Date: June 28, 2023

Code/Standard Title: ***NFPA 70® – National Electrical Code®***

CODE/STANDARD EVALUATION

TITLE: Technical Evaluation of the Changes in *NFPA 70* between 2020 and 2023 Editions

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1. DESCRIPTION

10 CFR 851 - "DOE Worker Health and Safety Program", as amended by Technical Amendment dated 12/18/2017, requires that the 2017 edition of *NFPA 70 - "National Electrical Code" (NEC)* be utilized.

The purpose of this evaluation is to document the acceptability of the changes introduced in 2023 edition of *NFPA 70* as compared to the 2020 edition and to identify and evaluate the impact of the changes to the safety and health of workers. In general, most of the following revisions are not included in the Comparison Table (Attachment #2):

- sections of the *NEC* that deal strictly with residential, health care installations, or systems not in use in industrial applications,
- majority of editorial or usability changes, clarifications, relocations, removal of redundancies, or vague, unenforceable, or inconsistent language, additions of definitions, rearrangement of sections and related cross-reference revisions, or changes related to bringing the code in alignment with the *NEC* Style Manual,
- changes addressing prohibition of use of reconditioned equipment, introduced in multiple articles of the code
- changes adding a requirement for a particular type of equipment or material to be listed,
- changes to voltage level applicability from 600 V to 1000 V (consistent with the changes introduced in previous editions of the *NEC*),
- changes to cross-references to other Sections,
- references to national consensus standards or updating edition dates.

Articles with no changes or with changes falling into one of the above categories are not listed. Informational Notes and Informative Annexes were not evaluated as they are not part of the enforceable Code requirements.

2. TECHNICAL JUSTIFICATION

The attached comparison was prepared by Andrew Drutel (SRNS, LLC) and reviewed by David Hawver (SRNS, LLC).

Attachment #2 to this document provides comparisons of changes that were made to 2020 edition of the *NEC* in 2023 edition of the code. Each line item listed in the "Comparison Table" has been reviewed and rated for the impact on worker safety. A rating of "1" (editorial), "2" (technical improvement), or "3" (potential safety consequence) has been assigned for each item.

Any item with a ranking of "3" requires additional justification. Examples of the three ratings are provided below.

1. Editorial Change – No impact to worker health or safety
   Example: Adding a metrication reference.

2. Technical Improvement – Addition, enhancement, or change in methodology or acceptance criteria that does not degrade worker safety when compared to the previous edition.
   Example: Adding requirements for equipment grounding for lighting switches supplied by a general-purpose branch circuit.

3. Potential Safety Consequence – Changes or revisions that potentially make the electrical installation less robust and could affect personnel safety. A ranking of "3" requires additional justification or further action.
   Example: Change in an overcurrent protection of a conductor or equipment which could result in reduced margin of safety.

As demonstrated in Attachment #2, there is only one subsection in the *NFPA 70, National Electrical Code* in the 2023 Edition that could present adverse impact to worker health or safety (rated "3", as described above). This subsection has not been substantially changed between 2020 and 2023 editions. All other provisions of the 2023 edition are at least as protective as provided in 2020 edition of the *NEC*.

Subsection 700.12(H)(2)(3)c addresses requirements for individual emergency lighting units, which are required to illuminate means of egress in case of loss of general area illumination due to a normal power loss. The following is the revised text, per *NFPA 70, National Electrical Code*, 2023 Edition (only the relevant portion is quoted):

> 700.12 General Requirements
> (H) Battery-Equipped Emergency Luminaires
> (2) Installation
> (3) The branch circuit feeding the battery-equipped emergency luminaire shall be one of the following:
> a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches.
> b. The same or a different branch circuit as that serving the normal lighting in the area if that circuit is equipped with means to monitor the status of that area's normal lighting branch circuit ahead of any local switches.
> c. **A separate branch circuit originating from the same panelboard as one or more normal lighting circuits. This separate branch circuit disconnecting means shall be provided with a lock-on feature.**
> [emphasis added]

The change in this subsection, originally introduced in the 2020 edition of the code, will result in an unsafe condition, as described herein and in Ref. 6. Opening of a branch circuit breaker in an area where general lighting is served by a single branch circuit will result in a loss of general

lighting, with emergency lighting unit equipment not activated if not fed from the same branch circuit. This is not consistent with *NFPA 101, Life Safety Code*, 2021, Section 7.9.2.3(2) which states:

> 7.9.2.3 The emergency lighting system shall be arranged to provide the required illumination automatically in the event of any interruption of normal lighting due to any of the following:
> (1) Failure of a public utility or other outside electrical power supply
> (2) Opening of a circuit breaker or fuse
> (3) Manual act(s), including accidental opening of a switch controlling normal lighting facilities

This conflict between *NFPA 101-2021* and *NFPA 70-2020* (edition of *NFPA 70* current at the time *NFPA 101-2021* was published) is recognized in the enhanced content commentary to *NFPA 101-2021,* which states:

> "The emergency lighting provisions of 7.9.2.3 are more stringent than those in *NFPA70-2020) – National Electrical Code."*

Furthermore, this potentially unsafe condition created when only one circuit feeds normal lighting in an area, with battery-operated emergency luminaires fed from a separate circuit, is also recognized in the *National Electrical Code 2023 Handbook* commentary which states:

> "Unit equipment is intended to provide illumination for the area where it is installed. For instance, if an emergency luminaire is in a corridor, connecting it to the branch circuit supplying the normal corridor lights (on the line side of any switching arrangements) provides the most reliable emergency lighting arrangement. If the normal lighting circuit power is interrupted or if there is a larger-scale power outage, the unit automatically energizes the unit lamps, restoring emergency illumination to the corridor.
> **A separate circuit is permitted for unit equipment as noted in 700.12(H)(2)(3)(c). It should be noted that under this condition, failure of the normal corridor circuit would not result in operation of the unit equipment and the corridor would remain dark unless there are multiple normal lighting circuits supplying the corridor.**"
> [emphasis added]

It is recommended that the text in subsection 700.12(H)(2)(3)c. of *NFPA 70-2023* be replaced with the following wording based on *NFPA 70-2017*, Subsection 700.12(F)(2)(3)(b) (added/revised text shown in bold):

> (3) The branch circuit feeding the battery-equipped emergency luminaire shall be one of the following:
> a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches.

b. The same or a different branch circuit as that serving the normal lighting in the area if that circuit is equipped with means to monitor the status of that area's normal lighting branch circuit ahead of any local switches.

c. A separate branch circuit originating from the same panelboard as **the normal lighting circuits, where the normal lighting is served by a minimum of three normal branch circuits that are not part of a multiwire branch circuit.** This separate branch circuit disconnecting means shall be provided with a lock-on feature.

3. GENERAL NOTES

1. The Comparison Table (Attachment #2) does not represent all changes potentially having impact on future installations. Refer to the *NEC* - 2023 for the full extent of the changes introduced in this new edition of the code.
2. In some cases, text of a particular revised section was truncated, capturing only portion of the text relevant to a particular change. New Articles or Articles rearranged in their entirety are not copied in the Comparison Table.
3. The following Tentative Interim Amendments were considered in this evaluation: TIA 23-1 through TIA 23-10.
4. The following Errata were considered in this evaluation: Errata 70-23-1 through 70-23-4.
5. This document shall be considered when adopting 2023 edition of the *National Electrical Code* for use.

4. REFERENCES

1. 10 CFR 851, Worker Safety and Health Program (including Technical Amendment dated 12/18/2017)
2. *NFPA 70, National Electrical Code* (2017, 2020, and 2023 editions)
3. *NFPA 101*, Life Safety Code (2021 edition)

5. ATTACHMENTS

1. Letter, K. Bigda (*NFPA*) to A. Drutel (SRNS), dated December 14, 2022
2. Comparison Table

NATIONAL FIRE PROTECTION ASSOCIATION

The leading information and knowledge resource on fire, electrical and related hazards

SENT VIA EMAIL
andrew.drutel@srs.gov

December 14, 2022

Andrew M. Drutel, P.E.
Savannah River Nuclear Solutions
Savannah River Site
Building 730-2B, Rm. 217
Aiken, SC 29808

Re: Requests for NFPA® Material – Updated Permission Letter

Dear Mr. Drutel:

We are writing in response to your request on behalf of Savannah River Nuclear Solutions ("**SRNS**") to use certain material which is the intellectual property of the National Fire Protection Association® ("**NFPA®**"). Specifically, SNRS has requested NFPA's permission to use excerpts from the NFPA 70® 2020 and 2023 editions of the National Electrical Code® ("**NEC®**")(collectively, the "**NFPA Material**") to compare the two editions of the NEC and evaluate technical changes, additions of new Articles and changes related to industrial applications, with the goals of: 1) demonstrating to SNRS' customer, Department of Energy ("**DOE**"), that the 2023 edition of the NEC is as protective to the worker safety as the 2020 edition of the NEC; and 2) using the 2023 edition of the NEC at Savannah River Site ("**SRS**") in September 2023.

It is our understanding that SRNS' proposed comparison and evaluation document would consist of technical changes only from the 2020 and 2023 editions of the NEC and a commentary regarding acceptability of the individual changes for use at SRS. For changes selected for evaluation, the exact text from the 2020 and 2023 editions will be reflected to help readers understand the nature and the impact of the specific change. We also understand SNRS will quote changes which are applicable to industrial uses or settings, and will exclude other changes, such as editorial changes, rearrangement of articles, changes to articles which are not applicable to the work at SRS (e.g., residential installations, carnivals, fairs, motion picture locations, pipe organs, swimming pools, etc.), and changes to certain parts of the Code, such as informational notes. Furthermore, new articles will not be quoted but will be listed by title only.

NFPA is willing to grant SNRS' request for permission to use the NFPA Material with the following terms and conditions:

1. NFPA sent (via a secure, password-protected email) to SNRS with a Word document containing the technical changes between the 2020 and 2023 editions of the NEC ("**Technical Changes**"). SNRS will review the Technical Changes and will provide NFPA an Excel spreadsheet containing a list of NEC Articles which SNRS would like to receive from NFPA. NFPA will then provide SNRS with the NEC Articles requested (via a secure, password-protected email) ("**NEC Articles**"); however, NFPA will provide titles only for any new NEC Articles.

2. SNRS may set forth the NFPA Material referenced in its evaluation and comparison document only this one time for the goals stated above and at no other time and for no other purpose. SNRS may copy and paste such NFPA Material. Except as set forth herein, SNRS may not reproduce, distribute, share or sell the NFPA Material and may not use the NFPA Material in any other manner, form or format, except as noted herein.

3. Pursuant to this agreement, SRNS is authorized to share the evaluation and comparison document with the following:
    a. Department of Energy, SRS Field Office
    b. Members of the Energy Facility Contractors Group (EFCOG)

4. SRNS agrees to include the following credit statement where the NFPA Material appears:

    "Material reprinted from NFPA 70®, 2020 edition and NFPA 70®, 2023 edition, *National Electrical Code*®, Copyright © 2019 and 2022, respectively, with permission from National Fire Protection Association®, Quincy, MA 02169, which owns all rights thereto. This reprinted material is not the complete and official position of the NFPA® on the referenced subject, which is represented only by the standard in its entirety. For a full copy, please go to www.nfpa.org."

5. Upon creation and prior to publication, SNRS shall send to NFPA a copy of SNRS' comparison and evaluation document, including the attribution statement described herein.

6. SNRS acknowledges and agrees that, as between SNRS and NFPA, NFPA owns and has all right, title and interest to the NFPA Material, including all intellectual property rights therein, and SNRS shall not take any steps that would violate such rights.

7. All rights in the NFPA Material not expressly granted pursuant to the terms of this letter agreement are expressly reserved in their entirety to NFPA.

8. The permission granted herein is non-exclusive, non-assignable, non-transferrable, non-sublicensable and is granted pursuant to these terms and conditions. Any and all rights that may be granted herein may not be assigned or transferred to any third party without the express prior written consent of NFPA in each instance.

9. SNRS acknowledges and agrees that nothing herein is intended or shall be construed to create a relationship of agency, partnership, distributorship, joint venture, or employee-employer.

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11. On or before October 31, 2023, SNRS shall destroy all electronic files of Technical Changes and NEC Articles provided by NFPA to SNRS. Immediately after destruction, SNRS shall provide NFPA with written confirmation of such destruction.

Sincerely,

Kristin Bigda

Kristin Bigda
Director of Publication Strategy

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
Article 90	**Introduction**				
Restricted Industrial Establishment [as applied to hazardous (classified) locations]		SR-7700	Establishment with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation. (CMP-14)	Added definition. Impacts: No negative impact.	**2**
Chapter 1 General					
Article 110	**General Requirements for Electrical Installations**				
110.3(A)(8)	[Did not exist]	SR-7666	(8) Cybersecurity for network-connected life safety equipment to address its ability to withstand unauthorized updates and malicious attacks while continuing to perform its intended safety functionality	Added requirement for cybersecurity for network-connected life safety equipment. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
110.16(A)	**(A) General.** Electrical equipment, such as switchboards, switchgear, panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment.	FR-8707	**(A) General.** Electrical equipment, such as switchboards, switchgear, enclosed panelboards, industrial control panels, meter socket enclosures, and motor control centers, that is in other than dwelling units, and is likely to require examination, adjustment, servicing, or maintenance while energized, shall be field or factory marked to warn qualified persons of potential electric arc flash hazards. The marking shall meet the requirements in 110.21(B) and shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment .	Revised to add “enclosed” to “panelboard” to read as “enclosed panelboard” to clarify that arc flash labeling be applied to the exterior enclosure of a panelboard and not on the panelboard itself, which is often installed within the cabinet. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	(B) Service Equipment. In other than dwelling units, in addition to the requirements in 110.16(A), a permanent label shall be field or factory applied to service equipment rated 1200 amps or more. The label shall meet the requirements of 110.21(B) and contain the following information: (1) Nominal system voltage (2) Available fault current at the service overcurrent protective devices (3) The clearing time of service overcurrent protective devices based on the available fault current at the service equipment (4) The date the label was applied	FR-8772, SR-7704	**(B) Service Equipment and Feeder Supplied Equipment.** In other than dwelling units, in addition to the requirements in 110.16(A), a permanent arc flash label shall be field or factory applied to service equipment and feeder supplied equipment rated 1000 amperes or more. The arc flash label shall be in accordance with applicable industry practice and include the date the label was applied. The label shall meet the requirements of 110.21(B).	Revised title of section, reduced the ampacity requirements for the label to 1000 amps, removed the list format, and replaced "acceptable" with "applicable." The revision from 1200 amps to 1000 amps and inclusion of feeders increases worker's safety. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
110.17	[Did not exist]	FR-8625, SR-7732	**110.17 Servicing and Maintenance of Equipment.** Servicing and electrical preventive maintenance shall be performed by qualified persons trained in servicing and maintenance of equipment and shall comply with the following: (1) The servicing and electrical preventive maintenance shall be performed in accordance with the original equipment manufacturer's instructions and information included in the listing information, applicable industry standards, or as approved by the authority having jurisdiction. (2) The servicing and electrical preventive maintenance shall be performed using identified replacement parts that are verified under applicable product standards. The replacement parts shall comply with at least one of the following: a. Be provided by the original equipment manufacturer b. Be designed by an engineer experienced in the design of replacement parts for the type of	Added section that distinguishes between reconditioning and servicing activities and maintenance activities. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
			equipment being serviced or maintained c. Be approved by the authority having jurisdiction		
110.22(A)	**(A) General.** Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification of the circuit source that supplies the disconnecting means. The marking shall be of sufficient durability to withstand the environment involved.	FR-8583, SR-7762	**(A) General.** Each disconnecting means shall be legibly marked to indicate its purpose unless located and arranged so the purpose is evident. In other than one- or two-family dwellings, the marking shall include the identification and location of the circuit source that supplies the disconnecting means unless located and arranged so the identification and location of the circuit source is evident. The marking shall be of sufficient durability to withstand the environment involved.	Revised text to require disconnecting means to be marked with both the identification and location of the circuit source that supplies the disconnecting means unless located and arranged so the identification and location are evident. Impacts: No negative impact.	**2**
110.26	**110.26 Spaces About Electrical Equipment.** Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment.	SCR-25	**110.26 Spaces About Electrical Equipment.** Working space, and access to and egress from working space, shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment. Open equipment doors shall not impede access to and egress from the working space. Access	Revised to clarify what would be considered as impeding access to equipment. Impacts: No negative impact.	**1**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
			or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high.		
110.26(A)(4)	**(4) Limited Access.** Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply: (1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.). (2) The width of the working space shall be the width of the equipment enclosure	FR-8637	**(4) Limited Access.** Where equipment operating at 1000 volts, nominal, or less to ground and likely to require examination, adjustment, servicing, or maintenance while energized is required by installation instructions or function to be located in a space with limited access, all of the following shall apply: (1) Where equipment is installed above a lay-in ceiling, there shall be an opening not smaller than 559 mm × 559 mm (22 in. × 22 in.), or in a crawl space, there shall be an accessible opening not smaller than 559 mm × 762 mm (22 in. × 30 in.). (2) The width of the working space shall be the width of the equipment enclosure or a minimum of 762 mm (30 in.), whichever is greater.	Revised to clarify that the working depth requirement must be maintained all the way to the floor and that in no case should there be a side reach of more than 6 inches to work within the panel. Improves worker's safety. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	or a minimum of 762 mm (30 in.), whichever is greater. (3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees. (4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1). The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space.		(3) All enclosure doors or hinged panels shall be capable of opening a minimum of 90 degrees. (4) The space in front of the enclosure shall comply with the depth requirements of Table 110.26(A)(1) and shall be unobstructed to the floor by fixed cabinets, walls, or partitions. Space reductions in accordance with 110.26(A)(1)(b) shall be permitted. The maximum height of the working space shall be the height necessary to install the equipment in the limited space. A horizontal ceiling structural member or access panel shall be permitted in this space provided the location of weight-bearing structural members does not result in a side reach of more than 150 mm (6 in.) to work within the enclosure.		
110.26(A)(6)	[Did not exist]	FR-8633, FR-7803	**(6) Grade, Floor, or Working Platform.** The grade, floor, or platform in the required working space shall be kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire required depth and width of the working space.	Added requirement to maintain the grade level and flat for the full depth and width of working space required, which correlates with 110.34(A). While it was never clearly stated, having a flat and level working space is critical to electrical worker's safety. Impacts: No negative impact.	**2**
110.26(C)(3)	**(3) Personnel Doors.**	FR-8363	**(3) Personnel Doors.**	Revised to require that personnel doors open at least 90 degrees for safe egress.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.		Where equipment rated 800 amperes or more that contains overcurrent devices, switching devices, or control devices is installed and there is a personnel door(s) intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the door(s) shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.	Improves worker's safety. Impacts: No negative impact.	
110.26(E)	**(E) Dedicated Equipment Space.** All switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage. *Exception:* *Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.*	FR-8654	**(E) Dedicated Equipment Space.** All service equipment, switchboards, switchgear, panelboards, and motor control centers shall be located in dedicated spaces and protected from damage. *Exception:* *Control equipment that by its very nature or because of other rules of the Code must be adjacent to or within sight of its operating machinery shall be permitted in those locations.*	Revised to add "service equipment" to clarify that service disconnects also require dedicated equipment space and protection from damage. Impacts: No negative impact.	**2**
110.29	[Did not exist]	SR-7706	**110.29 In Sight From (Within Sight From, Within Sight).**	Added section providing details about equipment "in sight from," "within sight from," or "within sight of."	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
			Where this *Code* specifies that one equipment shall be "in sight from," "within sight from," or "within sight of" another equipment, the specified equipment shall be visible and not more than 15 m (50 ft) distant from the other.	Impacts: No negative impact.	
110.31(A)(4)	**(4) Locks.** Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.	FR-8673	**(4) Locks.** Doors shall be equipped with locks, and doors shall be kept locked, with access allowed only to qualified persons. Personnel doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.	Revised to require that personnel doors open at least 90 degrees and added Informational Note for clarity. Improves worker's safety. Impacts: No negative impact.	**2**
110.33(A)	**(A) Entrance.** At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment.	FR-8681, SR-7810	**(A) Entrance.** At least one entrance to enclosures for electrical installations as described in 110.31 not less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high shall be provided to give access to the working space about electrical equipment. Open equipment doors shall not impede access to and egress from the working space. Access or egress is impeded if one or more simultaneously opened equipment doors restrict working space access to be less than 610 mm (24 in.) wide and 2.0 m (6½ ft) high.	Revised to add the requirement that doors cannot restrict working space or impede entry or egress from working space. Improves worker's safety. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
110.33(A)(3)	**(3) Personnel Doors.** Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.	FR-8771	**(3) Personnel Doors.** Where there are personnel doors intended for entrance to and egress from the working space less than 7.6 m (25 ft) from the nearest edge of the working space, the doors shall open at least 90 degrees in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware.	Revised to require that personnel doors open at least 90 degrees and added Informational Note for clarity. Improves worker's safety. Impacts: No negative impact.	**2**
110.34(A)	**(A) Working Space.** Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed. *Exception:* *Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or*	FR-8712, SR-7811	**(A) Working Space.** Except as elsewhere required or permitted in this *Code,* equipment likely to require examination, adjustment, servicing, or maintenance while energized shall have clear working space in the direction of access to live parts of the electrical equipment and shall be not less than specified in Table 110.34(A). Distances shall be measured from the live parts, if such are exposed, or from the enclosure front or opening if such are enclosed. The grade, floor, or platform in the required working space shall be kept clear, and the floor, grade, or platform in the working space shall be as level and flat as practical for the entire depth and width of the working space.	Revised to add requirement that working space floors must be as flat and level as practicable for the full depth and width of working space required. Improves worker's safety. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.		*Exception:* *Working space shall not be required in back of equipment such as switchgear or control assemblies where there are no renewable or adjustable parts (such as fuses or switches) on the back and where all connections are accessible from locations other than the back. Where rear access is required to work on nonelectrical parts on the back of enclosed equipment, a minimum working space of 762 mm (30 in.) horizontally shall be provided.*		

