equipment of the building or portion thereof that contains the proposed occupancy shall comply with the applicable requirements of NFPA 70 ~~whether or not a *change of occupancy* group is involved~~. Health care facilities, including Group I-2, ambulatory healthcare facilities and outpatient clinics, shall also comply with the applicable requirements of NFPA 99:

1. Hazardous locations.
2. Commercial garages, repair and storage.
3. Aircraft hangars.
4. Gasoline dispensing and service stations.
5. Bulk storage plants.
6. Spray application, dipping and coating processes.
7. Health care facilities, including Group I-2, ambulatory healthcare facilities and outpatient clinics.
8. Places of assembly.
9. Theaters, audience areas of motion picture and television studios, and similar locations.
10. Motion picture and television studios and similar locations.
11. Motion picture projectors.
12. Agricultural buildings.

Code Change No: EB99-19

Original Proposal

Section(s): 1007.1

Proponents: John Williams, representing Healthcare Committee (AHC@iccsafe.org)

2018 International Existing Building Code

Revise as follows:

1007.1 Special occupancies. Where the occupancy of an *existing building* or part of an *existing building* is changed to one of the following special occupancies as described in NFPA 70, the electrical wiring and equipment of the building or portion thereof that contains the proposed occupancy shall comply with the applicable requirements of NFPA 70 ~~whether or not a *change of occupancy* group is involved~~. Health care facilities, including Group I-2, ambulatory healthcare facilities and outpatient clinics, shall also comply with the applicable requirements of NFPA 99:

1. Hazardous locations.
2. Commercial garages, repair and storage.
3. Aircraft hangars.
4. Gasoline dispensing and service stations.
5. Bulk storage plants.
6. Spray application, dipping and coating processes.
7. Health care facilities, including Group I-2, ambulatory healthcare facilities and outpatient clinics.
8. Places of assembly.
9. Theaters, audience areas of motion picture and television studios, and similar locations.
10. Motion picture and television studios and similar locations.
11. Motion picture projectors.
12. Agricultural buildings.

Reason: NFPA 99 specifies additional requirements for electrical systems in health care facilities than just NFPA 70. In order to meet federal conditions of participation health care facilities must comply with the electrical systems and equipment must be installed according to the requirements listed in NFPA 99, Health Care Facilities Code (K901, K911, and K916). This change will align the electrical systems installation requirements for Outpatient Clinics, Group B Ambulatory Care and Group I-2 facilities.

NFPA 99 uses a risk based approach to system design, installation and maintenance in healthcare facilities (Group I-2 facilities, ambulatory care facilities and outpatient clinics). Four levels of systems categories are defined in NFPA 99, based on the risks to patients and caregivers in the facilities. The categories are as follows:

(1) Category 1: Systems that are expected to be functional at all times. Failure of these systems is likely to cause major injury or death.
(2) Category 2: Systems are expected to have a high level of reliability. Failures of these systems are likely to cause minor injury to patients or caregivers, however, limited short durations of equipment downtime can be tolerated. Category 2 systems are not critical for life support.
(3) Category 3: Normal building system reliabilities are expected. Such systems support patient needs, but failure of such equipment or systems would not immediately affect patient care and are not critical for life support.
(4) Category 4: Such systems have no impact on patient care and would not be noticeable to patients in the event of failure.

The category definitions apply to equipment and systems operations.

A risk assessment should be conducted to evaluate the risk to the patients, staff, and visitors in all healthcare facilities. These categories are not always aligned to occupancy classification. Potential examples of areas/systems and their categories of risk;

(1) Ambulatory surgical center, where patients undergo general anesthesia, Category 1
(2) Reconstructive surgeon's office with general anesthesia, Category 1
(3) Procedural sedation site for outpatient services, Category 2
(4) Cooling systems in Houston, TX, Category 2
(5) Cooling systems in Seattle, WA, Category 3

(6) Heating systems in Chicago, IL Category 2
(7) Dental office, no general anesthesia, Category 3
(8) Typical doctor's office/exam room, Category 4
(9) Group I-2 Condition 2 facilities most systems would be Category 1