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
Chapter 2 Wiring and Protection					
Article 210	**Branch Circuits**				
Article 210	**Branch Circuits**	SR-8154	**Branch Circuits Not Over 1000 Volts ac, 1500 Volts dc, Nominal**	Revised article title to align with voltage limits in Article 210. Impacts: No negative impact.	**2**
210.8(D)	**(D) Specific Appliances.** Unless GFCI protection is provided in accordance with 422.5(B)(3) through (B)(5), the outlets supplying the appliances specified in 422.5(A) shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2). Where the appliance is a vending machine as specified in 422.5(A)(5) and GFCI protection is not provided in accordance with 422.5(B)(3) or (B)(4), branch circuits supplying vending machines shall have GFCI protection in accordance with 422.5(B)(1) or (B)(2).	FR-8865, SR-7966	**(D) Specific Appliances.** GFCI protection shall be provided for the branch circuit or outlet supplying the following appliances rated 150 volts or less to ground and 60 amperes or less, single- or 3-phase: (1) Automotive vacuum machines (2) Drinking water coolers and bottle fill stations (3) High-pressure spray washing machines (4) Tire inflation machines (5) Vending machines (6) Sump pumps (7) Dishwashers (8) Electric ranges (9) Wall-mounted ovens	Revised text, converted into list format, corrected list item (3), and added items (8) through (12). Note that microwave oven circuits and outlets now require GFCI protection. Impacts: No negative impact	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
			(10) Counter-mounted cooking units (11) Clothes dryers (12) Microwave ovens		
210.18	**210.18 Rating**. Branch circuits recognized by this article shall be rated in accordance with the maximum permitted ampere rating or setting of the overcurrent device. The rating for other than individual branch circuits shall be 15, 20, 30, 40, and 50 amperes. Where conductors of higher ampacity are used for any reason, the ampere rating or setting of the specified overcurrent device shall determine the circuit rating. *Exception:* *Multioutlet branch circuits greater than 50 amperes shall be permitted to supply nonlighting outlet loads on industrial premises where conditions of maintenance and supervision ensure that only qualified persons service the equipment.*	FR-9097, SR-8039	**210.18 Rating.** Branch circuits recognized by this article shall be rated in accordance with the maximum permitted ampere rating or setting of the overcurrent device. The rating for other than individual branch circuits shall be 10, 15, 20, 30, 40, and 50 amperes. Where conductors of higher ampacity are used for any reason, the ampere rating or setting of the specified overcurrent device shall determine the circuit rating. *Exception No. 1:* *Multioutlet branch circuits greater than 50 amperes shall be permitted to supply nonlighting outlet loads in locations where conditions of maintenance and supervision ensure that only qualified persons service the equipment.* *Exception No. 2:* *Branch circuits rated 10 amperes shall not supply receptacle outlets.*	Added 10-ampere circuit to the list of recognized branch circuit ratings, allowing the use of #14 copper-clad aluminum conductors recognized elsewhere in the NEC. Revised text to broaden the applicability of Exception No. 1 by eliminating the words “industrial applications” and added Exception No. 2 to prohibit 10-ampere branch circuits from supplying receptacle outlets. Impacts: No negative impact.	**2**
210.23(A)	[Did not exist]	FR-9100	**(A) 10-Ampere Branch Circuits.** A 10-ampere branch circuit shall comply with the requirements of 210.23(A)(1) and (A)(2).	Added section to address the introduction of 10-ampere branch circuits and what will be allowed on those branch circuits.	**2**

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			(1) Loads Permitted for 10-Ampere Branch Circuits. A 10-ampere branch circuit shall be permitted to supply one or more of the following: (1) 215.15 Barriers. Barriers shall be placed such that no energized, uninsulated, ungrounded busbar or terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations in panelboards, switchboards, switchgear, or motor control centers supplied by feeder taps in 240.21(B) or transformer secondary conductors in 240.21(C) when the disconnecting device, to which the tap conductors are terminated, is in the open position. (1) Lighting outlets (2) Dwelling unit exhaust fans on bathroom or laundry room lighting circuits (3) A gas fireplace unit supplied by an individual branch circuit **(2) Loads Not Permitted for 10-Ampere Branch Circuits.**	Impacts: No negative impact.	

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			A 10-ampere branch circuit shall not supply any of the following: (1) Receptacle outlets (2) Fixed appliances, except as permitted for individual branch circuits (3) Garage door openers (4) Laundry equipment		
210.24	See Tables	FR-9190, SCR-43, SR-8154	See Tables	Added table note to address 10-ampere branch circuits and created Table 210.24(2) specifically for aluminum and copper-clad aluminum conductors. Impacts: No negative impact.	**2**
	Article 2				
215.15	[Did not exist]	FR-7688, SR-8216	**215.15 Barriers.** Barriers shall be placed such that no energized, uninsulated, ungrounded busbar or terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations in panelboards, switchboards, switchgear, or motor control centers supplied by	Added section for barriers that mirrors 230.62(C). This revision adds a new section to reduce the hazards that exist when creating an electrically safe work condition in equipment supplied by tap conductors. Improves worker's safety. Impacts: No negative impact.	**2**

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			feeder taps in 240.21(B) or transformer secondary conductors in 240.21(C) when the disconnecting device, to which the tap conductors are terminated, is in the open position.		
Article 220	**Branch-Circuit, Feeder, and Service Load Calculations**				
220.57	[Did not exist]	FR-9170, SR-8101	**220.57 Electric Vehicle Supply Equipment (EVSE) Load.** The EVSE load shall be calculated at either 7200 watts (volt-amperes) or the nameplate rating of the equipment, whichever is larger.	Added section for electric vehicle supply equipment (EVSE) and defined the load to be used in calculations. Impacts: No negative impact.	**2**
220.70	[Did not exist]	FR-9172, SR-8106	**220.70 Energy Management Systems (EMSs).** If an energy management system (EMS) is used to limit the current to a feeder or service in accordance with 750.30, a single value equal to the maximum ampere setpoint of the EMS shall be permitted to be used in load calculations for the feeder or service. The setpoint value of the EMS shall be considered a continuous load for the purposes of load calculations.	Added section for energy management systems (EMSs) allowing use of the maximum ampere setpoint of the EMS in load calculations and consider it a continuous load. Impacts: No negative impact.	**2**
220.87	**220.87 Determining Existing Loads.** The calculation of a feeder or service load for existing installations shall be permitted to use actual maximum demand to determine the	FR-9179	**220.87 Determining Existing Loads.** The calculation of a feeder or service load for existing installations shall be permitted to use actual	Revised to account for peak load shaving by renewable energy systems. Impacts: No negative impact.	**2**

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	existing load under all of the following conditions: (1) The maximum demand data is available for a 1-year period. *Exception:* *If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling*		maximum demand to determine the existing load under all of the following conditions: (1) The maximum demand data is available for a 1-year period. *Exception:* *If the maximum demand data for a 1-year period is not available, the calculated load shall be permitted to be based on the maximum demand (the highest average kilowatts reached and maintained for a 15-minute interval) continuously recorded over a minimum 30-day period using a recording ammeter or power meter connected to the highest loaded phase of the feeder or service, based on the initial loading at the start of the recording. The recording shall reflect the maximum demand of the feeder or service by being taken when the building or space is occupied and shall include by measurement or calculation the larger of the heating or cooling equipment load, and other loads that might be periodic in nature due to seasonal or similar conditions. This exception shall not be permitted if the*		

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	equipment load, and other loads that may be periodic in nature due to seasonal or similar conditions. (2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service. (3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90. *Exception:* *If the feeder or service has any renewable energy system (i.e., solar photovoltaic systems or wind electric systems) or employs any form of peak load shaving, this calculation method shall not be permitted.*		*feeder or service has a renewable energy system (i.e., solar photovoltaic or wind electric) or employs any form of peak load shaving.* (2) The maximum demand at 125 percent plus the new load does not exceed the ampacity of the feeder or rating of the service. (3) The feeder has overcurrent protection in accordance with 240.4, and the service has overload protection in accordance with 230.90.		
Article 230	**Services**				
230.43	**230.43 Wiring Methods for 1000 Volts, Nominal, or Less.** Service-entrance conductors shall be installed in accordance with the applicable requirements of this *Code* covering the type of wiring	FR-7732, SR-8241	**230.43 Wiring Methods for 1000 Volts, Nominal, or Less.** Service-entrance conductors shall be installed in accordance with the applicable requirements of this *Code* covering the type of wiring method	Revised list item (20) to require that Type TC-ER cable be identified for use as service entrance conductors and added item (21) to allow for flexible bus systems. Impacts: No negative impact.	**2**

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	method used and shall be limited to the following methods: (1) Open wiring on insulators (2) Type IGS cable (3) Rigid metal conduit (RMC) (4) Intermediate metal conduit (IMC) (5) Electrical metallic tubing (EMT) (6) Electrical nonmetallic tubing (7) Service-entrance cables (8) Wireways (9) Busways (10) Auxiliary gutters (11) Rigid polyvinyl chloride conduit (PVC) (12) Cablebus (13) Type MC cable		used and shall be limited to the following methods: (1) Open wiring on insulators (2) Type IGS cable (3) Rigid metal conduit (RMC) (4) Intermediate metal conduit (IMC) (5) Electrical metallic tubing (EMT) (6) Electrical nonmetallic tubing (7) Service-entrance cables (8) Wireways (9) Busways (10) Auxiliary gutters (11) Rigid polyvinyl chloride conduit (PVC) (12) Cablebus (13) Type MC cable		

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	(14) Mineral-insulated, metal-sheathed cable, Type MI (15) Flexible metal conduit (FMC) not over 1.8 m (6 ft) long or liquidtight flexible metal conduit (LFMC) not over 1.8 m (6 ft) long between a raceway, or between a raceway and service equipment, with a supply-side bonding jumper routed with the flexible metal conduit (FMC) or the liquidtight flexible metal conduit (LFMC) according to 250.102(A), (B), (C), and (E) (16) Liquidtight flexible nonmetallic conduit (LFNC) (17) High density polyethylene conduit (HDPE) (18) Nonmetallic underground conduit with conductors (NUCC) (19) Reinforced thermosetting resin conduit (RTRC) (20) Type TC-ER cable		(14) Mineral-insulated, metal-sheathed cable, Type MI (15) Flexible metal conduit (FMC) not over 1.8 m (6 ft) long or liquidtight flexible metal conduit (LFMC) not over 1.8 m (6 ft) long between a raceway, or between a raceway and service equipment, with a supply-side bonding jumper routed with the flexible metal conduit (FMC) or the liquidtight flexible metal conduit (LFMC) according to 250.102(A), (B), (C), and (E) (16) Liquidtight flexible nonmetallic conduit (LFNC) (17) High density polyethylene conduit (HDPE) (18) Nonmetallic underground conduit with conductors (NUCC) (19) Reinforced thermosetting resin conduit (RTRC) (20) Type TC-ER cable where identified for use as service entrance conductors (21) Flexible bus systems		

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230.71(B)	**(B) Two to Six Service Disconnecting Means.** Two to six service disconnects shall be permitted for each service permitted by 230.2 or for each set of service-entrance conductors permitted by 230.40, Exception No. 1, 3, 4, or 5. The two to six service disconnecting means shall be permitted to consist of a combination of any of the following: (1) Separate enclosures with a main service disconnecting means in each enclosure (2) Panelboards with a main service disconnecting means in each panelboard enclosure (3) Switchboard(s) where there is only one service disconnect in each separate vertical section where there are barriers separating each vertical section (4) Service disconnects in switchgear or metering centers where each disconnect is located in a separate compartment	FR-7759, FR-7798, FR-7801, FR-7800, FR-7799	**(B) Two to Six Service Disconnecting Means.** Two to six service disconnects shall be permitted for each service permitted by 230.2 or for each set of service-entrance conductors permitted by 230.40, Exception No. 1, 3, 4, or 5. The two to six service disconnecting means shall be permitted to consist of a combination of any of the following: (1) Separate enclosures with a main service disconnecting means in each enclosure (2) Panelboards with a main service disconnecting means in each panelboard enclosure (3) Switchboard(s) where there is only one service disconnect in each separate vertical section with barriers provided between each vertical section to maintain the inadvertent contact protection required in 230.62 based on access from the adjacent section(s) (4) Service disconnects in switchgear, transfer switches, or metering centers where each disconnect is located in a separate compartment	Revised list item (3) to require barriers in switchboard(s), revised item (4) to add transfer switches, added items (5) and (6), and added an exception and Informational Note. Improves worker's safety Impacts: No negative impact.	**2**

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			(5) Metering centers with a main service disconnecting means in each metering center (6) Motor control center(s) where there is only one service disconnect in a motor control center unit and a maximum of two service disconnects provided in a single motor control center with barriers provided between each motor control center unit or compartment containing a service disconnect to maintain the inadvertent contact protection required in 230.62 based on access from adjacent motor control center unit(s) or compartment(s) *Exception to (2), (3), (4), (5), and (6):* *Existing service equipment, installed in compliance with previous editions of this Code that permitted multiple service disconnecting means in a single enclosure, section, or compartment, shall be permitted to contain a maximum of six service disconnecting means.*		
230.75	**230.75 Disconnection of Grounded Conductor**. Where the service disconnecting means does not disconnect the grounded conductor from the premises wiring, other means shall be provided for this purpose in the service	FR-7741	**230.75 Disconnection of Grounded Conductor**. Where the service disconnecting means does not disconnect the grounded conductor from the premises wiring, other means shall be provided for this purpose in the service equipment. A terminal or bus to which all grounded conductors can be	Revised to replace language inadvertently removed during 2020 NEC cycle. Improve worker's safety. Impacts: No negative impact.	**2**

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	equipment. A terminal or bus to which all grounded conductors can be attached by means of pressure connectors shall be permitted for this purpose. In a multisection switchboard or switchgear, disconnects for the grounded conductor shall be permitted to be in any section of the switchboard or switchgear.		attached by means of pressure connectors shall be permitted for this purpose. In a multisection switchboard or switchgear, disconnects for the grounded conductor shall be permitted to be in any section of the switchboard or switchgear, if the switchboard or switchgear section is marked to indicate a grounded conductor disconnect is located within.		
230.82	**230.82 Equipment Connected to the Supply Side of Service Disconnect.** Only the following equipment shall be permitted to be connected to the supply side of the service disconnecting means: (1) Cable limiters. (2) Meters and meter sockets nominally rated not in excess of 1000 volts, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. (3) Meter disconnect switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or	FR-8282, SR-8253	**230.82 Equipment Connected to the Supply Side of Service Disconnect.** Only the following equipment shall be permitted to be connected to the supply side of the service disconnecting means: (1) Cable limiters. (2) Meters and meter sockets nominally rated not in excess of 1000 volts, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article **250**. (3) Meter disconnect switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current, if all metal housings and service enclosures are grounded in accordance	Revised text for clarity and to add the term “energy management system.” Added list item (12) to protect workers. This is necessary to eliminate the 10 to 100 millisecond start-up delay that the typical protective relay requires to transition from unpowered to active state. Should there be a fault upon closing the service disconnect, the protection must act immediately to clear the fault to increase the likelihood of protecting workers. Improves worker’s safety. Impacts: No negative impact.	**2**

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	greater than the available fault current, if all metal housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. A meter disconnect switch shall be capable of interrupting the load served. A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment as follows: METER DISCONNECT NOT SERVICE EQUIPMENT (4) Instrument transformers (current and voltage), impedance shunts, load management devices, surge arresters, and Type 1 surge-protective devices. (5) Conductors used to supply load management devices, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors. (6) Solar photovoltaic systems, fuel cell systems, wind electric systems, energy storage systems, or interconnected electric power production sources, if		with Part VII and bonded in accordance with Part V of Article **250**. A meter disconnect switch shall be capable of interrupting the load served. A meter disconnect shall be legibly field marked on its exterior in a manner suitable for the environment as follows: METER DISCONNECT NOT SERVICE EQUIPMENT (4) Instrument transformers (current and voltage), impedance shunts, load management devices, surge arresters, and Type 1 surge-protective devices. (5) Conductors used to supply energy management systems, circuits for standby power systems, fire pump equipment, and fire and sprinkler alarms, if provided with service equipment and installed in accordance with requirements for service-entrance conductors. (6) Solar photovoltaic systems, fuel cell systems, wind electric systems, energy storage systems, or interconnected electric power production sources, if provided with a disconnecting means listed as suitable for use as service equipment, and overcurrent protection as specified in Part VII of Article **230**.		

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	provided with a disconnecting means listed as suitable for use as service equipment, and overcurrent protection as specified in Part VII of Article 230. (7) Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided. (8) Ground-fault protection systems or Type 2 surge-protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided. (9) Connections used only to supply listed communications equipment under the exclusive control of the serving electric utility, if suitable overcurrent protection and disconnecting means are provided. For installations of equipment by the serving electric utility, a disconnecting means is not required if the supply is installed as part of a meter socket, such that access can only be gained with the meter removed. (10) Emergency disconnects in accordance with 230.85, if all metal		(7) Control circuits for power-operable service disconnecting means, if suitable overcurrent protection and disconnecting means are provided. (8)Ground-fault protection systems or Type 2 surge-protective devices, where installed as part of listed equipment, if suitable overcurrent protection and disconnecting means are provided. (9) Connections used only to supply listed communications equipment under the exclusive control of the serving electric utility, if suitable overcurrent protection and disconnecting means are provided. For installations of equipment by the serving electric utility, a disconnecting means is not required if the supply is installed as part of a meter socket, such that access can only be gained with the meter removed. (10) Emergency disconnects in accordance with **230.85**(B)(2) and (B)(3), if all metal housings and enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article **250**. (11) Meter-mounted transfer switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater		

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	housings and service enclosures are grounded in accordance with Part VII and bonded in accordance with Part V of Article 250. (11) Meter-mounted transfer switches nominally rated not in excess of 1000 volts that have a short-circuit current rating equal to or greater than the available fault current. A meter-mounted transfer switch shall be listed and be capable of transferring the load served. A meter-mounted transfer switch shall be marked on its exterior with both of the following: a. Meter-mounted transfer switch b. Not service equipment		than the available fault current. A meter-mounted transfer switch shall be listed and be capable of transferring the load served. A meter-mounted transfer switch shall be marked on its exterior with both of the following: a. Meter-mounted transfer switch b. Not service equipment (12) Control power circuits for protective relays where installed as part of listed equipment, if overcurrent protection and disconnecting means are provided.		
Article 235	**Branch Circuits, Feeders, and Services Over 1000 Volts ac, 1500 Volts dc, Nominal**				
Article 235	[Did not exist]	CC-8155, CC-8472	**Article 235**	Created new article for branch circuits, feeders, and services over 1000 Vac, 1500 Vdc, nominal, comprised of requirements from Articles 210, 215, 225, and 230. Impacts: No negative impact.	**2**
Article 240	**Overcurrent protection**				
240.4(B)	**(B) Overcurrent Devices Rated 800 Amperes or Less.**	FR-7802, SR-8283	**(B) Overcurrent Devices Rated 800 Amperes or Less.**	Revised text for clarify and to allow for adjustable OCPD to be used provided the protection does	**2**

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	The next higher standard overcurrent device rating (above the ampacity of the conductors being protected) shall be permitted to be used, provided all of the following conditions are met: (1) The conductors being protected are not part of a branch circuit supplying more than one receptacle for cord-and-plug-connected portable loads. (2) The ampacity of the conductors does not correspond with the standard ampere rating of a fuse or a circuit breaker without overload trip adjustments above its rating (but that shall be permitted to have other trip or rating adjustments). (3) The next higher standard rating selected does not exceed 800 amperes.		The next higher standard overcurrent device rating (above the ampacity of the conductors being protected) shall be permitted to be used, provided all of the following conditions are met: (1) The conductors being protected are not part of a branch circuit supplying more than one receptacle for cord-and-plug-connected portable loads. (2) The ampacity of the conductors does not correspond with the standard ampere rating of a fuse or a circuit breaker without overload trip adjustments above its rating (but that shall be permitted to have other trip or rating adjustments). (3) The next higher standard rating selected does not exceed 800 amperes. If the overcurrent protective device is an adjustable trip device installed in accordance with 240.4(B)(1), (B)(2), and (B)(3), it shall be permitted to be set to a value that does not exceed the next higher standard value above the ampacity of the conductors being protected as shown in Table 240.6(A) where restricted access in accordance with 240.6(C) is provided.	not exceed the next higher standard overcurrent device rating. Impacts: No negative impact.	
240.4(D)(1)	**(1) 18 AWG Copper.**	FR-7827	**18 AWG Copper.**	Revised to permit use of Class CF fuses.	**2**

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	7 amperes, provided all the following conditions are met: (1) Continuous loads do not exceed 5.6 amperes. (2) Overcurrent protection is provided by one of the following: a. Branch-circuit-rated circuit breakers listed and marked for use with 18 AWG copper wire b. Branch-circuit-rated fuses listed and marked for use with 18 AWG copper wire c. Class CC, Class J, or Class T fuses		• 7 amperes, provided all the following conditions are met: (1) Continuous loads do not exceed 5.6 amperes. (2) Overcurrent protection is provided by one of the following: a. Branch-circuit-rated circuit breakers listed and marked for use with 18 AWG copper conductor b. Branch-circuit-rated fuses listed and marked for use with 18 AWG copper conductor c. Class CC, Class CF, Class J, or Class T fuses	Impacts: No negative impact.	
240.4(D)(3)	**[Did not exist]**	SR-8285	**(3) 14 AWG Copper-Clad Aluminum.** 10 amperes, provided all the following conditions are met: (1) Continuous loads do not exceed 8 amperes (2) Overcurrent protection is provided by one of the following:	Added section to address copper-clad aluminum. Impacts: No negative impact.	**2**

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			a. Branch-circuit-rated circuit breakers are listed and marked for use with 14 AWG copper-clad aluminum conductor. b. Branch-circuit-rated fuses are listed and marked for use with 14 AWG copper-clad aluminum conductor.		
240.6(A) [See also Tables]	**(A) Fuses and Fixed-Trip Circuit Breakers.** The standard ampere ratings for fuses and inverse time circuit breakers shall be considered as shown in Table 240.6(A). Additional standard ampere ratings for fuses shall be 1, 3, 6, 10, and 601. The use of fuses and inverse time circuit breakers with nonstandard ampere ratings shall be permitted.	FR-7828	**(A) Fuses and Fixed-Trip Circuit Breakers.** The standard ampere ratings for fuses and inverse time circuit breakers shall be considered as shown in Table 240.6(A). Additional standard ampere ratings for fuses shall be 1, 3, 6, and 601. The use of fuses and inverse time circuit breakers with nonstandard ampere ratings shall be permitted.	Revised to add 10 ampere to standard size breakers and fuses. Impacts: No negative impact.	**2**
240.6(D)	[Did not exist]	FR-7947, SR-8391	**(D) Remotely Accessible Adjustable-Trip Circuit Breakers.** A circuit breaker(s) that can be adjusted remotely to modify the adjusting means shall be permitted to have an ampere rating(s) that is equal to the adjusted current setting (long-time pickup setting). Remote access shall be achieved by one of the following methods:	Added section to address remotely accessible adjustable trip circuit breakers. Impacts: No negative impact.	**2**

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			(1) Connected directly through a local nonnetworked interface. (2) Connected through a networked interface complying with one of the following methods: a. The circuit breaker and associated software for adjusting the settings are identified as being evaluated for cybersecurity. b. A cybersecurity assessment of the network is completed. Documentation of the assessment and certification shall be made available to those authorized to inspect, operate, and maintain the system.		
240.7	[Did not exist]	FR-7805, SR-8295	**240.7 Listing Requirements**. The following shall be listed: (1) Branch-circuit overcurrent protective devices (2) Relays and circuit breakers providing ground-fault protection of equipment (3) Ground-fault circuit interrupter devices	Added section for listing requirements of overcurrent protection devices, relays, and GF devices. Impacts: No negative impact.	**2**
240.11	[Did not exist]	FR-7807	**240.11 Selective Coordination**.	Added section for selective coordination of feeder overcurrent protection devices.	**2**

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			If one or more feeder overcurrent protective devices are required to be selectively coordinated with a service overcurrent protective device by other requirements in this *Code*, all feeder overcurrent protective devices supplied directly by the service overcurrent protective device shall be selectively coordinated with the service overcurrent protective device.	This revision assures that the service overcurrent protective device is less likely to open due to an overcurrent condition on a feeder that is not currently required to selectively coordinate with the service overcurrent protective device. Impacts: No negative impact.	
Article 242	**Overvoltage Protection**				
242.9	[Did not exist]	FR-7957	**242.9 Indicating**. An SPD shall provide indication that it is functioning properly.	Added section to require functional indication on an SPD. Impacts: No negative impact.	**2**
Article 245	**Overcurrent Protection for Systems Rated Over 1000 Volts ac, 1500 Volts dc**				
Article 245	[Did not exist]	FCR-387, SR-7853, SCR-87, SCR-88	**Article 245**	Created new article for overcurrent protection for systems rated over 1000 Vac, 1500 Vdc, comprised of requirements from Article 240.	**1**
Article 250	**Grounding and Bonding**				
250.6(A), (B), and (C)	**(A) Arrangement to Prevent Objectionable Current.** The grounding of electrical systems, circuit conductors, surge arresters, surge-protective devices, and conductive normally non–current-carrying metal parts of equipment	FR-7990, SR-7941, SR-7938	**(A) Arrangement to Prevent Objectionable Current.** The grounding and bonding of electrical systems, circuit conductors, surge arresters, surge-protective devices, and conductive normally non-current-carrying metal parts of equipment shall be installed	Revised text to add the term "bonding" as these connections can also create objectionable currents. Impacts: No negative impact.	**2**

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	shall be installed and arranged in a manner that will prevent objectionable current. **(B) Alterations to Stop Objectionable Current.** If the use of multiple grounding connections results in objectionable current and the requirements of 250.4(A)(5) or (B)(4) are met, one or more of the following alterations shall be permitted: (1) Discontinue one or more but not all of such grounding connections. (2) Change the locations of the grounding connections. (3) Interrupt the continuity of the conductor or conductive path causing the objectionable current. (4) Take other suitable remedial and approved action. **(C) Temporary Currents Not Classified as Objectionable Currents.** Temporary currents resulting from abnormal conditions, such as ground faults, shall not be		and arranged in a manner that will prevent objectionable current. **(B) Alterations to Stop Objectionable Current.** If the use of multiple grounding or bonding connections results in objectionable current and the requirements of 250.4(A)(5) or (B)(4) are met, one or more of the following alterations shall be permitted: (1) Discontinue one or more but not all of such grounding or bonding connections. (2) Change the locations of the grounding or bonding connections. (3) Interrupt the continuity of the conductor or conductive path causing the objectionable current. (4) Take other remedial and approved action. **(C) Currents Not Classified as Objectionable Currents.** Currents resulting from abnormal conditions such as ground faults, and from currents resulting from required grounding and bonding connections shall		

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	classified as objectionable current for the purposes specified in 250.6(A) and (B).		not be classified as objectionable current for the purposes specified in 250.6(A) and (B).		
250.64(B)(4)	**(4) In Contact with the Earth.** Grounding electrode conductors and grounding electrode bonding jumpers in contact with the earth shall not be required to comply with 300.5, but shall be buried or otherwise protected if subject to physical damage.	FR-8090	**(4) In Contact with the Earth.** Grounding electrode conductors and grounding electrode bonding jumpers in contact with the earth shall not be required to comply with 300.5 or 305.15, but shall be buried or otherwise protected if subject to physical damage.	Revised to add reference to the new section 305.15 to clarify burial depth does not apply to grounding electrode conductors for systems rated over 1,000 V DC, 1,500 V DC. Impacts: No negative impact.	**1**
250.64(G)	[Did not exist]	FR-8075	(G) **Enclosures with Ventilation Openings.** Grounding electrode conductors shall not be installed through a ventilation opening of an enclosure.	Added section to address enclosures with ventilation openings. Impact: No negative impact.	**2**
250.102(C)	**(C) Size — Supply-Side Bonding Jumper.** **(1) Size for Supply Conductors in a Single Raceway or Cable.** The supply-side bonding jumper shall not be smaller than specified in Table 250.102(C)(1). **(2) Size for Parallel Conductor Installations in Two or More Raceways or Cables.** Where the ungrounded supply conductors are paralleled in two or more raceways or cables, and an individual supply-side bonding jumper is used for bonding these raceways or cables,	FR-8258	**(C) Size — Supply-Side Bonding Jumper.** **(1) Size for Supply Conductors in a Single Raceway or Cable.** The supply-side bonding jumper shall not be smaller than specified in Table 250.102(C)(1). **(2) Size for Parallel Conductor Installations in Two or More Raceways or Cables.** If the ungrounded supply conductors are connected in parallel in two or more raceways or cables, the supply-side bonding jumper shall be sized in accordance with either of the following:	Revised text and list items for clarity in sizing bonding jumpers in single raceway, cable, or in two or more cables and raceways. Impacts: No negative impact.	**1**

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	the size of the supply-side bonding jumper for each raceway or cable shall be selected from Table 250.102(C)(1) based on the size of the ungrounded supply conductors in each raceway or cable. A single supply-side bonding jumper installed for bonding two or more raceways or cables shall be sized in accordance with 250.102(C)(1).		(1) An individual bonding jumper for each raceway or cable shall be selected from Table 250.102(C)(1) based on the size of the largest ungrounded supply conductor in each raceway or cable. (2) A single bonding jumper installed for bonding two or more raceways or cables shall be sized in accordance with Table 250.102(C)(1) based on the sum of the circular mil areas of the largest ungrounded conductors from each set connected in parallel in each raceway or cable. The size of the grounded conductor(s) in each raceway or cable shall be based on the largest ungrounded conductor in each raceway or cable, or the sum of the circular mil areas of the largest ungrounded conductors from each set connected in parallel in each raceway or cable.		
250.118(A)	**250.118 Types of Equipment Grounding Conductors.** The equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:	FR-8184, SR-8022	**250.118 Types of Equipment Grounding Conductors.** **(A) Permitted.** Each equipment grounding conductor run with or enclosing the circuit conductors shall be one or more or a combination of the following:	Added stainless steel flexible metal conduit under list items (5) and (6). Impacts: No negative impact.	**2**

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	(1) A copper, aluminum, or copper-clad aluminum conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape. (2) Rigid metal conduit. (3) Intermediate metal conduit. (4) Electrical metallic tubing. (5) Listed flexible metal conduit meeting all the following conditions: a. The conduit is terminated in listed fittings. b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less. c. The size of the conduit does not exceed metric designator 35 (trade size 1¼). d. The combined length of flexible metal conduit, flexible		(1) A copper, aluminum, or copper-clad aluminum conductor. This conductor shall be solid or stranded; insulated, covered, or bare; and in the form of a wire or a busbar of any shape. (2) Rigid metal conduit. (3) Intermediate metal conduit. (4) Electrical metallic tubing. (5) Listed flexible metal conduit meeting all the following conditions: a. The conduit is terminated in listed fittings. b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less. c. The size of the conduit does not exceed metric designator 35 (trade size 1¼). d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in		

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	metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft). e. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor shall be installed. (6) Listed liquidtight flexible metal conduit meeting all the following conditions: a. The conduit is terminated in listed fittings. b. For metric designators 12 through 16 (trade sizes 3⁄8 through 1⁄2), the circuit conductors contained in the conduit are protected by		the same effective ground-fault current path does not exceed 1.8 m (6 ft). e. If flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed. f. If flexible metal conduit is constructed of stainless steel, a wire-type equipment grounding conductor or bonding jumper in accordance with 250.102(E)(2) shall be installed. (6) Listed liquidtight flexible metal conduit meeting all the following conditions: a. The conduit is terminated in listed fittings. b. For metric designators 12 through 16 (trade sizes 3⁄8 through 1⁄2), the circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.		