This approach more closely aligns system design, performance and maintenance to the safety risk to the public. It does not create significant additional costs.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation. In 2017 and 2018 the CHC held 4 open meetings and numerous conference calls, *which included members of the committees as well as any interested parties, to discuss and debate the proposed changes*. Information on the CHC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CHC effort can be downloaded from the CHC website at: https://www.iccsafe.org/codes-tech-support/cs/icc-committee-on-healthcare/.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This change aligns with existing federal requirements for the healthcare industry.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal was approved to further correlate the IEBC with the federal healthcare requirements. (Vote: 13-0)

Assembly Action: **None**

Final Action

EB99-19 **AS**

Sub Code: Residential

E8699/RB141-19

19

Date Submitted	2/9/2021	**Section**	322	**Proponent**	Mo Madani
Chapter	3	**Affects HVHZ**	Yes	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Flood Requirements

Comments

General Comments **Yes**

Related Modifications

309

Correlates Directly

Summary of Modification

The primary aspect of elevated homes in flood hazard areas that contributes to reducing damage is the elevation of the lowest floor (R322.2.1) or lowest horizontal structural member of the lowest floor in Zone V and Coastal A Zones (R322.3.2) relative to the base flood elevation.

Rationale

Reason: The primary aspect of elevated homes in flood hazard areas that contributes to reducing damage is the elevation of the lowest floor (R322.2.1) or lowest horizontal structural member of the lowest floor in Zone V and Coastal A Zones (R322.3.2) relative to the base flood elevation. The higher the floor, the lower the risk (and the lower are NFIP flood insurance premiums). To ensure the same level of protection is applied to all aspects of dwellings, Section R322.1.6 requires mechanical, plumbing and electrical equipment to be located at or above the required elevations, and R322.1.8 requires use of flood damage-resistant materials below the required elevations. This same level of protection should apply to enclosures and walls below the required elevations. Currently, the level of protection for enclosures and walls is at the design flood elevation, which may be lower than the lowest floor elevations required in R322.2.1 and R322.3.2.

Comment Period History

E8699-G1

Proponent Rebecca Quinn obo F **Submitted** 6/18/2021 **Attachments** No

Comment:

Retain this proposal; it is an important clarification for application of several flood sections.

Comment Period History

E8699-G2

Proponent Brian Walsh - RCCIW **Submitted** 6/21/2021 **Attachments** No

Comment:

This can have cost implications, but would very widely based on the situation and build. I cannot put a dollar amount at this time.

Comment Period History

E899-G3

Proponent Joseph Belcher **Submitted** 6/29/2021 **Attachments** No

Comment:

The Florida Home Builders Association (FHBA) requests denial of this code change. While the provisions are flood requirements, it is unclear whether adoption of the provisions is necessary to maintain eligibility for federal funding and discounts from the National Flood Insurance Program. It appears there could be a considerable cost involved to comply with the changes and we request more time to consider the full impact.

Comment Period History

E899-G4

Proponent Joseph Belcher **Submitted** 6/29/2021 **Attachments** No

Comment:

Additional comment from FHBA: Further investigation reveals that the ICC Committee action was AMPC1. The Complete Revision Resource shows a Public Comment 2, but no Public Comment 1. Reviewing the 2021 IRC, First Printing, reveals that the provisions of RB141-19 Public Comment 2 were adopted. Please move denial of this provision to allow interested parties the opportunity to submit in the proper form in Phase II.

ORIGINAL

AS - APPROVED AS SUBMITTED

Revise as follows:

R309.3 Flood hazard areas.

For buildings located in flood hazard areas as established by Table R301.2(1), garage floors shall be one of the following:

1. Elevated to or above the ~~design flood~~ required lowest floor elevation as determined in accordance with Section R322.

2. Located below the ~~design flood~~ required lowest floor elevation provided that the floors are at or above *grade* on not less than one side, are used solely for parking, building access or storage, meet the requirements of Section R322 and are otherwise constructed in accordance with this code.

R322.1.6 Protection of mechanical, plumbing and electrical systems. Electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall be located at or above the elevation required in Section R322.2 or R322.3. If replaced as part of a substantial improvement, electrical systems, *equipment* and components; heating, ventilating, air-conditioning and plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall meet the requirements of this section. Systems, fixtures, and *equipment* and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

Exception: Locating electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* is permitted below the elevation required in Section R322.2 or R322.3 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the ~~design flood~~ required elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of this code for wet locations.

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height above the highest adjacent grade of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.

3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

Exception: Enclosed areas below the ~~design flood~~ elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R322.2.2.