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	overcurrent devices rated at 20 amperes or less. c. For metric designators 21 through 35 (trade sizes 3⁄4 through 1 1⁄4), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquidtight flexible metal conduit in metric designators 12 through 16 (trade sizes 3⁄8 through 1⁄2) in the effective ground-fault current path. d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft). e. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to		c. For metric designators 21 through 35 (trade sizes 3⁄4 through 1 1⁄4), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit, flexible metallic tubing, or liquidtight flexible metal conduit in metric designators 12 through 16 (trade sizes 3⁄8 through 1⁄2) in the effective ground-fault current path. d. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft). e. If flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor or a bonding jumper in accordance with 250.102(E)(2) shall be installed. f. If liquidtight flexible metal conduit contains a stainless steel core, a wire-type equipment grounding conductor or		

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	provide flexibility for equipment that requires movement after installation, a wire-type equipment grounding conductor shall be installed. (7) Flexible metallic tubing where the tubing is terminated in listed fittings and meeting the following conditions: a. The circuit conductors contained in the tubing are protected by overcurrent devices rated at 20 amperes or less. b. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft). (8) Armor of Type AC cable as provided in 320.108. (9) The copper sheath of mineral-insulated, metal-sheathed cable Type MI.		a bonding jumper in accordance with 250.102(E)(2) shall be installed. (7) Flexible metallic tubing if the tubing is terminated in listed fittings and meeting the following conditions: a. The circuit conductors contained in the tubing are protected by overcurrent devices rated at 20 amperes or less. b. The combined length of flexible metal conduit, flexible metallic tubing, and liquidtight flexible metal conduit in the same effective ground-fault current path does not exceed 1.8 m (6 ft). (8) Armor of Type AC cable as provided in 320.108. (9) The copper sheath of mineral-insulated, metal-sheathed cable Type MI. (10) Type MC cable that provides an effective ground-fault current path in accordance with one or more of the following: a. It contains an insulated or uninsulated equipment grounding		

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	(10) Type MC cable that provides an effective ground-fault current path in accordance with one or more of the following: a. It contains an insulated or uninsulated equipment grounding conductor in compliance with 250.118(1). b. The combined metallic sheath and uninsulated equipment grounding/bonding conductor of interlocked metal tape–type MC cable that is listed and identified as an equipment grounding conductor c.The metallic sheath or the combined metallic sheath and equipment grounding conductors of the smooth or corrugated tube-type MC cable that is listed and identified as an equipment grounding conductor (11) Cable trays as permitted in 392.10 and 392.60.		conductor in compliance with 250.118(1). b. The combined metallic sheath and uninsulated equipment grounding/bonding conductor of interlocked metal tape–type MC cable that is listed and identified as an equipment grounding conductor c. The metallic sheath or the combined metallic sheath and equipment grounding conductors of the smooth or corrugated tube-type MC cable that is listed and identified as an equipment grounding conductor (11) Cable trays as permitted in 392.10 and 392.60. (12) Cablebus framework as permitted in 370.60(1). (13) Other listed electrically continuous metal raceways and listed auxiliary gutters. (14) Surface metal raceways listed for grounding.		

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	(12) Cablebus framework as permitted in 370.60(1). (13) Other listed electrically continuous metal raceways and listed auxiliary gutters. (14) Surface metal raceways listed for grounding.				
250.118(B)	**250.121 Restricted Use of Equipment Grounding Conductors.** **(A) Grounding Electrode Conductor.** An equipment grounding conductor shall not be used as a grounding electrode conductor. *Exception:* *A wire-type equipment grounding conductor installed in compliance with 250.6(A) and the applicable requirements for both the equipment grounding conductor and the grounding electrode conductor in Parts II, III, and VI of this article shall be permitted to serve as both an equipment grounding conductor and a grounding electrode conductor.* **(B) Metal Frame of Building or Structure.**	FR-8370	**(B) Not Permitted.** The following shall not be used as equipment grounding conductors. (1) Grounding electrode conductors *Exception:* *A wire-type equipment grounding conductor installed in compliance with 250.6(A) and the applicable requirements for both the equipment grounding conductor and the grounding electrode conductor in Parts II, III, and VI of this article shall be permitted to serve as both an equipment grounding conductor and a grounding electrode conductor.*	Revised text with material from 250.121. Impacts: No negative impact.	**1**

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	The structural metal frame of a building or structure shall not be used as an equipment grounding conductor.		(2) Structural metal frame of a building or structure		
250.144	**250.144 Multiple Circuit Connections.** Where equipment is grounded and is supplied by separate connection to more than one circuit or grounded premises wiring system, an equipment grounding conductor termination shall be provided for each such connection as specified in 250.134 and 250.138.	FR-8238	**250.144 Multiple Circuit Connections.** If equipment is required to be grounded and is supplied by more than one circuit containing an equipment grounding conductor, a means to terminate each equipment grounding conductor meeting the requirements of 250.8 shall be provided as specified in 250.134 and 250.138.	Revised text to add compliance with 250.8. Impacts: No negative impact.	**1**
250.148	**250.148 Continuity of Equipment Grounding Conductors and Attachment in Boxes.** If circuit conductors are spliced within a box or terminated on equipment within or supported by a box, all wire-type equipment grounding conductor(s) associated with any of those circuit conductors shall be connected within the box or to the box in accordance with 250.8 and 250.148(A) through (D). *Exception:*	FR-8240	**250.148 Continuity of Equipment Grounding Conductors and Attachment in Boxes.** If circuit conductors are spliced within a box or terminated on equipment within or supported by a box, the installation shall comply with 250.148(A) through (D). *Exception:* *The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box.* **(A) Connections and Splices.**	Clarified text to require the connection of all equipment grounding conductors in a box if spliced or terminated. Impacts: No negative impact.	**1**

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	The equipment grounding conductor permitted in 250.146(D) shall not be required to be connected to the other equipment grounding conductors or to the box. **(A) Connections and Splices.** Connections and splices shall be made in accordance with 110.14(B) except that insulation shall not be required. **(B) Equipment Grounding Conductor Continuity.** The arrangement of grounding connections shall be such that the disconnection or the removal of a luminaire, receptacle, or other device fed from the box does not interrupt the electrical continuity of the equipment grounding conductor(s) providing an effective ground-fault current path. **(C) Metal Boxes.** A connection used for no other purpose shall be made between the metal box and the equipment grounding conductor(s) in accordance with 250.8. **(D) Nonmetallic Boxes.**		All equipment grounding conductors that are spliced or terminated within the box shall be connected together. Connections and splices shall be made in accordance with 110.14(B) and 250.8 except that insulation shall not be required. **(B) Equipment Grounding Conductor Continuity.** The arrangement of grounding connections shall be such that the disconnection or the removal of a luminaire, receptacle, or other device fed from the box does not interrupt the electrical continuity of the equipment grounding conductor(s) providing an effective ground-fault current path. **(C) Metal Boxes.** A connection used for no other purpose shall be made between the metal box and the equipment grounding conductor(s). The equipment bonding jumper or equipment grounding conductor shall be sized from Table 250.122 based on the largest overcurrent device protecting circuit conductors in the box. **(D) Nonmetallic Boxes.** One or more equipment grounding conductors brought into a nonmetallic outlet box shall be		

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	One or more equipment grounding conductors brought into a nonmetallic outlet box shall be arranged such that a connection can be made to any fitting or device in that box requiring connection to an equipment grounding conductor.		arranged to provide a connection to any fitting or device in that box requiring connection to an equipment grounding conductor.		
250.187	**250.187 Impedance Grounded Systems.** Impedance grounded systems in which a grounding impedance, usually a resistor, limits the ground-fault current shall be permitted where all of the following conditions are met: (1) The conditions of maintenance and supervision ensure that only qualified persons service the installation. (2) Ground detectors are installed on the system. (3)Line-to-neutral loads are not served. Impedance grounded systems shall comply with 250.187(A) through (D). **(A) Location.**	FR-8227	**250.187 Impedance Grounded Systems.** Impedance grounded systems in which a grounding impedance device, typically a resistor, limits the ground-fault current shall be permitted if all of the following conditions are met: (1) The conditions of maintenance and supervision ensure that only qualified persons service the installation. (2) Ground detectors are installed on the system. (3) Line-to-neutral loads are not served. Impedance grounded systems shall comply with 250.187(A) through (D). **(A) Location.** The grounding impedance device shall be installed between the grounding electrode conductor and the	Revised text for clarity and added an exception. The added exception recognizes that there are equivalent methods to prevent inadvertent contact with bare or covered conductors by persons or other current-carrying conductors. This is consistent with other sections of the NEC such as 110.27(A). Impacts: No negative impact.	**1**

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	The grounding impedance shall be inserted in the grounding electrode conductor between the grounding electrode of the supply system and the neutral point of the supply transformer or generator. **(B) Insulated.** The grounded conductor shall be insulated for the maximum neutral voltage. **(C) Grounded System Conductor Connection.** The system grounded conductor shall not be connected to ground, except through the grounding impedance. **(D) Equipment Grounding Conductors.** Equipment grounding conductors shall be permitted to be bare and shall be electrically connected to the ground bus and grounding electrode conductor.		impedance grounding conductor connected to the system neutral point. **(B) Insulated.** The impedance grounding conductor shall be insulated for the maximum neutral voltage. *Exception:* *A bare impedance grounding conductor shall be permitted if the bare portion of the grounding impedance device and conductor are not in a readily accessible location and securely separated from the ungrounded conductors.*		

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Chapter 3 Wiring Methods and Materials					
Article 300	**General Requirements for Wiring Methods and Materials**				
300.2(A)	**(A) Voltage.** Wiring methods specified in Chapter 3 shall be used for 1000 volts, nominal, or less where not specifically limited in some section of Chapter 3. They shall be permitted for over 1000 volts, nominal, where specifically permitted elsewhere in this *Code*.	SR-8615	**(A) Voltage.** Wiring methods specified in Chapter 3 shall be used for 1000 volts ac, 1500 volts dc, nominal, or less where not specifically limited elsewhere in Chapter 3. They shall be permitted for over 1000 volts ac, 1500 volts dc, nominal, where specifically permitted elsewhere in this *Code*.	Revised text to indicate wiring methods in Chapter 3 be used for 1000 volts ac, or 1500 volts dc, nominal or less, unless otherwise permitted. Impacts: No negative impact.	**2**
300.3(B)	**(B) Conductors of the Same Circuit.** All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord, unless otherwise permitted in accordance with 300.3(B)(1) through (B)(4). **(1) Paralleled Installations.** Conductors shall be permitted to be run in parallel in accordance with the provisions of 310.10(G). The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or	FR-9269	**(B) Conductors of the Same Circuit.** All conductors of the same circuit and, where used, the grounded conductor and all equipment grounding conductors and bonding conductors shall be contained within the same raceway, conduit body, auxiliary gutter, cable tray, cablebus assembly, trench, cable, or cord unless otherwise permitted in accordance with 300.3(B)(1) through (B)(4). **(1) Paralleled Installations.** Conductors shall be permitted to be run in parallel in accordance with 310.10(G). The requirement to run all circuit conductors within the same raceway, auxiliary gutter, cable tray, trench, cable, or cord shall apply separately to each portion of the paralleled installation, and the equipment grounding	Revised text to include the "conduit body." Impacts: No negative impact.	**2**

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	cord shall apply separately to each portion of the paralleled installation, and the equipment grounding conductors shall comply with 250.122. Connections, taps, or extensions made from paralleled conductors shall connect to all conductors of the paralleled set, grounded and ungrounded, as applicable. Parallel runs in cable trays shall comply with 392.20(C). *Exception:* *Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase, neutral, and grounded conductor installations. The raceways shall be installed in close proximity, and the isolated phase, neutral, and grounded conductors shall comply with 300.20(B).* **(2) Grounding and Bonding Conductors.** Equipment grounding conductors shall be permitted to be installed outside a raceway or cable assembly where in accordance with the provisions of 250.130(C) for certain existing installations or in accordance with 250.134, Exception No. 2, for dc circuits. Equipment		conductors shall comply with 250.122. Connections, taps, or extensions made from paralleled conductors shall connect to all conductors of the paralleled set, grounded and ungrounded, as applicable. Parallel runs in cable trays shall comply with 392.20(C). *Exception:* *Conductors installed in nonmetallic raceways run underground shall be permitted to be arranged as isolated phase, neutral, and grounded conductor installations. The raceways shall be installed in close proximity, and the isolated phase, neutral, and grounded conductors shall comply with 300.20(B).* **(2) Grounding and Bonding Conductors.** Equipment grounding conductors shall be permitted to be installed outside a raceway or cable assembly in accordance with 250.130(C) for certain existing installations or in accordance with 250.134, Exception No. 2, for dc circuits. Equipment bonding conductors shall be permitted to be installed on the outside of raceways in accordance with 250.102(E). **(3) Nonferrous Wiring Methods.** Conductors in wiring methods with a nonmetallic or other nonmagnetic sheath, where run in different raceways, auxiliary gutters, cable trays, trenches,		

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	bonding conductors shall be permitted to be installed on the outside of raceways in accordance with 250.102(E). **(3) Nonferrous Wiring Methods.** Conductors in wiring methods with a nonmetallic or other nonmagnetic sheath, where run in different raceways, auxiliary gutters, cable trays, trenches, cables, or cords, shall comply with 300.20(B). Conductors in single-conductor Type MI cable with a nonmagnetic sheath shall comply with 332.31. Conductors of single-conductor Type MC cable with a nonmagnetic sheath shall comply with 330.31, 330.116, and 300.20(B). **(4) Column-Width Panelboard Enclosures.** Where an auxiliary gutter runs between a column-width panelboard and a pull box, and the pull box includes neutral terminations, the neutral conductors of circuits supplied from the panelboard shall be permitted to originate in the pull box.		cables, or cords, shall comply with 300.20(B). Conductors in single-conductor Type MI cable with a nonmagnetic sheath shall comply with 332.31. Conductors of single-conductor Type MC cable with a nonmagnetic sheath shall comply with 330.31, 330.116, and 300.20(B). **(4) Column-Width Panelboard Enclosures.** Where an auxiliary gutter runs between a column-width panelboard and a pull box, and the pull box includes neutral terminations, the neutral conductors of circuits supplied from the panelboard shall be permitted to originate in the pull box.		
300.4(G)	**(G) Fittings.**	FR-9319	**(G) Fittings.**	Revised text to clarify that protective fittings must be installed before the conductors are installed.	**2**

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	Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, the conductors shall be protected in accordance with any of the following: (1) An identified fitting providing a smoothly rounded insulating surface (2) A listed metal fitting that has smoothly rounded edges (3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place (4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature		Where raceways contain 4 AWG or larger insulated circuit conductors, and these conductors enter a cabinet, a box, an enclosure, or a raceway, prior to the installation of conductors, the conductors shall be protected in accordance with any of the following: (1) An identified fitting providing a smoothly rounded insulating surface (2) A listed metal fitting that has smoothly rounded edges (3) Separation from the fitting or raceway using an identified insulating material that is securely fastened in place (4) Threaded hubs or bosses that are an integral part of a cabinet, box, enclosure, or raceway providing a smoothly rounded or flared entry for conductors Conduit bushings constructed wholly of insulating material shall not be used to secure a fitting or raceway. The insulating fitting or insulating material shall have a temperature rating not less than the insulation temperature rating of the installed conductors.	Impacts: No negative impact.	

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	rating not less than the insulation temperature rating of the installed conductors.				
300.5(A)	See Tables.	FR-9323, SR-8551	See Tables.	The current UL directory recognizes the use of Stainless Steel, Aluminum (when provided with approved supplemental corrosion protection), and Galvanized EMT for direct burial applications. As such, column 2 was revised to clarify that Electrical Metallic Tubing (EMT) is included in the list of "Other Approved Raceways". Revised Table 300.5(A) to add “Electrical Metallic Tubing” to Column 3 and added Note 5 to EMT reference section. Impacts: No negative impact.	**2**
300.11(B)	**(B) Wiring Systems Installed Above Suspended Ceilings.** Support wires that do not provide secure support shall not be permitted as the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and	SR-8510	**(B) Wiring Systems Installed Above Suspended Ceilings.** Support wires that do not provide secure support shall not be the sole support. Support wires and associated fittings that provide secure support and that are installed in addition to the ceiling grid support wires shall be permitted as the sole support. Where independent support wires are used, they shall be secured at both ends. Cables and raceways shall not be supported by ceiling grids. **(1) Fire-Rated Assemblies.**	Revised to clarify that the ceiling grid support wires not be the sole support. Impacts: No negative impact.	**1**

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	raceways shall not be supported by ceiling grids. **(1) Fire-Rated Assemblies.** Wiring located within the cavity of a fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design. *Exception:* *The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.* Informational Note: One method of determining fire rating is testing in accordance with ANSI/ASTM E119-18b, *Standard Test Methods for Fire Tests of Building Construction and Materials*. **(2) Non–Fire-Rated Assemblies.**		Wiring located within the cavity of a fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means from those that are part of the fire-rated design. *Exception:* *The ceiling support system shall be permitted to support wiring and equipment that have been tested as part of the fire-rated assembly.* Informational Note: See ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, for one method of testing to determine fire rating. **(2) Non-Fire-Rated Assemblies.** Wiring located within the cavity of a non-fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where		

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	Wiring located within the cavity of a non–fire-rated floor–ceiling or roof–ceiling assembly shall not be secured to, or supported by, the ceiling assembly, including the ceiling support wires. An independent means of secure support shall be provided and shall be permitted to be attached to the assembly. Where independent support wires are used, they shall be distinguishable by color, tagging, or other effective means. *Exception:* *The ceiling support system shall be permitted to support branch-circuit wiring and associated equipment where installed in accordance with the ceiling system manufacturer's instructions.*		independent support wires are used, they shall be distinguishable by color, tagging, or other effective means. *Exception:* *The ceiling support system shall be permitted to support branch-circuit wiring and associated equipment where installed in accordance with the ceiling system manufacturer's instructions.*		
300.11(C)	**(C) Raceways Used as Means of Support.** Raceways shall be used only as a means of support for other raceways, cables, or nonelectrical equipment under any of the following conditions: (1) Where the raceway or means of support is identified as a means of support	FR-9230	**(C) Raceways Used as Means of Support.** Raceways shall be used only as a means of support for other raceways, cables, or nonelectrical equipment under any of the following conditions: (1) Where the raceway or means of support is identified as a means of support (2) Where the raceway contains power supply conductors for electrically controlled equipment	Revised to add "or Class 3" in list item (2), aligning it with section 725.143. Impacts: No negative impact.	**2**

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	(2) Where the raceway contains power supply conductors for electrically controlled equipment and is used to support Class 2 circuit conductors or cables that are solely for the purpose of connection to the equipment control circuits (3) Where the raceway is used to support boxes or conduit bodies in accordance with 314.23 or to support luminaires in accordance with 410.36(E)		and is used to support Class 2 or Class 3 circuit conductors or cables that are solely for the purpose of connection to the equipment control circuits (3) Where the raceway is used to support boxes or conduit bodies in accordance with 314.23 or to support luminaires in accordance with 410.36(E)		
300.25	300.25 Exit Enclosures (Stair Towers). Where an exit enclosure is required to be separated from the building, only electrical wiring methods serving equipment permitted by the authority having jurisdiction in the exit enclosure shall be installed within the exit enclosure.	FR-9267, SR-8571	300.25 Exit Enclosures (Stair Towers). Where an exit enclosure is required to have a fire resistance rating, only electrical wiring methods serving equipment permitted by the authority having jurisdiction in the exit enclosure shall be installed within the exit enclosure. *Exception:* *Where egress lighting is required on outside exterior doorways from the exit enclosure, luminaires shall be permitted to be supplied from the inside of the exit enclosure.*	Revised text to contain fire resistance rating and to add an exception that permits exterior mounted egress lights to be supplied from the circuit that feeds the interior exit enclosure lights. Impacts: No negative impact.	**2**
300.26	[Did not exist]	SR-8481	300.26 Remote-Control and Signaling Circuits Classification.	Added section for remote-control and signaling circuit classification. In the 2020 NEC 725.41 states the classifications for Class 1 power-limited circuits and Class 1 remote-control and	**2**

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			Remote-control and signaling circuits shall be classified as either power-limited or non-power-limited and comply with the following: (1) Class 1 power-limited remote-control and signaling circuits shall comply with 724.3. (2) Class 2 and Class 3 power-limited remote-control and signaling circuits shall comply with 725.3. (3) Non-power-limited remote-control and signaling circuits shall be installed in accordance with 300.2 through 300.25.	signaling circuits. The new section 300.26 expands this classification to include class 2 and class 3 circuits and non-power limited remote- control and signaling circuits. Impacts: No negative impact.	
Article 305	[Did not exist]	FR-9609, CC-8485	**Article 305 General Requirements for Wiring Methods and Materials for Systems Rated Over 1000 Volts ac, 1500 Volts dc, Nominal**	Created new Article 305, (no new requirements – previously addressed in and moved from Article 300). Impacts: No negative impact.	**1**
Article 310	**Conductors for General Wiring**				
310.3(B)	**(B) Conductor Material.** Conductors in this article shall be of aluminum, copper-clad aluminum, or copper unless otherwise specified. Solid aluminum conductors 8, 10, and 12 AWG shall be made of an AA-8000 series	FR-8372	**(B) Conductor Material.** Conductors in this article shall be of copper, aluminum, or copper-clad aluminum, unless otherwise specified. Aluminum and copper-clad aluminum shall comply with the following:	Revised into list format, added information for copper-clad aluminum conductors, and added new insulation types XHHN and XHWN. Impacts: No negative impact.	**2**

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	electrical grade aluminum alloy conductor material. Stranded aluminum conductors 8 AWG through 1000 kcmil marked as Type RHH, RHW, XHHW, THW, THHW, THWN, THHN, service-entrance Type SE Style U, and SE Style R shall be made of an AA-8000 series electrical grade aluminum alloy conductor material.		(1) Solid aluminum conductors 8, 10, and 12 AWG shall be made of an AA-8000 series electrical grade aluminum alloy conductor material. (2) Stranded aluminum conductors 8 AWG through 1000 kcmil marked as Type RHH, RHW, XHHW, XHHN, XHWN, THW, THHW, THWN, THHN, service-entrance Type SE Style U, and SE Style R shall be made of an AA-8000 series electrical grade aluminum alloy conductor material. (3) For copper-clad aluminum conductors, the copper shall form a minimum 10 percent of the cross-sectional area of a solid conductor or each strand of a stranded conductor. The aluminum core of a copper-clad aluminum conductor shall be made of an AA-8000 series electrical grade aluminum alloy conductor material. (4) Copper-clad aluminum conductor material shall be listed.		
310.3(C)	(1) 1000 Volts, Nominal, or Less. Conductors of ac and dc circuits, rated 1000 volts, nominal, or less, shall be permitted to occupy the same equipment wiring enclosure, cable, or raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage applied to any		(1) 1000 Volts ac, 1500 volts dc, Nominal, or Less. Conductors of ac and dc circuits rated 1000 volts ac, 1500 volts dc, nominal, or less shall be permitted to occupy the same equipment wiring enclosure, cable, or raceway. All conductors shall have an insulation rating equal to at least the maximum circuit voltage	Increased voltage level for dc circuit to 1500 volts which are permitted to occupy the same enclosure, cable, or raceway. Impact: No negative impact.	**2**

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	conductor within the enclosure, cable, or raceway. Secondary wiring to electric-discharge lamps of 1000 volts or less, if insulated for the secondary voltage involved, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors. Informational Note No. 1: See 725.136(A) for Class 2 and Class 3 circuit conductors. Informational Note No. 2: See 690.31(B) for photovoltaic source and output circuits. (2) Over 1000 Volts, Nominal. Conductors of circuits rated over 1000 volts, nominal, shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 1000 volts, nominal, or less unless otherwise permitted in 300.3(C)(2)(a) through 300.3(C)(2)(d). (a) Primary leads of electric-discharge lamp ballasts insulated for the primary voltage of the ballast, where contained within the individual wiring enclosure, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors.		applied to any conductor within the enclosure, cable, or raceway. Secondary wiring to electric-discharge lamps of 1000 volts ac, 1500 volts dc, or less, if insulated for the secondary voltage involved, shall be permitted to occupy the same luminaire, sign, or outline lighting enclosure as the branch-circuit conductors. Informational Note No. 1: See 725.136(A) for Class 2 and Class 3 circuit conductors. Informational Note No. 2: See 690.31(B) for photovoltaic source and output circuits. (2) Over 1000 Volts ac, 1500 Volts dc, Nominal. Conductors of circuits rated over 1000 volts ac, 1500 volts dc, nominal, shall not occupy the same equipment wiring enclosure, cable, or raceway with conductors of circuits rated 1000 volts ac, 1500 volts dc, nominal, or less unless permitted in accordance with 305.4.		

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	(b) Excitation, control, relay, and ammeter conductors used in connection with any individual motor or starter shall be permitted to occupy the same enclosure as the motor-circuit conductors. (c) In motors, transformers, switchgear, switchboards, control assemblies, and similar equipment, conductors of different voltage ratings shall be permitted. (d) In manholes, if the conductors of each system are permanently and effectively separated from the conductors of the other systems and securely fastened to racks, insulators, or other approved supports, conductors of different voltage ratings shall be permitted. Conductors having nonshielded insulation and operating at different voltage levels shall not occupy the same enclosure, cable, or raceway.				
310.10(G)	**(G) Conductors in Parallel.** **(1) General.** Aluminum, copper-clad aluminum, or copper conductors for each phase, polarity, neutral, or grounded circuit shall be permitted to be	FR-8314, SR-8420	**(G) Conductors in Parallel.** **(1) General.** Aluminum, copper-clad aluminum, or copper circuit conductors for each ungrounded conductor, grounded conductor, or neutral	Revised text to clarify that EGC and supply-side bonding jumpers are not required to be 1/0 or larger. Impacts: No negative impact.	**1**

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	connected in parallel (electrically joined at both ends) only in sizes 1/0 AWG and larger where installed in accordance with 310.10(G)(2) through (G)(6). *Exception No. 1:* *Conductors in sizes smaller than 1/0 AWG shall be permitted to be run in parallel to supply control power to indicating instruments, contactors, relays, solenoids, and similar control devices, or for frequencies of 360 Hz and higher, provided all of the following apply:* *(1) They are contained within the same raceway or cable.* *(2) The ampacity of each individual conductor is sufficient to carry the entire load current shared by the parallel conductors.* *(3) The overcurrent protection is such that the ampacity of each individual conductor will not be exceeded if one or*		conductor shall be permitted to be connected in parallel (electrically joined at both ends) only in sizes 1/0 AWG and larger and shall be installed in accordance with 310.10(G)(2) through (G)(4). *Exception No. 1:* *Conductors in sizes smaller than 1/0 AWG shall be permitted to be run in parallel to supply control power to indicating instruments, contactors, relays, solenoids, and similar control devices, or for frequencies of 360 Hz and higher, provided all of the following apply:* *(1) They are contained within the same raceway or cable.* *(2) The ampacity of each individual conductor is sufficient to carry the entire load current shared by the parallel conductors.* *(3) The overcurrent protection is such that the ampacity of each individual conductor will not be exceeded if one or more of the parallel conductors become inadvertently disconnected.* *Exception No. 2:*		

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	more of the parallel conductors become inadvertently disconnected. *Exception No. 2:* *Under engineering supervision, 2 AWG and 1 AWG grounded neutral conductors shall be permitted to be installed in parallel for existing installations.*		*Under engineering supervision, 2 AWG and 1 AWG grounded neutral conductors shall be permitted to be installed in parallel for existing installations.*		
Article 312	**Cabinets, Cutout Boxes, and Meter Socket Enclosures**				
312.8(A)(3)	[Did not exist]	FR-7708	(1) The bending space for conductors 4 AWG and larger complies with 314.28(A)(2).	Added list item (3) condition for 4 AWG and larger conductors to comply with 314.28(A)(2). Impact: No negative impact.	**2**
312.10	[Did not exist]	FR-7820, SR-7525	**312.10 Screws or Other Fasteners.** Screws or other fasteners installed in the field that enter wiring spaces shall be as provided by or specified by the manufacturer or shall comply with the following as applicable: (1) Screws shall be machine type with blunt ends. (2) Other fasteners shall have blunt ends. (3) Screws or other fasteners shall extend into the enclosure no more than 6 mm (1⁄4 in.)	Added section to address specific types of non-factory screws being placed in covers and devices. This change addresses hazards associated insertion of screws into enclosures, identifying specific requirements regarding the blunt end, length, etc. Impacts: No negative impact.	**2**

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			unless the end is protected with an approved means. *Exception to (3):* *Screws or other fasteners shall be permitted to extend into the enclosure not more than 11 mm (7/16 in.) if located within 10 mm (3/8 in.) of an enclosure wall.*		
312.102	[Did not exist]	FR-7711	**312.102 Doors or Covers.** Cabinets, cutout boxes, and meter socket enclosures shall be equipped with doors or covers.	Added section to clearly require doors or covers for cabinets, cutout boxes, and meter socket enclosures. Impacts: No negative impact.	**2**
Article 314	**Outlet Devices, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures**				
314.5	[Did not exist]	FR-7821, SR-7527	**314.5 Screws or Other Fasteners.** Screws or other fasteners installed in the field that enter wiring spaces shall be as provided by or specified by the manufacturer or shall comply with the following as applicable: (1) Screws shall be machine type with blunt ends. (2) Other fasteners shall have blunt ends.	Added section to address types of screws that enter wiring spaces and how far they can extend into wiring space to prevent damage to conductors contained in the enclosure. Impacts: No negative impact.	**2**

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			(3) Screws attaching a cover shall extend no more than 10 mm (3⁄8 in.). (4) Screws or other fasteners, other than in (3), penetrating a cover shall extend no more than 8 mm (5⁄16 in.). (5) Screws or other fasteners penetrating a wall of a box exceeding 1650 cm^3 (100 $in.^3$) shall extend no more than 6 mm (1⁄4 in.), or more than 11 mm (7⁄16 in.) if located within 10 mm (3⁄8 in.) of an adjacent box wall. (6) Screws or other fasteners penetrating the wall of a box not exceeding 1650 cm^3 (100 $in.^3$) and not covered in 314.23(B)(1) shall be made flush with the box interior. (7) Screws or other fasteners penetrating the wall of a conduit body shall be made flush with the conduit body interior. *Exception to (3) through (6):* *A screw shall be permitted to be longer if the end of the screw is protected with an approved means.*		

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314.16(A)(2)	See Tables.	FR-7727	See Tables.	Revised top row of Table 314.16(A) to correct an error in the number of 8 AWG conductors permitted in a 4 x 1-1/4 in. round/octagon box from 5 to 4 to align with 8 AWG cu. in. capacity. Impacts: No negative impact.	**2**
314.16(B)(6)	[Did not exist]	FR-7868, SCR-1	**(6) Terminal Block Fill.** Where a terminal block is present in a box, a single volume allowance in accordance with Table 314.16(B)(1) shall be made for each terminal block assembly based on the largest conductor(s) terminated to the assembly.	Added section to address volume allowance for terminal blocks when used within outlet and device boxes. Impacts: No negative impact.	**2**
314.17	**314.17 Conductors Entering Boxes, Conduit Bodies, or Fittings.** Conductors entering boxes, conduit bodies, or fittings shall be protected from abrasion and shall comply with 314.17(A) through (C). **(A) Openings to Be Closed.** Openings through which conductors enter shall be closed in a manner identified for the application. **(B) Boxes and Conduit Bodies.**	FR-7738	**314.17 Conductors and Cables Entering Boxes, Conduit Bodies, or Fittings.** Conductors entering boxes, conduit bodies, or fittings shall be protected from abrasion. Conductors and cables shall comply with 314.17(A) through (C). **(A) Openings to Be Closed.** Openings through which conductors enter shall be closed in an approved manner. **(B) Boxes and Conduit Bodies.**	Revised to add cables to be included with conductors and change wording for 1/4 in. cable sheath from where it enters box to where it emerges from the clamping mechanism. Impacts: No negative impact.	**2**

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	The installation of the conductors in boxes and conduit bodies shall comply with 314.17(B)(1) through (B)(4). **(1) Conductors Entering Through Individual Holes or Through Flexible Tubing.** For messenger-supported wiring, open wiring on insulators, or concealed knob-and-tube wiring, the conductors shall enter the box through individual holes. In installations where metal boxes or conduit bodies are used with conductors unprotected by flexible tubing, the individual openings shall be provided with insulating bushings. Where flexible tubing is used to enclose the conductors, the tubing shall extend from the last insulating support to not less than 6 mm (1⁄4 in.) inside the box or conduit body and beyond any cable clamp. The wiring method shall be secured to the box or conduit body. **(2) Conductors Entering Through Cable Clamps.** Where cable assemblies with nonmetallic sheathes are used, the sheath shall extend not		The installation of the conductors and cables in boxes and conduit bodies shall comply with 314.17(B)(1) through (B)(4). **(1) Conductors Entering Through Individual Holes or Through Flexible Tubing.** For messenger-supported wiring, open wiring on insulators, or concealed knob-and-tube wiring, the conductors shall enter the box through individual holes. In installations where metal boxes or conduit bodies are used with conductors unprotected by flexible tubing, the individual openings shall be provided with insulating bushings. Where flexible tubing is used to enclose the conductors, the tubing shall extend from the last insulating support to not less than 6 mm (1⁄4 in.) inside the box or conduit body and 6 mm (1⁄4 in.) beyond the end of any cable clamp. The wiring method shall be secured to the box or conduit body. **(2) Cables Entering Through Cable Clamps.** Where cable assemblies with nonmetallic sheaths are used, the sheath shall extend not less than 6 mm (1⁄4 in.) inside the box and 6 mm (1⁄4 in.) beyond the end of any cable clamp. Except		

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	less than 6 mm (1⁄4 in.) inside the box and beyond any cable clamp. Except as provided in 300.15(C), the wiring method shall be secured to the box or conduit body. *Exception:* *Where nonmetallic-sheathed cable is used with single gang nonmetallic boxes not larger than a nominal size 57 mm × 100 mm (21/4 in. × 4 in.) mounted in walls or ceilings, and where the cable is fastened within 200 mm (8 in.) of the box measured along the sheath and where the sheath extends through a cable knockout not less than 6 mm (1/4 in.), securing the cable to the box shall not be required. Multiple cable entries shall be permitted in a single cable knockout opening.* **(3) Conductors Entering Through Raceways.** Where the raceway is complete between boxes, conduit bodies, or both and encloses individual conductors or nonmetallic cable assemblies or both, the conductors or cable assemblies shall not be required to be additionally secured. Where raceways enclose cable assemblies as provided in 300.15(C), the		as covered in 300.15(C), the wiring method shall be secured to the box or conduit body. *Exception:* *Where nonmetallic-sheathed cable is used with single gang nonmetallic boxes not larger than a nominal size 57 mm × 100 mm (21/4 in. × 4 in.) mounted in walls or ceilings, and where the cable is fastened within 200 mm (8 in.) of the box measured along the sheath and where the sheath extends through a cable knockout not less than 6 mm (1/4 in.), securing the cable to the box shall not be required. Multiple cable entries shall be permitted in a single cable knockout opening.* **(3) Conductors and Cables Entering Through Raceways.** Where the raceway is complete between boxes, conduit bodies, or both and encloses individual conductors or nonmetallic cable assemblies or both, the conductors or cable assemblies shall not be required to be additionally secured. Where raceways enclose cable assemblies as covered in 300.15(C), the cable assembly shall not be required to be additionally secured within the box or conduit body. **(4) Temperature Limitation.**		

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	cable assembly shall not be required to be additionally secured within the box or conduit body. **(4) Temperature Limitation.** Nonmetallic boxes and conduit bodies shall be suitable for the lowest temperature-rated conductor entering the box or conduit body. **(C) Conductors 4 AWG or Larger.** Installation shall comply with 300.4(G).		Nonmetallic boxes and conduit bodies shall be suitable for the lowest temperature-rated conductor entering the box or conduit body. **(C) Conductors 4 AWG or Larger.** Installation shall comply with 300.4(G).		
314.24(C)	[Did not exist]	FR-7870, SCR-2	**(C) Clearances for Side-Wiring Entrances.** Where devices or equipment are mounted in boxes having side-wiring entries, the conductors entering from the side shall be protected as covered in (1) or (2), as follows. The term *side* applies to any wall of a box other than the one opposite to the opening. (1) The rearward projection of the device or equipment shall not extend beyond the centerline of the wiring knockout or other entry. (2) The clearance from the box wall to the installed device or equipment shall be not less than 13 mm (1⁄2 in.).	Added section that addresses clearances for side-wiring entrances. The rule is being added to minimize chances for a conductor damage due to inadequate space for wire manipulation in a side entry configuration. Impacts: No negative impact.	**2**

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Article 315	[Did not exist]	FR-8616, SCR-65	**Article 315 Medium Voltage Conductors, Cables, Cable Joints, and Cable Terminations**	Created new Article 315, comprised of requirements from former Article 311. Expanded listing requirement to include terminations, cable joints, and cable connectors, with an effective date of 1/1/2026. Limiting applicability of this article to 2,500 V for DC systems. Added a requirement for a qualified person with documented training and experience for installation cables, of cable joints, terminations, and for testing. Emphasized the fact that cable shield may not be suitable for clearing ground fault events, unless sized properly. Impacts: No negative impact.	**2**
Article 330	**Metal-Clad Cable: Type MC**				
330.10(A)	**General Uses.** Type MC cable shall be permitted as follows: (1) For services, feeders, and branch circuits. (2) For power, lighting, control, and signal circuits.	FR-8407	**General Uses.** Type MC cable shall be permitted as follows: (1) For services, feeders, and branch circuits. (2) For power, lighting, control, and signal circuits. (3) Indoors or outdoors. (4) Exposed or concealed.	Revised list item (11) to include Type MC cable being able to be installed in damp locations, following the same requirements as for wet locations already allowed in the code. Impacts: No negative impact.	**2**

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	(3) Indoors or outdoors. (4) Exposed or concealed. (5) To be direct buried where identified for such use. (6) In cable tray where identified for such use. (7) In any raceway. (8) As aerial cable on a messenger. (9) In hazardous (classified) locations where specifically permitted by other articles in this *Code*. (10) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations. (11) In wet locations where a corrosion-resistant jacket is provided over the metallic covering and any of the following conditions are met: a. The metallic covering is impervious to moisture.		(5) To be direct buried where identified for such use. (6) In cable tray where identified for such use. (7) In any raceway. (8) As aerial cable on a messenger. (9) In hazardous (classified) locations where specifically permitted by other articles in this *Code*. (10) In dry locations and embedded in plaster finish on brick or other masonry except in damp or wet locations. (11) In damp or wet locations where a corrosion-resistant jacket is provided over the metallic covering and any of the following conditions are met: a. The metallic covering is impervious to moisture. b. A jacket resistant to moisture is provided under the metal covering. c. The insulated conductors under the metallic covering are listed for use in wet locations.		