R322.2.2 Enclosed area below ~~design flood~~ required elevation. Enclosed areas, including crawl spaces, that are below the ~~design flood~~ elevation required in Section R322.2.1 shall:

1. Be used solely for parking of vehicles, building access or storage.

2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R322.2.2.1:

   2.1. The total net area of nonengineered openings shall be not less than 1 square inch (645 mm2) for each square foot (0.093 m2) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the construction documents shall include a statement by a registered design professional that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.

   2.2. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.

   2.3. The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.

R322.2.2.1 Installation of openings. The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a building has more than one enclosed area ~~below the design flood elevation~~, each area shall have openings.

2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening.

3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

R322.3.2 Elevation requirements.

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.

2. Basement floors that are below grade on all sides are prohibited.

3. The use of fill for structural support is prohibited.

4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

5. Walls and partitions enclosing areas below the ~~design flood~~ elevation required in this section shall meet the requirements of Sections R322.3.5 and R322.3.6.

R322.3.5 Walls below ~~design flood~~ required elevation. Walls and partitions are permitted below the ~~elevated floor~~ elevation required in Section R322.3.2, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and

2. Are constructed with insect screening or open lattice; or

3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or

4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design, the construction documents shall include documentation prepared and sealed by a registered design professional that:

   4.1. The walls and partitions below the ~~design flood~~ required elevation have been designed to collapse from a water load less than that which would occur during the base flood.

4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural building components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.

5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R322.2.2, Item 2.

R322.3.6 Enclosed areas below ~~design flood~~ required elevation. Enclosed areas below the ~~design flood~~ elevation required in Section R322.3.2 shall be used solely for parking of vehicles, building access or storage.

R322.3.7 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open risers and guards.

2. Stairways and ramps not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the building or structure, including foundation.

3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.

4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the building or structure, including foundation.

Areas below stairways and ramps shall not be enclosed with walls below the ~~design flood~~ elevation required in Section R322.3.2 unless such walls are constructed in accordance with Section R322.3.5.

Code Change No: RB141-19

Original Proposal

Section(s): R309.3, R322.1.6, R322.2.1, R322.2.2, R322.2.2.1, R322.3.2, R322.3.5, R322.3.6, R322.3.7

Proponents: Gregory Wilson, representing Federal Emergency Management Agency (gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, on behalf of Federal Emergency Management Agency, representing Federal Emergency Management Agency (rcquinn@earthlink.net)

2018 International Residential Code

Revise as follows:

R309.3 Flood hazard areas.

For buildings located in flood hazard areas as established by Table R301.2(1), garage floors shall be one of the following:

1. Elevated to or above the ~~design flood~~ required lowest floor elevation as determined in accordance with Section R322.
2. Located below the ~~design flood~~ required lowest floor elevation provided that the floors are at or above *grade* on not less than one side, are used solely for parking, building access or storage, meet the requirements of Section R322 and are otherwise constructed in accordance with this code.

R322.1.6 Protection of mechanical, plumbing and electrical systems. Electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall be located at or above the elevation required in Section R322.2 or R322.3. If replaced as part of a substantial improvement, electrical systems, *equipment* and components; heating, ventilating, air-conditioning and plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* shall meet the requirements of this section. Systems, fixtures, and *equipment* and components shall not be mounted on or penetrate through walls intended to break away under flood loads.

> **Exception:** Locating electrical systems, *equipment* and components; heating, ventilating, air-conditioning; plumbing *appliances* and plumbing fixtures; *duct systems*; and other service *equipment* is permitted below the elevation required in Section R322.2 or R322.3 provided that they are designed and installed to prevent water from entering or accumulating within the components and to resist hydrostatic and hydrodynamic loads and stresses, including the effects of buoyancy, during the occurrence of flooding to the ~~design flood~~ required elevation in accordance with ASCE 24. Electrical wiring systems are permitted to be located below the required elevation provided that they conform to the provisions of the electrical part of this code for wet locations.

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height above the highest adjacent grade of not less than the

depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.

3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.

Exception: Enclosed areas below the ~~design flood~~ elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R322.2.2.