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	b. A jacket resistant to moisture is provided under the metal covering. c. The insulated conductors under the metallic covering are listed for use in wet locations. (12) Where single-conductor cables are used, all phase conductors and, where used, the grounded conductor shall be grouped together to minimize induced voltage on the sheath.		(12) Where single-conductor cables are used, all phase conductors and, where used, the grounded conductor shall be grouped together to minimize induced voltage on the sheath.		
330.112(A)	**Insulation.** Insulated conductors shall comply with 330.112(A) and (B) **(A) 1000 Volts or Less.** Insulated conductors in sizes 18 AWG and 16 AWG shall be of a type listed in Table 402.3, with a maximum operating temperature not less than 90°C (194°F) and as permitted by 725.49. Conductors larger than 16 AWG shall be of a type listed in Table 310.4(A) or of a type identified for use in Type MC cable.	SR-8309	**Insulation.** Insulated conductors shall comply with 330.112(A) and (B) **(A) 1000 Volts or Less.** Insulated control and signal conductors in sizes 18 AWG and 16 AWG shall be of a type listed in Table 402.3, with a maximum operating temperature not less than 90°C (194°F) and as permitted by 724.49. Ungrounded, grounded, and equipment grounding conductors 16 AWG and larger shall be of a type listed in Table 310.4(1) or of a type identified for use in Type MC cable.	Editorial change to correlate with the addition of 16 AWG as a conductor for general use wiring. Impacts: No negative impact.	**2**
Article 334	**Nonmetallic-Sheathed Cable: Type NM and NMC**				
334.10(B)	**Uses Permitted.**	FR-8434	**Uses Permitted.**	Revised to replace the term “moist” with “wet.”	**2**

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	(B) Type NMC. Type NMC cable shall be permitted as follows: (1) For both exposed and concealed work in dry, moist, damp, or corrosive locations, except as prohibited by 334.10(3) (2) In outside and inside walls of masonry block or tile (3) In a shallow chase in masonry, concrete, or adobe protected against nails or screws by a steel plate at least 1.59 mm (1⁄16 in.) thick and covered with plaster, adobe, or similar finish		**(B) Type NMC.** Type NMC cable shall be permitted as follows: (1) For both exposed and concealed work in dry, wet, damp, or corrosive locations, except as prohibited by 334.10(3) (2) In outside and inside walls of masonry block or tile (3) In a shallow chase in masonry, concrete, or adobe protected against nails or screws by a steel plate at least 1.59 mm (1⁄16 in.) thick and covered with plaster, adobe, or similar finish	Impacts: No negative impact.	
334.15(B) and (C)	**(B) Protection from Physical Damage.** Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, Type RTRC marked with the suffix -XW, or other approved means. Where passing through a floor, the cable shall be enclosed in rigid	FR-8439, FR-8443	**(B) Protection from Physical Damage.** Cable shall be protected from physical damage where necessary by rigid metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, RTRC marked with the suffix -XW, or other approved means. Where passing through a floor, the cable shall be enclosed in rigid metal conduit, intermediate metal conduit, electrical	Added requirement for abrasion protection when a cable enters or exits a raceway. Impacts: No negative impact.	**2**

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	metal conduit, intermediate metal conduit, electrical metallic tubing, Schedule 80 PVC conduit, Type RTRC marked with the suffix -XW, or other approved means extending at least 150 mm (6 in.) above the floor. Type NMC cable installed in shallow chases or grooves in masonry, concrete, or adobe shall be protected in accordance with the requirements in 300.4(F) and covered with plaster, adobe, or similar finish. **(C) In Unfinished Basements and Crawl Spaces.** Where cable is run at angles with joists in unfinished basements and crawl spaces, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. Nonmetallic-sheathed cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance		metallic tubing, Schedule 80 PVC conduit, RTRC marked with the suffix -XW, or other approved means extending at least 150 mm (6 in.) above the floor. Conduit or tubing shall be provided with a bushing or adapter that provides protection from abrasion at the point the cable enters and exits the raceway. Type NMC cable installed in shallow chases or grooves in masonry, concrete, or adobe shall be protected in accordance with the requirements in 300.4(F) and covered with plaster, adobe, or similar finish. **(C) In Unfinished Basements and Crawl Spaces.** Where cable is run at angles with joists in unfinished basements and crawl spaces, it shall be permissible to secure cables not smaller than two 6 AWG or three 8 AWG conductors directly to the lower edges of the joists. Smaller cables shall be run either through bored holes in joists or on running boards. Nonmetallic-sheathed cable installed on the wall of an unfinished basement shall be permitted to be installed in a listed conduit or tubing or shall be protected in accordance with 300.4. Conduit or		

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	with 300.4. Conduit or tubing shall be provided with a suitable insulating bushing or adapter at the point the cable enters the raceway. The sheath of the nonmetallic-sheathed cable shall extend through the conduit or tubing and into the outlet or device box not less than 6 mm (1⁄4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor complying with the provisions of 250.86 and 250.148.		tubing shall be provided with a bushing or adapter that provides protection from abrasion at the point the cable enters and exits the raceway. The sheath of the nonmetallic-sheathed cable shall extend through the conduit or tubing and into the outlet, device, or junction box not less than 6 mm (1⁄4 in.). The cable shall be secured within 300 mm (12 in.) of the point where the cable enters the conduit or tubing. Metal conduit, tubing, and metal outlet boxes shall be connected to an equipment grounding conductor complying with 250.86 and 250.148.		
334.19	[Did not exist]	FR-8481	**334.19 Cable Entries.** The sheath on nonmetallic-sheathed cable shall extend not less than 6 mm (1⁄4 in.) beyond any cable clamp or cable entry.	Added section requiring cable sheath to extend at least 1/4 inch beyond any cable clamp or cable entry. Impacts: No negative impact.	**2**
334.24	334.24 Bending Radius. Bends in Types NM and NMC cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend during or after installation shall not	FR-8519	334.24 Bending Radius. Bends in Types NM and NMC cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend during or after installation shall not be less than five times the diameter of the cable. For flat cables, the major	Added a requirement to use the major diameter (i.e., widest part) of a flat cable when considering bending radius. Impacts: No negative impact.	**2**

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	be less than five times the diameter of the cable.		diameter dimension of the cable shall be used to determine the bending radius.		
334.80	**334.80 Ampacity.** The ampacity of Types NM and NMC cable shall be determined in accordance with 310.14. The ampacity shall not exceed that of a 60°C (140°F) rated conductor. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction calculations, provided the final calculated ampacity does not exceed that of a 60°C (140°F) rated conductor. The ampacity of Types NM and NMC cable installed in cable trays shall be determined in accordance with 392.80(A). Where more than two NM cables containing two or more current-carrying conductors are installed, without maintaining spacing between the cables, through the same opening in wood framing that is to be sealed with thermal insulation, caulk, or sealing foam, the ampacity of each conductor shall be	FR-8521	**334.80 Ampacity.** The ampacity of Types NM and NMC cable shall be determined in accordance with 310.14. The ampacity shall not exceed that of a 60°C (140°F) rated conductor. The 90°C (194°F) rating shall be permitted to be used for ampacity adjustment and correction calculations, provided the final calculated ampacity does not exceed that of a 60°C (140°F) rated conductor. The ampacity of Types NM and NMC cable installed in cable trays shall be determined in accordance with 392.80(A). Where more than two NM cables containing two or more current-carrying conductors are installed, without maintaining spacing between the cables, through the same opening in wood framing that is to be sealed with thermal insulation, caulk, or sealing foam, the ampacity of each conductor shall be adjusted in accordance with Table	Revised to remove the use of the exception within 310.14(A)(2) when dealing with two or more conductors in contact with thermal insulation, requiring all ungrounded and grounded conductors in thermal insulation (e.g., foam, caulk, etc.) to be considered current carrying for the purpose of ampacity adjustment. Impacts: No negative impact.	**2**

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	adjusted in accordance with Table 310.15(C)(1) and the provisions of 310.14(A)(2), Exception, shall not apply. Where more than two NM cables containing two or more current-carrying conductors are installed in contact with thermal insulation without maintaining spacing between cables, the ampacity of each conductor shall be adjusted in accordance with Table 310.15(C)(1).		310.15(C)(1) and 310.14(A)(2), Exception, shall not apply. Where more than two NM cables containing two or more current-carrying conductors are installed in contact with thermal insulation without maintaining spacing between cables, the ampacity of each conductor shall be adjusted in accordance with Table 310.15(C)(1) and 310.14(A)(2), Exception shall not apply.		
Article 335	Formerly Article 727	FCR-457	**Article 335 – Instrumentation Tray Cable: Type ITC**	Relocated former Article 727 into Chapter 3 as new Article 335, Instrumentation Tray Cable: Type ITC. Impacts: No negative impact.	**1**
	Power and Control Tray Cable: Type TC				
336.10	**336.10 Uses Permitted.** Type TC cable shall be permitted to be used as follows: (1) For power, lighting, control, and signal circuits.	FR-8524	**336.10 Uses Permitted.** Type TC cable shall be permitted to be used as follows: (1) For power, lighting, control, and signal circuits.	Added list item (12) to permit Type TC cable to be used as service-entrance conductors where identified for such use and marked as Type TC-ER. Impacts: No negative impact.	**2**

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	(2) In cable trays, including those with mechanically discontinuous segments up to 300 mm (1 ft). (3) In raceways. (4) In outdoor locations supported by a messenger wire. (5) For Class 1 circuits as permitted in Parts II and III of Article 725. (6) For non-power-limited fire alarm circuits if conductors comply with the requirements of 760.49. (7) Between a cable tray and the utilization equipment or device(s), provided all of the following apply: a. The cable is Type TC-ER. b. The cable is installed in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation.		(2) In cable trays, including those with mechanically discontinuous segments up to 300 mm (1 ft). (3) In raceways. (4) In outdoor locations supported by a messenger wire. (5) For Class 1 circuits as permitted in Parts II and III of Article 725. (6) For non-power-limited fire alarm circuits if conductors comply with the requirements of 760.49. (7) Between a cable tray and the utilization equipment or device(s), provided all of the following apply: a. The cable is Type TC-ER. b. The cable is installed in industrial establishments where the conditions of maintenance and supervision ensure that only qualified persons service the installation. c. The cable is continuously supported and protected against physical damage		

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	c. The cable is continuously supported and protected against physical damage using mechanical protection such as struts, angles, or channels. d. The cable complies with the crush and impact requirements of Type MC cable and is identified with the marking "TC–ER." e. The cable is secured at intervals not exceeding 1.8 m (6 ft). f. Equipment grounding for the utilization equipment is provided by an equipment grounding conductor within the cable. In cables containing conductors sized 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an		using mechanical protection such as struts, angles, or channels. d. The cable complies with the crush and impact requirements of Type MC cable and is identified with the marking "TC–ER." e. The cable is secured at intervals not exceeding 1.8 m (6 ft). f. Equipment grounding for the utilization equipment is provided by an equipment grounding conductor within the cable. In cables containing conductors sized 6 AWG or smaller, the equipment grounding conductor shall be provided within the cable or, at the time of installation, one or more insulated conductors shall be permanently identified as an equipment grounding conductor in accordance with 250.119(B). *Exception to (7):* *Where not subject to physical damage, Type TC-ER shall be permitted to transition between cable trays and*		

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	equipment grounding conductor in accordance with 250.119(B). *Exception to (7):* *Where not subject to physical damage, Type TC-ER shall be permitted to transition between cable trays and between cable trays and equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.* (8) Type TC cable shall be resistant to moisture and corrosive agents where installed in wet locations.		*between cable trays and equipment or devices for a distance not to exceed 1.8 m (6 ft) without continuous support. The cable shall be mechanically supported where exiting the cable tray to ensure that the minimum bending radius is not exceeded.* (8) Type TC cable shall be resistant to moisture and corrosive agents where installed in wet locations. (9) For one- and two-family dwelling units, Type TC-ER-JP cable containing conductors for both power and control circuits shall be permitted for branch circuits and feeders. Type TC-ER-JP cable used as interior wiring shall be installed per the requirements of Part II of Article 334 and where installed as exterior wiring shall be installed per the requirements of Part II of Article 340. *Exception:* *Where used to connect a generator and associated equipment having terminals rated 75°C (140°F) or higher, the cable*		

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	(9) In one- and two-family dwelling units, Type TC-ER-JP cable containing both power and control conductors shall be permitted for branch circuits and feeders. Type TC-ER-JP cable used as interior wiring shall be installed per the requirements of Part II of Article 334 and where installed as exterior wiring shall be installed per the requirements of Part II of Article 340. *Exception:* *Where used to connect a generator and associated equipment having terminals rated 75°C (140°F) or higher, the cable shall not be limited in ampacity by 334.80 or 340.80.* (10) Direct buried, where identified for such use. (11) In hazardous (classified) locations where specifically permitted by other articles in this *Code*.		*shall not be limited in ampacity by 334.80 or 340.80.* (10) Direct buried, where identified for such use. (11) In hazardous (classified) locations where specifically permitted by other articles in this *Code*. (12) For service-entrance conductors where identified for such use and marked Type TC-ER.		
Article 337	**Type P Cable**				

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337.115	**337.115 Jacket.** Single conductor cables and multiconductor cables shall have an overall nonmetallic jacket that is impervious to moisture, corrosion resistant, and sunlight resistant.	FR-8570	**337.115 Jacket.** Multiconductor cables shall have an overall nonmetallic jacket that is impervious to moisture, corrosion resistant, and sunlight resistant. When installed external to an enclosure or industrial machinery, single conductor cables shall have an overall nonmetallic jacket that is impervious to moisture, corrosion resistant, and sunlight resistant. Single conductor cables rated 2000 volts with conductor sizes equal to or larger than 4/0 AWG shall be permitted to use an increased insulation thickness in lieu of using a separate cable jacket. When the increased insulation thickness is used, the insulation material shall be sunlight resistant.	Revised text to allow single conductors without an overall jacket, within enclosures or machinery, or larger conductors with increased insulation thickness. Impacts: No negative impact.	**2**
337.116	**337.116 Armor.** Armor shall be permitted over the jacket. If provided, the armor or metallic covering shall be a braided basket weave type consisting of wire laid closely together, flat and parallel, and forming a basket weave that shall firmly grip the cable. The wire shall be commercial bronze. The armor shall not be used as a	FR-8572	**337.116 Armor.** Armor shall be permitted over the jacket. If provided, the armor or metallic covering shall be a braided basket weave type consisting of wire laid closely together, flat and parallel, and forming a basket weave that shall firmly grip the cable. The wire shall be commercial bronze, tinned copper, stainless steel, or aluminum. The armor shall not be	Revised text to allow for additional armor options to recognize industry practices. Impacts: No negative impact.	**2**

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	current-carrying conductor or as an equipment grounding conductor. A nonmetallic jacket that conforms to 337.115 shall be provided over the armor.		used as a current-carrying conductor or as an equipment grounding conductor. A nonmetallic jacket that conforms to 337.115 shall be provided over the armor.		
Article 338	**Service-Entrance Cable: Type SE and USE**				
338.24	338.24 Bending Radius. Bends in Types USE and SE cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend, during or after installation, shall not be less than five times the diameter of the cable.	FR-8605	338.24 Bending Radius. Bends in Types USE and SE cable shall be so made that the cable will not be damaged. The radius of the curve of the inner edge of any bend, during or after installation, shall not be less than five times the diameter of the cable. For flat cables, the major diameter dimension of the cable shall be used to determine the bending radius.	Revised to specify that the major dimension (i.e., widest part) of flat cables is to be used for determining bending radius. Impacts: No negative impact.	**2**
Article 340	**Underground Feeder and Branch-Circuit Cable: Type UF**				
340.24	**340.24 Bending Radius.** Bends in Type UF cable shall be so made that the cable is not damaged. The radius of the curve of the inner edge of any bend shall not be less than five times the diameter of the cable.	FR-8608	**340.24 Bending Radius.** Bends in Type UF cable shall be so made that the cable is not damaged. The radius of the curve of the inner edge of any bend shall not be less than five times the diameter of the cable. For flat cables, the major diameter dimension of the cable shall be used to determine the bending radius.	Revised text to specify that the major dimension (i.e., widest part) of flat cables is to be used for determining bending radius. Impacts: No negative impact.	**2**
Article 342	**Intermediate Metal Conduit (IMC)**				

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342.10(B)	**(B) Corrosion Environments.** IMC, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition.	FR-7582	**(B) Corrosion Environments.** IMC, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, in direct burial applications, or in areas subject to severe corrosive influences where protected by corrosion protection approved for the condition.	Revised text to allow use of IMC in direct burial applications. Impacts: No negative impact.	**2**
342.30(A)(3)	(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast.	FR-7584	(3) Where approved, conduit shall not be required to be securely fastened within 900 mm (3 ft) of the service head for above-the-roof termination of a mast. *Exception:* *For concealed work in finished buildings or prefinished wall panels where such securing is impracticable, unbroken lengths (without coupling) of IMC shall be permitted to be fished.*	Added an exception that allows fishing of unbroken lengths of IMC within existing walls or panels, similar to EMT and flexible conduits. Impacts: No negative impact.	**2**
Article 344	**Rigid Metal Conduit (RMC)**				
344.10(B)	**(B) Corrosive Environments.** **(1) Galvanized Steel, Stainless Steel, and Red Brass RMC, Elbows, Couplings, and Fittings.** Galvanized steel, stainless steel, and red brass RMC elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, or in areas subject to	FR-7585	**(B) Corrosive Environments.** **(1) Galvanized Steel, Stainless Steel, and Red Brass RMC, Elbows, Couplings, and Fittings.** Galvanized steel, stainless steel, and red brass RMC, elbows, couplings, and fittings shall be permitted to be installed in concrete, in direct contact with the earth, in direct burial applications, or in areas subject to severe corrosive influences where	Revised text to allow for use of RMC in direct burial applications. Impacts: No negative impact.	**2**

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	severe corrosive influences where protected by corrosion protection approved for the condition. **(2) Supplementary Protection of Aluminum RMC.** Aluminum RMC shall be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth.		protected by corrosion protection approved for the condition. **(2) Supplementary Protection of Aluminum RMC.** Aluminum RMC shall be provided with approved supplementary corrosion protection where encased in concrete or in direct contact with the earth, or in direct burial applications where identified for the application.		
344.20(A)	**(A) Minimum.** RMC smaller than metric designator 16 (trade size 1⁄2) shall not be used. *Exception:* *For enclosing the leads of motors as permitted in 430.245(B).*	FR-7654	**(A) Minimum.** RMC smaller than metric designator 16 (trade size 1⁄2) shall not be used. *Exception:* *Metric designator 12 (trade size 3⁄8) shall be permitted for enclosing the leads of motors as permitted in 430.245(B).*	Revised exception text to allow for use of smaller RMC. Impacts: No negative impact.	**2**
344.28	**344.28 Reaming and Threading.** All cut ends shall be reamed or otherwise finished to remove rough edges. Where conduit is threaded in the field, a standard cutting die with a 1 in 16 taper (3⁄4 in. taper per foot) shall be used.	FR-7589	**344.28 Reaming and Threading.** All cut ends shall be reamed or otherwise finished to remove rough edges. Where conduit is threaded in the field, a standard cutting die with a 1 in 16 taper (3⁄4 in. taper per foot) shall be used. PVC-coated RMC shall be threaded in accordance with manufacturer's instructions to prevent damage to the exterior coating.	Revised text to require manufacturer's instructions be followed when threading conduit to prevent damage to outer coating of PVC-coated RMC and added Informational Note for reference. Impacts: No negative impact.	**2**

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Article 352	**Rigid Polyvinyl Chloride Conduit (PVC)**				
352.10(B)	[Did not exist]	FR-7561	**(B) Encased in Concrete.** PVC conduit shall be permitted to be encased in concrete.	Added section to clearly state that PVC can be encased in concrete. Impacts: No negative impact.	**1**
352.10(K)	[Did not exist]	FR-7563	**(K) Physical Damage.** Where subject to physical damage, Schedule 80 PVC conduit, Schedule 80 PVC elbows, and listed fittings for PVC conduit shall be used.	Added section to clearly state that Schedule 80 PVC can be used where subject to physical damage. Impacts: No negative impact.	**2**
352.44(B)	[Did not exist]	FR-7571	**(B) Earth Movement.** Expansion fittings for underground runs of direct buried PVC conduit emerging from the ground shall be provided above grade when required to compensate for earth settling or movement, including frost heave.	Added section to address frost heave with expansion fittings. Impacts: No negative impact.	**2**
Article 356	**Liquidtight Flexible Nonmetallic Conduit (LFNC)**				
356.10	356.10 Uses Permitted. LFNC shall be permitted to be used in exposed or concealed locations for the following purposes: (1) Where flexibility is required for installation, operation, or maintenance.	FR-7502, SR-8131	356.10 Uses Permitted. LFNC shall be permitted to be used in exposed or concealed locations for the following purposes: (1) Where flexibility is required for installation, operation, or maintenance.	Revised text in list item (5) for clarity and added permission in item (8) to allow use in corrosive environments to correlate with Article 680. Impacts: No negative impact.	**2**

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	(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids. (3) For outdoor locations where listed and marked as suitable for the purpose. (4) For direct burial where listed and marked for the purpose. (5) Type LFNC shall be permitted to be installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30. (6) Type LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size 1⁄2 through 1) conduit. (7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42. (8) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC conduit shall be permitted to be installed in LFNC, provided the conductors or cables are not		(2) Where protection of the contained conductors is required from vapors, machine oils, liquids, or solids. (3) For outdoor locations where listed and marked as suitable for the purpose. (4) For direct burial where listed and marked for the purpose. (5) Installed in lengths longer than 1.8 m (6 ft) where secured in accordance with 356.30. (6) LFNC-B as a listed manufactured prewired assembly, metric designator 16 through 27 (trade size 1⁄2 through 1) conduit. (7) For encasement in concrete where listed for direct burial and installed in compliance with 356.42. (8) In locations subject to severe corrosive influences as covered in 300.6 and where subject to chemicals for which the materials are specifically approved. (9) Conductors or cables rated at a temperature higher than the listed temperature rating of LFNC shall be permitted to be installed in LFNC, provided the conductors or cables are not		

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	operated at a temperature higher than the listed temperature rating of the LFNC.		operated at a temperature higher than the listed temperature rating of the LFNC.		
Article 358	**Flexible Metallic Tubing (EMT)**				
358.10(A)	358.10 Uses Permitted. **(A) Exposed and Concealed.** The use of EMT shall be permitted for both exposed and concealed work for the following: (1) In concrete, in direct contact with the earth or in areas subject to severe corrosive influences where installed in accordance with 358.10(B) (2) In dry, damp, and wet locations (3) In any hazardous (classified) location as permitted by other articles in this *Code*	FR-7591, SR-8159	**(A) Exposed and Concealed.** The use of EMT shall be permitted for both exposed and concealed work for the following: (1) In concrete, in direct contact with the earth, in direct burial applications with fittings identified for direct burial, or in areas subject to severe corrosive influences where installed in accordance with 358.10(B) (2) In dry, damp, and wet locations (3) In any hazardous (classified) location as permitted by other articles in this *Code* (4) For manufactured wiring systems as permitted in 604.100(A)(2)	Revised list item (3) for clarification allowing EMT in direct burial applications and added list item (4) for use in manufactured wiring systems. Impacts: No negative impact.	**2**
358.20(A)	**(A) Minimum.** EMT smaller than metric designator 16 (trade size 1⁄2) shall not be used. *Exception:*	FR-7592	**(A) Minimum.** EMT smaller than metric designator 16 (trade size 1⁄2) shall not be used. *Exception:*	Revised the exception to allow for a smaller size EMT. Impacts: No negative impact.	**2**

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	For enclosing the leads of motors as permitted in 430.245(B).		*Metric designator 12 (trade size 3/8) shall be permitted for enclosing the leads of motors as permitted in 430.245(B).*		
358.20(B)	**(B) Maximum.** The maximum size of EMT shall be metric designator 103 (trade size 4).	FR-7593	**(B) Maximum.** The maximum size of EMT shall be metric designator 155 (trade size 6).	Revised text to allow for larger size EMT. Impacts: No negative impact.	**2**
Article 362	**Electrical Nonmetallic Tubing (ENT)**				
362.10	**362.10 Uses Permitted.** For the purpose of this article, the first floor of a building shall be that floor that has 50 percent or more of the exterior wall surface area level with or above finished grade. One additional level that is the first level and not designed for human habitation and used only for vehicle parking, storage, or similar use shall be permitted. The use of ENT and fittings shall be permitted in the following: (1) In any building not exceeding three floors above grade as follows: a. For exposed work, where not prohibited by 362.12	FR-7596, SCR-124	**382.10 Uses Permitted.** Nonmetallic extensions shall be permitted only in accordance with 382.10(A), (B), and (C). **(A) From an Existing Outlet.** The extension shall be from an existing outlet on a 15- or 20-ampere branch circuit. Where a concealable nonmetallic extension originates from a non–grounding-type receptacle, the installation shall comply with 250.130(C), 406.4(D)(2)(b), or 406.4(D)(2)(c). **(B) Exposed and in a Dry Location.** The extension shall be run exposed, or concealed as permitted in 382.15, and in a dry location. **(C) Residential or Offices.** For nonmetallic surface extensions mounted directly on the surface of walls or ceilings, the building shall	Revised text for permitted uses of ENT when protected with fire sprinkler systems or encased in concrete. Impacts: No negative impact.	**2**

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	b. Concealed within walls, floors, and ceilings (2) In any building exceeding three floors above grade, ENT shall be concealed within walls, floors, and ceilings where the walls, floors, and ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies. The 15-minute-finish-rated thermal barrier shall be permitted to be used for combustible or noncombustible walls, floors, and ceilings. *Exception to (2):* *Where a fire sprinkler system(s) is installed in accordance with* **NFPA 13**-*2016, Standard for the Installation of Sprinkler Systems, on all floors, ENT shall be permitted to be used within walls, floors, and ceilings, exposed or concealed, in buildings exceeding three floors abovegrade.* (3) In locations subject to severe corrosive influences as covered		be occupied for residential or office purposes and shall not exceed three floors above grade. Where identified for the use, concealable nonmetallic extensions shall be permitted more than three floors above grade.		

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	in 300.6 and where subject to chemicals for which the materials are specifically approved. (4) In concealed, dry, and damp locations not prohibited by 362.12. (5) Above suspended ceilings where the suspended ceilings provide a thermal barrier of material that has at least a 15-minute finish rating as identified in listings of fire-rated assemblies, except as permitted in 362.10(1)a. *Exception to (5):* *ENT shall be permitted to be used above suspended ceilings in buildings exceeding three floors above grade where the building is protected throughout by a fire sprinkler system installed in accordance with* **NFPA 13-***2016, Standard for the Installation of Sprinkler Systems.* (6) Encased in poured concrete, or embedded in a concrete slab on grade where ENT is placed on sand or approved				

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	screenings, provided fittings identified for this purpose are used for connections. (7) For wet locations indoors as permitted in this section or in a concrete slab on or belowgrade, with fittings listed for the purpose. (8) Metric designator 16 through 27 (trade size 1⁄2 through 1) as listed manufactured prewired assembly. (9) Conductors or cables rated at a temperature higher than the listed temperature rating of ENT shall be permitted to be installed in ENT, if the conductors or cables are not operated at a temperature higher than the listed temperature rating of the ENT.				
Article 366	**Auxiliary Gutters**				
366.10(C)	[Did not exist]	FR-7609	**(C) Extended Distance of Auxiliary Gutters.** Auxiliary gutters shall be permitted to extend a distance not greater than 9 m (30 ft) beyond the equipment that it supplements.	Added section to permit auxiliary gutters extending up to 30 feet and added exception to permit extension beyond 30 feet to correlate with 620.35. Impacts: No negative impact.	**2**
Article 369	[Did not exist]	FR-7620, SR-8151	**Article 369 Insulated Bus Pipe (IBP)/Tubular Covered Conductors (TCC) Systems.**	Created new Article 369. Insulated Bus Pipe (IBP), also known as Tubular Covered Conductor (TCC). IBP may achieve listing under the UL	**2**

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				category of CVZL using the requirements published in UL 1366 the Outline of Investigation for Insulated Bus Pipe. Impacts: No negative impact.	
Article 370	**Cablebus**				
370.10	**370.10 Uses Permitted.** Approved cablebus shall be permitted: (1) At any voltage or current for which spaced conductors are rated and where installed only for exposed work, except as permitted in 370.18 (2) For branch circuits, feeders, and services (3) To be installed outdoors or in corrosive, wet, or damp locations where identified for the use	FR-7612	**370.10 Uses Permitted.** Cablebus shall be permitted as follows: (1) At any voltage or current for which spaced conductors are rated and where installed only for exposed work, except as permitted in 370.18 (2) For branch circuits, feeders, and services (3) To be installed indoors, outdoors, or in corrosive, wet, or damp locations where identified for the use	Revised text for clarity and added "indoors" to list item (3) to clarify cablebus can be used indoors. Impacts: No negative impact.	**1**
370.18	**370.18 Cablebus Installation.** **(A) Transversely Routed.** Cablebus shall be permitted to extend transversely through partitions or walls, other than fire walls, provided that the section within the wall is continuous, protected against physical damage, and unventilated.	FR-7613	**370.18 Cablebus Installation.** Cablebus shall be permitted to extend transversely through partitions and walls or vertically through platforms and floors in wet or dry locations where the installation, complete with the installed cables, is made in accordance with 300.21.	Revised text and removed firestop requirements by referencing 300.21. Impacts: No negative impact.	**2**

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	(B) Through Dry Floors and Platforms. Except where firestops are required, cablebus shall be permitted to extend vertically through dry floors and platforms, provided that the cablebus is totally enclosed at the point where it passes through the floor or platform and for a distance of 1.8 m (6 ft) above the floor or platform. **(C) Through Floors and Platforms in Wet Locations.** Except where firestops are required, cablebus shall be permitted to extend vertically through floors and platforms in wet locations where: (1) There are curbs or other suitable means to prevent waterflow through the floor or platform opening, and (2) Where the cablebus is totally enclosed at the point where it passes through the floor or platform and for a distance of 1.8 m (6 ft) above the floor or platform.				
Article 371	[Did not exist]	FR-7621, SR-8156	**Article 371 Flexible Bus Systems**	Created new article 371. This new Article recognizes flexible bus systems as a wiring method. Impacts: No negative impact.	**2**
Article 376	**Metal Wireways**				

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376.60	[Did not exist]	FR-7619	**376.60 Grounding.** Listed metal wireway shall be permitted as an equipment grounding conductor in accordance with 250.118(A)(13).	Added section that permits a listed metal wireway to be used as an equipment grounding conductor. Impacts: No negative impact.	**2**
Article 393	**Low-Voltage Suspended Ceiling Power Distribution Systems**				
393.60	**393.60 Grounding.** **(A) Grounding of Supply Side of Class 2 Power Source.** The supply side of the Class 2 power source shall be connected to an equipment grounding conductor in accordance with the applicable requirements in Part IV of Article 250. **(B) Grounding of Load Side of Class 2 Power Source.** Class 2 load side circuits for suspended ceiling low-voltage power grid distribution systems shall not be grounded.	FR-7660	**393.60 Equipment Grounding Conductor.** The supply side of the Class 2 power source shall be connected to an equipment grounding conductor in accordance with the applicable requirements in Part IV of Article 250.	Revised section title to "Equipment Grounding Conductor" and removed load side requirements as they are addressed in 393.61. Impacts: No negative impact.	**1**
393.61	**(B) Grounding of Load Side of Class 2 Power Source.** Class 2 load side circuits for suspended ceiling low-voltage power grid distribution systems shall not be grounded.	FR-7660	393.61 Grounding of Load Side of Class 2 Power Source. Class 2 load side circuits for suspended ceiling low-voltage power grid distribution systems shall be permitted to be grounded.	Revised to replace "shall not be grounded" with "shall be permitted to be grounded." Impacts: No negative impact.	**2**

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Article 395	[Did not exist]	FR-8560	**Article 395 Outdoor Overhead Conductors over 1000 Volts**	Relocated requirements from former Article 399 to create new Article 395. Impacts: No negative impact.	**1**

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Chapter 4 Equipment for General Use					
Article 400	**Flexible Cords and Flexible Cables**				
400.4	See Tables.	FR-8612	See Tables.	Revised Note 2 of Table 400.4 to add an allowance for communications cables, to reflect the need for data transfer in elevator installations, and to correlate with changes in other section. Impacts: No negative impact.	**2**
400, Part III	**Part III. Portable Cables Over 600 Volts, Nominal**	FR-8475	**Part III. Portable Cables Over 600 Volts, up to 2000 Volts, Nominal**	Revised Part III title to include a maximum of 2000 volts, assisting in establishing new Part IV. Impacts: No negative impact.	**2**
400, Part IV	[Part IV did not exist]	FR-8465	**Part IV. Portable Power Feeder Cables Over 2000 Volts, Nominal**	Added Part IV to address portable power feeder cables over 2000 volts, nominal. Impacts: No negative impact.	**2**
Article 404	**Switches**				
404.2(C)	**(C) Switches Controlling Lighting Loads.** The grounded circuit conductor for the controlled lighting circuit shall be installed at the location where switches control lighting loads that are supplied by a grounded general-purpose branch circuit serving bathrooms, hallways, stairways, and habitable rooms or occupiable spaces as defined in the applicable	FR-7883	**(C) Switches Controlling Lighting Loads.** The grounded circuit conductor for the controlled lighting circuit shall be installed at the location where switches control lighting loads that are supplied by a grounded general-purpose branch circuit serving bathrooms, hallways, stairways, and habitable rooms or occupiable spaces as defined in the applicable building code. Where multiple switch	Removed the allowance that the grounded conductor would not be required to be installed at a lighting switch location where the box enclosing the switch is accessible for the installation of an additional or replacement cable without removing finish materials. Although the box may be accessible, the ease of installation of the grounded conductor after the initial installation is likely to be	**2**

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	building code. Where multiple switch locations control the same lighting load such that the entire floor area of the room or space is visible from the single or combined switch locations, the grounded circuit conductor shall only be required at one location. A grounded conductor shall not be required to be installed at lighting switch locations under any of the following conditions: (1) Where conductors enter the box enclosing the switch through a raceway, provided that the raceway is large enough for all contained conductors, including a grounded conductor (2) Where the box enclosing the switch is accessible for the installation of an additional or replacement cable without removing finish materials (3) Where snap switches with integral enclosures comply with 300.15(E) (4) Where lighting in the area is controlled by automatic means		locations control the same lighting load such that the entire floor area of the room or space is visible from the single or combined switch locations, the grounded circuit conductor shall only be required at one location. A grounded conductor shall not be required to be installed at lighting switch locations under any of the following conditions: (1) Where conductors enter the box enclosing the switch through a raceway, provided that the raceway is large enough for all contained conductors, including a grounded conductor (2) Where snap switches with integral enclosures comply with 300.15(E) (3) Where lighting in the area is controlled by automatic means (4) Where a switch controls a receptacle load The grounded conductor shall be extended to any switch location as necessary and shall be connected to switching devices that require line-to-neutral voltage to operate the electronics of the switch in the standby mode and shall meet the requirements of 404.22.	exceedingly more difficult than during the initial installation. Impacts: No negative impact.	