R322.2.2 Enclosed area below ~~design flood~~ required elevation. Enclosed areas, including crawl spaces, that are below the ~~design flood~~ elevation required in Section R322.2.1 shall:

1. Be used solely for parking of vehicles, building access or storage.
2. Be provided with flood openings that meet the following criteria and are installed in accordance with Section R322.2.2.1:
   2.1. The total net area of nonengineered openings shall be not less than 1 square inch (645 mm2) for each square foot (0.093 m2) of enclosed area where the enclosed area is measured on the exterior of the enclosure walls, or the openings shall be designed as engineered openings and the construction documents shall include a statement by a registered design professional that the design of the openings will provide for equalization of hydrostatic flood forces on exterior walls by allowing for the automatic entry and exit of floodwaters as specified in Section 2.7.2.2 of ASCE 24.
   2.2. Openings shall be not less than 3 inches (76 mm) in any direction in the plane of the wall.
   2.3. The presence of louvers, blades, screens and faceplates or other covers and devices shall allow the automatic flow of floodwater into and out of the enclosed areas and shall be accounted for in the determination of the net open area.

R322.2.2.1 Installation of openings. The walls of enclosed areas shall have openings installed such that:

1. There shall be not less than two openings on different sides of each enclosed area; if a building has more than one enclosed area ~~below the design flood elevation~~, each area shall have openings.
2. The bottom of each opening shall be not more than 1 foot (305 mm) above the higher of the final interior grade or floor and the finished exterior grade immediately under each opening.
3. Openings shall be permitted to be installed in doors and windows; doors and windows without installed openings do not meet the requirements of this section.

R322.3.2 Elevation requirements.

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
2. Basement floors that are below grade on all sides are prohibited.
3. The use of fill for structural support is prohibited.
4. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.
5. Walls and partitions enclosing areas below the ~~design flood~~ elevation required in this section shall meet the requirements of Sections R322.3.5 and R322.3.6.

R322.3.5 Walls below ~~design flood~~ required elevation. Walls and partitions are permitted below the ~~elevated floor~~ elevation required in Section R322.3.2, provided that such walls and partitions are not part of the structural support of the building or structure and:

1. Electrical, mechanical and plumbing system components are not to be mounted on or penetrate through walls that are designed to break away under flood loads; and
2. Are constructed with insect screening or open lattice; or
3. Are designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Such walls, framing and connections shall have a resistance of not less than 10 (479 Pa) and not more than 20 pounds per square foot (958 Pa) as determined using allowable stress design; or
4. Where wind loading values of this code exceed 20 pounds per square foot (958 Pa), as determined using allowable stress design, the construction documents shall include documentation prepared and sealed by a registered design professional that:
   - 4.1. The walls and partitions below the ~~design flood~~ required elevation have been designed to collapse from a water load less than that which would occur during the base flood.
   - 4.2. The elevated portion of the building and supporting foundation system have been designed to withstand the effects of wind and flood loads acting simultaneously on structural and nonstructural building components. Water-loading values used shall be those associated with the design flood. Wind-loading values shall be those required by this code.
5. Walls intended to break away under flood loads as specified in Item 3 or 4 have flood openings that meet the criteria in Section R322.2.2, Item 2.

R322.3.6 Enclosed areas below ~~design flood~~ required elevation. Enclosed areas below the ~~design flood~~ elevation required in Section R322.3.2 shall be used solely for parking of vehicles, building access or storage.

R322.3.7 Stairways and ramps. Stairways and ramps that are located below the lowest floor elevations specified in Section R322.3.2 shall comply with one or more of the following:

1. Be designed and constructed with open or partially open risers and guards.
2. Stairways and ramps not part of the required means of egress shall be designed and constructed to break away during design flood conditions without causing damage to the building or structure, including foundation.
3. Be retractable, or able to be raised to or above the lowest floor elevation, provided that the ability to be retracted or raised prior to the onset of flooding is not contrary to the means of egress requirements of the code.
4. Be designed and constructed to resist flood loads and minimize transfer of flood loads to the building or structure, including foundation.

Areas below stairways and ramps shall not be enclosed with walls below the ~~design flood~~ elevation required in Section R322.3.2 unless such walls are constructed in accordance with Section R322.3.5.

Reason: The primary aspect of elevated homes in flood hazard areas that contributes to reducing damage is the elevation of the lowest floor (R322.2.1) or lowest horizontal structural member of the lowest floor in Zone V and Coastal A Zones (R322.3.2) relative to the base flood elevation. The higher the floor, the lower the risk (and the lower are NFIP flood insurance premiums). To ensure the same level of protection is applied to all aspects of dwellings, Section R322.1.6 requires mechanical, plumbing and electrical equipment to be located at or above the required elevations, and R322.1.8 requires use of flood damage-resistant materials below the required elevations. This same level of protection should apply to enclosures and walls below the required elevations. Currently, the level of protection for enclosures and walls is at the design flood elevation, which may be lower than the lowest floor elevations required in R322.2.1 and R322.3.2.

This proposal is consistent with ASCE 24, in which each table specifying elevations refers not to the elevation of the flood, but the required elevation of the lowest floor (ow lowest horizontal structural member of the lowest floor). This proposal is consistent with the NFIP regulations which, in Section 60.3(c)(5) specifies.... "fully enclosed areas below the lowest floor..." and Section 60.3(e)(5) which specifies...."space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls ...".

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Most enclosures below elevated buildings in flood hazard areas are constructed with all elements required for enclosures applied below the elevated lowest floor, thus no change in cost of construction. There may be a slight increase in cost in those rare situations where someone determines the DFE/BFE and "precisely" applies the regulations up to that elevation rather than up to the actual elevation of the lowest floor.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Modify as follows:

Committee Reason: This takes out "design flood" and puts in "required elevation," but does not change technical requirements. The proposal is consistent with ASCE 24. (Vote: 7-4)

Assembly Action: **None**

Public Comments

Public Comment 2:

Gary Ehrlich, representing National Association of Home Builders (gehrlich@nahb.org) requests As Modified by Public Comment

Modify as follows:

2018 International Residential Code

R309.3 Flood hazard areas. Garages and carports ~~For buildings~~ located in flood hazard areas as established by Table R301.2(1) shall be constructed in accordance with Section R322., ~~garage floors shall be one of the following:~~

~~1. Elevated to or above the required lowest floor elevation as determined in accordance with Section R322.~~
~~2. Located below the required lowest floor elevation provided that the floors are at or above grade on not less than one side, are used solely for parking, building access or storage, meet the requirements of Section R322 and are otherwise constructed in accordance with this code.~~

R322.2.1 Elevation requirements.

1. Buildings and structures in flood hazard areas, including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
2. In areas of shallow flooding (AO Zones), buildings and structures shall have the lowest floor (including basement) elevated to a height above the highest adjacent grade of not less than the depth number specified in feet (mm) on the FIRM plus 1 foot (305 mm), or not less than 3 feet (915 mm) if a depth number is not specified.
3. Basement floors that are below grade on all sides shall be elevated to or above base flood elevation plus 1 foot (305 mm), or the design flood elevation, whichever is higher.
4. Garage and carport floors shall comply with one of the following:
    - 4.1. They shall be elevated to or above the elevations required in Item 1 or Item 2, as applicable.
    - 4.2. They shall be at or above grade on not less than one side. Where a garage or carport is enclosed by walls, the garage or carport shall be used solely for parking, building access or storage.

Exception: Enclosed areas below the elevation required in this section, including *basements* with floors that are not below *grade* on all sides, shall meet the requirements of Section R322.2.2.

R322.3.2 Elevation requirements.

1. Buildings and structures erected within coastal high-hazard areas and Coastal A Zones, shall be elevated so that the bottom of the lowest horizontal structural members supporting the lowest floor, with the exception of piling, pile caps, columns, grade beams and bracing, is elevated to or above the base flood elevation plus 1 foot (305 mm) or the design flood elevation, whichever is higher.
2. Basement floors that are below grade on all sides are prohibited.
3. Garages used solely for parking, building access or storage, and carports, shall comply with Item 1, or shall be at or above grade on not less than one side and, if enclosed with walls, such walls shall comply with Item 6.

4~~3~~. The use of fill for structural support is prohibited.

5~~4~~. Minor grading, and the placement of minor quantities of fill, shall be permitted for landscaping and for drainage purposes under and around buildings and for support of parking slabs, pool decks, patios and walkways.

6~~5~~. Walls and partitions enclosing areas below the elevation required in this section shall meet the requirements of Sections R322.3.5 and R322.3.6.

Commenter's Reason: The purpose of this public comment is to address potential confusion introduced by relating the location of a garage or carport floor to the lowest floor elevation determined in accordance with Section R322.

Garages and carports can be either attached in part or in whole to an adjacent dwelling or detached and completely independent of the dwelling. In all cases, they can be constructed such that the garage or carport floor or slab is at or above the elevation required by R322. The garage or carport floor may be elevated to the same level as the lowest floor of an attached or adjacent dwelling, or to another level that is still above the BFE+1 or DFE.

However, most garages and carports are only used for parking, building access or storage, and thus the floor of the garage or carport - generally a concrete slab on grade - is permitted by the NFIP to be below the BFE or DFE as long as the garage or carport floor is above grade on not less than one side. In this case, the key elevation in question is that of the finished grade around the carport or garage. There is no sense in relating the placement of the carport or garage slab to the lowest floor elevation of the adjacent house, which may be several feet higher and accessed up a set of steps or ramp.

Further, there appears to be no particular reason why flood elevation requirements for garages and carports are "parked" in Section R309, away from the rest of the flood resistant construction requirements. Hence, this comment relocates the elevation requirements to the appropriate sections of R322 (R322.2.1 for Zone A and R322.2.2 for Zone V/Coastal A Zone), leaving a pointer behind in R309. In doing so, this allows for rewriting the elevation requirements to be more clear, using the opportunity to parallel the standard elevation requirement (e.g. R322.2.1 Item 1) and the requirement based on surrounding grade (e.g. R322.2.1 Item 2). This also creates a similar construct to the way ASCE 24 Section 9.2 presents requirements for attached and detached garages and carports.

Cost Impact: The net effect of the public comment and code change proposal will increase the cost of construction
As noted in the proponent's original cost impact statement, the changes in RB141 would increase the cost of construction if a builder is using the DFE or BFE itself in applying enclosure requirements, rather than the actual lowest floor elevation which may be a few feet higher. The public comment could reduce the cost impact slightly by clarifying the requirements of the NFIP and IRC as they relate to where a garage or carport is allowed to be below the DFE or BFE+1.

Final Action

RB141-19 **AMPC1**

E8718/RB153-19

20

Date Submitted	2/10/2021	**Section**	327	**Proponent**	Mo Madani
Chapter	3	**Affects HVHZ**	No	**Attachments**	Yes
TAC Recommendation	Pending Review				
Commission Action	Pending Review			**Staff Classification**	Correlates Directly

Comments

General Comments **Yes**

Related Modifications

R327

FBC -R/R328

Summary of Modification

The code change replaces the term Stationary Battery Storage System with Energy Storage Systems (ESS) throughout the document and the adds Section R327.6 for commissioning requirements as part of the installation of ESS.

Rationale

The purpose of this proposal is two fold. First it replaces the term Stationary Battery Storage System with Energy Storage Systems (ESS) throughout the document. The existing term is from older editions of the IFC and legacy codes and based on older concepts. The new term suggested is the industry recognized term and is what both the IFC and NFPA 855 Energy Storage Systems use to identify these systems.

The second item is the addition of R327.6 for commissioning requirements as part of the installation of ESS. These systems are new technology and intricate. Commissioning is necessary to ensure a proper installation and proper operation of the systems once installed. This requirement is consistent with requirements added to the IFC for R-3 and R-4 Group occupancies and NFPA 855 requirements for one- and two-family homes and townhouses.

Usually these systems are added to an existing dwelling by the current owner. In the rare case a system is installed as part of construction of a custom home, new Section R327.6.1 provides for the handoff of the commissioning paperwork to the new owner after closing. This is consistent with what is done for the manufacturer's paperwork for other appliances and for fire alarms systems.

Comment Period History

E8718-G1

Proponent Lee Arsenault - RCCI\ **Submitted** 6/29/2021 **Attachments** No

Comment:

This modification could have a cost impact depending on how it is enforced.

ORIGINAL

AM - APPROVED AS MODIFIED

SECTION R202
DEFINITIONS

Delete without substitution:

~~**[RB] BATTERY SYSTEM, STATIONARY STORAGE.** A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical *equipment* designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.~~

Add new definition as follows:

[RB] Energy Storage Systems (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

Revise as follows:

SECTION R327
~~STATIONARY~~ ENERGY STORAGE ~~BATTERY~~ SYSTEMS

R327.1 General.~~*Stationary storage battery system*~~ *ESS* shall comply with the provisions of this section.

R327.2 Equipment listings.~~*Stationary storage battery systems*~~ *ESS* shall be *listed* and *labeled* for residential use in accordance with UL 9540.

Exceptions:

1. **Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.**
2. **Battery systems that are an integral part of an electric vehicle are allowed provided that the installation complies with Section 625.48 of NFPA 70.**
3. **Battery systems less than 1 kWh (3.6 megajoules).**

R327.3 Installation.~~*Stationary storage battery systems*~~ *ESS* shall be installed in accordance with the manufacturer's instructions and their *listing,* if applicable, and shall not be installed within the habitable space of a dwelling unit.

R327.4 Electrical installation.~~*Stationary storage battery systems*~~ *ESS* shall be installed in accordance with NFPA 70. Inverters shall be *listed* and *labeled* in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters listed for utility interaction.

R327.5 Ventilation.Indoor installations of ~~*stationary storage battery systems*~~ *ESS* that include batteries that produce hydrogen or other flammable gases during charging shall be provided with ventilation in accordance with Section M1307.4.

Add new text as follows:

R327.6 Commissioning.ESS shall be commissioned as follows:

1. Verify that the system is installed in accordance with the approved plans and manufacturer's instructions and is operating properly.

2. Provide a copy of the manufacturer's installation, operation, maintenance, and decommissioning instructions provided with the listed system.
3. Provide training on the proper operation and maintenance of the system to the system owner.
4. Provide a label on the installed system containing the contact information for the qualified maintenance and service providers.

R327.6.1 Installation prior to closing.Where the system is installed in a one- or two-family dwelling or townhouse that is owned by the builder and has yet to be sold, commissioning shall be conducted as outlined in Section R327.6, and the builder shall then transfer the required information in Section R327.6 to the home owner when the property is transfered to the owner at the closing.

Revise as follows:

~~R327.6~~ R327.7 Protection from impact.*~~Stationary storage battery systems~~* *ESS* installed in a location subject to vehicle damage shall be protected by approved barriers.

MODIFICATION

Committee Modification:

R327.6 ~~Commissioning~~ Documentation and labeling. ~~ESS shall be commissioned as follows~~ The following information shall be provided:

~~1. Verify that the system is installed in accordance with the approved plans and manufacturer's instructions and is operating properly.~~

1.~~2. Provide a~~ A copy of the manufacturer's installation, operation, maintenance, and decommissioning instructions shall be provided to the owner ~~with the listed system~~ or placed in a conspicuous location near the ESS equipment.

~~3. Provide training on the proper operation and maintenance of the system to the system owner.~~

2.~~4. Provide a~~ A label shall be provided on the installed system containing the contact information for the qualified maintenance and service providers.

~~**R327.6.1 Installation prior to closing.** Where the system is installed in a one- or two-family dwelling or townhouse that is owned by the builder and has yet to be sold, commissioning shall be conducted as outlined in Section R327.6, and the builder shall then transfer the required information in Section R327.6 to the home owner when the property is transfered to the owner at the closing.~~

Code Change No: RB153-19

Original Proposal

Section(s): SECTION R202, [RB] 202, 202 (New), SECTION R327, R327.1, R327.2, R327.3, R327.4, R327.5, R327.6 (New), R327.6.1 (New), R327.7

Proponents: Robert Davidson, Davidson Code Concepts, LLC, representing Tesla, USA (rjd@davidsoncodeconcepts.com); Kevin Reinertson, representing Riverside County Fire Department (kevin.reinertson@fire.ca.gov); Jack Applegate, Northwest Code Professionals, representing City of Clatskanie, Oregon (jacka@nwcodepros.com)

2018 International Residential Code

SECTION R202
DEFINITIONS

Delete without substitution:

~~[RB] BATTERY SYSTEM, STATIONARY STORAGE.~~ ~~A rechargeable energy storage system consisting of electrochemical storage batteries, battery chargers, controls and associated electrical *equipment* designed to provide electrical power to a building. The system is typically used to provide standby or emergency power, an uninterruptable power supply, load shedding, load sharing or similar capabilities.~~

Add new definition as follows:

[RB] Energy Storage Systems (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

Revise as follows:

SECTION R327
~~STATIONARY~~ ENERGY STORAGE ~~BATTERY~~ SYSTEMS

R327.1 General. ~~*Stationary storage battery system*~~ *ESS* shall comply with the provisions of this section.

R327.2 Equipment listings. ~~*Stationary storage battery systems*~~ *ESS* shall be *listed* and *labeled* for residential use in accordance with UL 9540.

Exceptions:

1. Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.
2. Battery systems that are an integral part of an electric vehicle are allowed provided that the installation complies with Section 625.48 of NFPA 70.
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R327.5 Ventilation. Indoor installations of ~~*stationary storage battery systems*~~ *ESS* that include batteries that produce hydrogen or other flammable gases during charging shall be provided with ventilation in accordance with Section M1307.4.

Add new text as follows:

R327.6 Commissioning. ESS shall be commissioned as follows:

1. Verify that the system is installed in accordance with the approved plans and manufacturer's instructions and is operating properly.
2. Provide a copy of the manufacturer's installation, operation, maintenance, and decommissioning instructions provided with the listed system.
3. Provide training on the proper operation and maintenance of the system to the system owner.
4. Provide a label on the installed system containing the contact information for the qualified maintenance and service providers.

R327.6.1 Installation prior to closing. Where the system is installed in a one- or two-family dwelling or townhouse that is owned by the builder and has yet to be sold, commissioning shall be conducted as outlined in Section R327.6, and the builder shall then transfer the required information in Section R327.6 to the home owner when the property is transfered to the owner at the closing.

Revise as follows:

~~R327.6~~ R327.7 Protection from impact. ~~*Stationary storage battery systems*~~ *ESS* installed in a location subject to vehicle damage shall be protected by approved barriers.

Reason: The purpose of this proposal is two fold. First it replaces the term Stationary Battery Storage System with Energy Storage Systems (ESS) throughout the document. The existing term is from older editions of the IFC and legacy codes and based on older concepts. The new term suggested is the industry recognized term and is what both the IFC and NFPA 855 Energy Storage Systems use to identify these systems.

The second item is the addition of R327.6 for commissioning requirements as part of the installation of ESS. These systems are new technology and intricate. Commissioning is necessary to ensure a proper installation and proper operation of the systems once installed. This requirement is consistent with requirements added to the IFC for R-3 and R-4 Group occupancies and NFPA 855 requirements for one- and two-family homes and townhouses.

Usually these systems are added to an existing dwelling by the current owner. In the rare case a system is installed as part of construction of a custom home, new Section R327.6.1 provides for the handoff of the commissioning paperwork to the new owner after closing. This is consistent with what is done for the manufacturer's paperwork for other appliances and for fire alarms systems.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This proposed change does not impact the cost of construction of one- or two-family dwellings and townhouses. ESS are specialty systems typically installed in an existing dwelling by the current owner. In the rare case that a new custom home owner desires installation of ESS as part of the construction of the custom home, these requirements impact the cost of the ESS portion of the installation not the home itself. These requirements will increase the cost of installation of ESS.

Report of Committee Action Hearings

Committee Action: **Approved as Modified**

Committee Modification:

R327.6 ~~Commissioning~~ Documentation and labeling. ~~ESS shall be commissioned as follows~~ The following information shall be provided:

1. ~~Verify that the system is installed in accordance with the approved plans and manufacturer's instructions and is operating properly.~~

1.~~2. Provide a~~ A copy of the manufacturer's installation, operation, maintenance, and decommissioning instructions shall be provided to the owner ~~with the listed system~~ or placed in a conspicuous location near the ESS equipment.
~~3. Provide training on the proper operation and maintenance of the system to the system owner.~~
2.~~4. Provide a~~ A label shall be provided on the installed system containing the contact information for the qualified maintenance and service providers.

~~**R327.6.1 Installation prior to closing.** Where the system is installed in a one- or two-family dwelling or townhouse that is owned by the builder and has yet to be sold, commissioning shall be conducted as outlined in Section R327.6, and the builder shall then transfer the required information in Section R327.6 to the home owner when the property is transfered to the owner at the closing.~~

Committee Reason: This proposal changes the definition and the use of the term "energy storage systems" and adds labeling requirements.

The modification removes commissioning and clarifies what is needed to be done in terms of manufacturer's installation instructions and providing equipment information to the buyer.

(Vote: 11-0)

Assembly Action: **None**

Final Action

RB153-19 **AM**