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	(5) Where a switch controls a receptacle load The grounded conductor shall be extended to any switch location as necessary and shall be connected to switching devices that require line-to-neutral voltage to operate the electronics of the switch in the standby mode and shall meet the requirements of 404.22. *Exception:* *The connection requirement shall become effective on January 1, 2020. It shall not apply to replacement or retrofit switches installed in locations prior to local adoption of 404.2(C) and where the grounded conductor cannot be extended without removing finish materials. The number of electronic control switches on a branch circuit shall not exceed five, and the number connected to any feeder on the load side of a system or main bonding jumper shall not exceed 25. For the purpose of this exception, a neutral busbar, in compliance with 200.2(B) and to which a main or system bonding jumper is connected shall not be*		*Exception:* *The connection requirement shall not apply to replacement or retrofit switches installed in locations prior to local adoption of 404.2(C) and where the grounded conductor cannot be extended without removing finish materials. The number of electronic control switches on a branch circuit shall not exceed five, and the number connected to any feeder on the load side of a system or main bonding jumper shall not exceed 25. For the purpose of this exception, a neutral busbar, in compliance with 200.2(B) and to which a main or system bonding jumper is connected shall not be limited as to the number of electronic lighting control switches connected.*		

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	limited as to the number of electronic lighting control switches connected.				
404.30	[Did not exist]	FR-7861, SR-7566	404.30 Switch Enclosures with Doors. Switch mechanisms mounted within enclosures with doors that, when opened, expose uninsulated live parts shall be constructed so that when the switch is in the closed position access to the switch interior is restricted. Access to the interior with the switch in the closed position shall require the use of a tool or an approved design that provides equivalent protection from access by unqualified persons.	Added section covering switch enclosures with doors. Switches of this type may allow access to live parts with the door open that the user may contact. This change will restrict access to qualified persons. Impacts: No negative impact.	**2**
Article 406	**Receptacles, Cord Connectors, and Attachments Plugs (Caps)**				
406.3(D)	**(D) Isolated Ground Receptacles.** Receptacles incorporating an isolated equipment grounding conductor connection intended for the reduction of electromagnetic interference as permitted in 250.146(D) shall be identified by an orange triangle located on the face of the receptacle. **(1) Isolated Equipment Grounding Conductor Required.**	FR-7601, SCR-13	**(D) Receptacle Terminations.** Receptacle terminations shall be in accordance with the following: (1) Terminals of 15-ampere and 20-ampere receptacles not marked CO/ALR shall be used with copper and copper-clad aluminum conductors only.	Added section covering receptacle terminations. Section addressing receptacles for copper-clad aluminum conductors has been modified to reflect the addition of copper-clad aluminum as it relates to a receptacle terminal construction. Impacts: No negative impact.	**2**

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	Receptacles so identified shall be used only with equipment grounding conductors that are isolated in accordance with 250.146(D). **(2) Installation in Nonmetallic Boxes.** Isolated ground receptacles installed in nonmetallic boxes shall be covered with a nonmetallic faceplate. *Exception:* *Where an isolated ground receptacle is installed in a nonmetallic box, a metal faceplate shall be permitted if the box contains a feature or accessory that permits the connection of the faceplate to the equipment grounding conductor.*		(2) Terminals marked CO/ALR shall be permitted to be used with aluminum, copper, and copper-clad aluminum conductors. (3) Receptacles installed using screwless terminals of the conductor push-in type construction (also known as *push-in-terminals*) shall be installed on not greater than 15-ampere branch circuits and shall be connected with 14 AWG solid copper wire only unless listed and marked for other types of conductors.		
406.4(D)(8)	[Did not exist]	FR-7570	**(8) Ground-Fault Protection of Equipment (GFPE).** Receptacles shall be provided with GFPE where replacements are made at receptacle outlets that are required to be so protected elsewhere in this *Code*.	Added section covering ground-fault protection of equipment (GFPE) when receptacle replacements are made. Impacts: No negative impact.	**2**
406.4(G)	[Did not exist]	FR-7667, FR-7668, SR-8147	**(G) Protection of Floor Receptacles.** Protection for floor receptacles shall be in accordance with the following:	Added section covering protection of floor receptacles using relocated requirements from former 406.9(D) and adding a GFCI requirement for all areas where liquids spillage may be present.	**2**

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			(1) Physical protection of floor receptacles shall allow floor-cleaning equipment to be operated without damage to receptacles. (2) All 125-volt, single-phase, 15- and 20-ampere floor receptacles installed in food courts and waiting spaces of passenger transportation facilities where food or drinks are allowed shall be GFCI protected.	Impacts: No negative impact.	
406.6(D)	**(D) Receptacle Faceplate (Cover Plates) with Integral Night Light and/or USB Charger.** A flush device cover plate that additionally provides a night light and/or Class 2 output connector(s) shall be listed and constructed such that the night light and/or Class 2 circuitry is integral with the flush device cover plate.	FR-7564, SR-8143	**(D) Receptacle Faceplate (Cover Plates) with Integral Night Light and/or USB Charger.** A flush device cover plate that additionally provides a night light and/or Class 2 output connector(s) shall be listed and constructed such that the night light and/or Class 2 circuitry is integral with the flush device cover plate. Listed receptacle faceplates with integral night light, USB charger, or both, that rely solely on spring-tensioned contacts shall be connected to only brass or copper alloy receptacle terminal screws and shall be rated 1 watt or less. *Exception:* *Effective January 1, 2026, spring-tensioned contact connections to steel receptacle terminal screws shall*	Revised to address faceplates with integral night lights and USB chargers and added a new exception covering spring-tensioned contact connections of faceplates. Impacts: No negative impact.	**2**

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			be permitted if the receptacle faceplate is specifically listed and identified for connection to steel receptacle terminal screws.		
Article 409	**Industrial Control Panels**				
409.60	409.60 Grounding. Multisection industrial control panels shall be bonded together with an equipment grounding conductor or an equivalent equipment grounding bus sized in accordance with Table 250.122. Equipment grounding conductors shall be connected to this equipment grounding bus or to an equipment grounding termination point provided in a single-section industrial control panel.	FR-8056, SR-7664	409.60 Bonding. Industrial control panels shall be grounded and bonded in accordance with 409.60(A) and (B). **(A) Grounding.** An equipment grounding conductor sized in accordance with 250.122 shall be connected to an equipment grounding bus or to an equipment grounding termination point provided in a single-section industrial control panel. **(B) Bonding.** Multisection industrial control panels shall be bonded together using an equipment bonding jumper sized in accordance with 250.102(D).	Revised section for clarity around grounding and bonding of industrial control panels. Impacts: No negative impact.	**2**
409.70	[Did not exist]	FR-8053, SR-7680	**409.70 Surge Protection.** Safety circuits for personnel protection that are subject to damage from surge events shall have surge	Added section covering surge protection. This first revision to require surge protective devices addresses a documented safety issue that has been reported by the Electrical Safety Foundation. This language provides consistency	**2** **16050?**

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			protection installed within or immediately adjacent to the control panel.	with requirements for industrial machinery in Article 670. Impacts: No negative impact.	
Article 410	**Luminaires, Lampholders, and Lamps**				
410.10(F)	**(F) Luminaires Installed in or Under Roof Decking.** Luminaires installed in exposed or concealed locations under metal-corrugated sheet roof decking shall be installed and supported so there is not less than 38 mm (1 1⁄2 in.) measured from the lowest surface of the roof decking to the top of the luminaire.	FR-7656, SR-8165	**(F) Luminaires Installed in or Under Roof Decking.** Luminaires installed in exposed or concealed locations under roof decking where subject to physical damage shall be installed and supported so there is not less than 38 mm (1 1⁄2 in.) measured from the lowest surface of the roof decking to the top of the luminaire. *Exception:* *The 38 mm (1 1⁄2 in.) spacing is not required where metal-corrugated sheet roof decking is covered with a minimum thickness 50 mm (2 in.) concrete slab, measured from the top of the corrugated roofing.*	Revised to add "where subject to physical damage" and to add exception that recognizes additional protection provided by concrete slab. Impacts: No negative impact.	**2**
410.71	[Did not exist]	FR-7640, SR-8172	**410.71 Disconnecting Means for Fluorescent or LED Luminaires that Utilize Double-Ended Lamps.** **(1) General.** In indoor locations other than dwellings and associated accessory structures, fluorescent or LED luminaires that utilize double-ended lamps and	Added section covering requirements for disconnecting means for fluorescent and LED luminaires that utilize double-ended lamps. Impacts: No negative impact.	**2**

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			contain ballast(s) or LED driver(s) that can be serviced in place shall have a disconnecting means either internal or external to each luminaire. For existing installed luminaires without disconnecting means, at the time a ballast or LED driver is added or replaced a disconnecting means shall be installed. The line side terminals of the disconnecting means shall be guarded. *Exception No. 1:* *A disconnecting means shall not be required for luminaires installed in hazardous (classified) location(s).* *Exception No. 2:* *A disconnecting means shall not be required for luminaires that provide emergency illumination required in 700.16.* *Exception No. 3:* *For cord-and-plug-connected luminaires, an accessible separable connector or an accessible plug and receptacle shall be permitted to serve as the disconnecting means.* *Exception No. 4:*		

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			Disconnecting means shall not be required for every luminaire in a building area if all of the following conditions apply: *(1) More than one luminaire is installed in the building area* *(2) The luminaires are not connected to a multiwire branch circuit* *(3) The design of the installation includes disconnecting means* *(4) The building area will not be left in total darkness should only one disconnect be opened* **(2) Multiwire Branch Circuits.** When connected to multiwire branch circuits, the disconnecting means shall simultaneously break all the supply conductors to the ballast, including the grounded conductor. **(3) Location.** The disconnecting means shall be located so as to be accessible to qualified persons before servicing or maintaining the ballast. Where the disconnecting means is external to the luminaire, it shall be a single		

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			device, and it shall be attached to the luminaire or the luminaire shall be located within sight of the disconnecting means.		
Article 411	**Low-Voltage Lighting**				
411.3	[Did not exist]	SR-8186	**411.3 Voltage Limitations.** The operating voltage of low-voltage lighting systems and their associated components shall not exceed 30 volts ac or 60 volts dc. If wet contact is likely to occur, the operating voltage of low-voltage lighting systems and their associated components shall not exceed 15 volts ac or 30 volts dc.	Added section covering voltage limitations for low-voltage lighting systems. Impacts: No negative impact.	**2**
411.6(A)	**(A) Grounding.** Secondary circuits shall not be grounded.	FR-7652	**411.7(A)** **(A) Grounding.** Secondary circuits shall not be grounded. *Exception:* *Secondary circuits supplied by a Class 2 power source listed and identified as suitable for secondary grounding shall be permitted to be grounded.*	Revised to add an exception covering secondary circuits supplied by a Class 2 power source. Impacts: No negative impact.	**2**
Article 424	**Fixed Electric Space-Heating Equipment**				
424.4(B)	**(B) Branch-Circuit Sizing.** The branch-circuit conductors for fixed electric space-heating equipment and any associated motors shall be sized not smaller than 125 percent of the load.	FR-8617, SR-8222	**(B) Branch-Circuit Conductor Sizing.** The branch-circuit conductor(s) ampacity shall not be less than 125 percent of the load of the fixed electric space-heating equipment and any associated motor(s).	Revised to clarify that the 125 percent load requirement applies to both the equipment and any associated motor(s). Impacts: No negative impact.	**2**

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424.48	[Did not exist]	FR-8618, SR-8354	**424.48 Installation of Cables in Walls.** Unless prohibited by 424.38(B), heating cables and cable sets shall be permitted to be installed in, on, or behind walls provided all of the following are met: (1) Heating cables and cable sets shall be identified as suitable for installation in, on, or behind walls. (2) Heating cables and cable sets shall be GFCI protected. (3) Grounding means, such as copper braid, metal sheath, or other approved means, shall be provided. (4) Heating cables and cable sets shall be AFCI protected. (5) Heating cables and cable sets shall be permitted to be installed no more than 1.2 m (4 ft) above the floor. This requirement shall become effective January 1, 2026.	Added section covering requirements for heating cables installed in walls. Impacts: No negative impact.	**2**

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424.93(C)	[Did not exist]	FR-8692	**C) Installation of Heating Panels in Walls.** Unless prohibited by 424.93(A)(2), heating panels shall be permitted to be installed in, on, or behind walls provided all of the following are met: (1) Heating panels shall be identified as suitable for installation in, on, or behind walls. (2) Heating panels shall be installed per the manufacturer's instructions and in accordance with the product listing. (3) Heating panels shall be GFCI protected. (4) Grounding means, such as copper braid, metal sheath, or other approved means, shall be provided. (5) Heating panels shall be AFCI protected. (6) Heating panels shall be permitted to be installed no more than 1.2 m (4 ft) above the floor. *Exception:* *Low-voltage heating panels shall not be required to be GFCI protected.*	Added section covering requirements for heating panels installed within walls. Impacts: No negative impact.	**2**

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			This requirement shall become effective January 1, 2026.		
Article 426	**Fixed Outdoor Electric Deicing and Snow-Melting Equipment**				
426.28	**426.28 Ground-Fault Protection of Equipment.** Ground-fault protection of equipment shall be provided for fixed outdoor electric deicing and snow-melting equipment.	FR-8674	**426.28 Ground-Fault Protection.** Ground-fault protection shall be provided for fixed outdoor electric deicing and snow-melting equipment. The trip level of ground-fault protection shall be as specified by the manufacturer.	Revised to allow the ground fault trip level to be specified by the manufacturer. Impacts: No negative impact.	**2**
Article 430	**Motor, Motor Circuits, and Controllers**				
430.7(A)	**(A) Usual Motor Applications.** A motor shall be marked with the following information: (1) Manufacturer's name. (2) Rated volts and full-load current. For a multispeed motor, full-load current for each speed, except shaded-pole and permanent-split capacitor motors where amperes are required only for maximum speed. (3) Rated frequency and number of phases if an ac motor. (4) Rated full-load speed.	FR-8031	**(A) Usual Motor Applications.** A motor shall be marked with the following information: (1) Manufacturer's name. (2) Rated volts and full-load current. For a multispeed motor, full-load current for each speed, except shaded-pole and permanent-split capacitor motors where amperes are required only for maximum speed. (3) Rated frequency and number of phases if an ac motor. (4) Rated full-load speed.	Revised section to include design letter A motors. Impacts: No negative impact.	**2**

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	(5) Rated temperature rise or the insulation system class and rated ambient temperature. (6) Time rating. The time rating shall be 5, 15, 30, or 60 minutes, or continuous. (7) Rated horsepower if 1⁄8 hp or more. For a multispeed motor 1⁄8 hp or more, rated horsepower for each speed, except shaded-pole and permanent-split capacitor motors 1⁄8 hp or more where rated horsepower is required only for maximum speed. Motors of arc welders are not required to be marked with the horsepower rating. (8) Code letter or locked-rotor amperes if an alternating-current motor rated 1⁄2 hp or more. On polyphase wound-rotor motors, the code letter shall be omitted. (9) Design letter for design B, C, or D motors. (10) Secondary volts and full-load current if a wound-rotor induction motor.		(5) Rated temperature rise or the insulation system class and rated ambient temperature. (6) Time rating. The time rating shall be 5, 15, 30, or 60 minutes, or continuous. (7) Rated horsepower if 1⁄8 hp or more. For a multispeed motor rated 1⁄8 hp or more, rated horsepower for each speed, except shaded-pole and permanent-split capacitor motors rated 1⁄8 hp or more where rated horsepower is required only for maximum speed. Motors of arc welders are not required to be marked with the horsepower rating. (8) Code letter or locked-rotor amperes if an alternating-current motor rated 1⁄2 hp or more. On polyphase wound-rotor motors, the code letter shall be omitted. (9) Design letter for design A, B, C, or D motors. (10) Secondary volts and full-load current if a wound-rotor induction motor. (11) Field current and voltage for dc excited synchronous motors.		

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	(11) Field current and voltage for dc excited synchronous motors. (12) Winding — straight shunt, stabilized shunt, compound, or series, if a dc motor. Fractional horsepower dc motors 175 mm (7 in.) or less in diameter shall not be required to be marked. (13) A motor provided with a thermal protector complying with 430.32(A)(2) or (B)(2) shall be marked "thermally protected." Thermally protected motors rated 100 watts or less and complying with 430.32(B)(2) shall be permitted to use the abbreviated marking "T.P." (14) A motor complying with 430.32(B)(4) shall be marked "impedance protected." Impedance-protected motors rated 100 watts or less and complying with 430.32(B)(4) shall be permitted to use the abbreviated marking "Z.P." (15) Motors equipped with electrically powered condensation prevention heaters shall be marked with the rated heater		(12) Winding — straight shunt, stabilized shunt, compound, or series, if a dc motor. Fractional horsepower dc motors 175 mm (7 in.) or less in diameter shall not be required to be marked. (13) A motor provided with a thermal protector complying with **430.32(A)(2)** or (B)(2) shall be marked "thermally protected." Thermally protected motors rated 100 watts or less and complying with **430.32(B)(2)** shall be permitted to use the abbreviated marking "T.P." (14) A motor complying with **430.32(B)(4)** shall be marked "impedance protected." Impedance-protected motors rated 100 watts or less and complying with **430.32(B)(4)** shall be permitted to use the abbreviated marking "Z.P." (15) Motors equipped with electrically powered condensation prevention heaters shall be marked with the rated heater voltage, number of phases, and the rated power in watts. (16) Motors that are electronically protected from overloads in accordance with **430.32(A)(2)** and (B)(2) shall be marked "electronically protected" or "E.P."		

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	voltage, number of phases, and the rated power in watts. (16) Motors that are electronically protected from overloads in accordance with 430.32(A)(2) and (B)(2) shall be marked "electronically protected" or "E.P."				
430.52(C) [See also Tables]	**(C) Rating or Setting.** **(1) In Accordance with Table 430.52.** A protective device that has a rating or setting not exceeding the value calculated according to the values given in Table 430.52 shall be used. [Table 430.52] *Exception No. 1:* *Where the values for branch-circuit short-circuit and ground-fault protective devices determined by Table 430.52 do not correspond to the standard sizes or ratings of fuses, nonadjustable circuit breakers, thermal protective devices, or possible settings of adjustable circuit breakers, a higher size, rating, or possible setting that does not exceed the next higher standard ampere rating shall be permitted.*	FR-8009	**(C) Rating or Setting.** **(1) In Accordance with Table 430.52(C)(1).** A protective device that has a rating or setting not exceeding the value calculated according to the values given in **Table 430.52(C)(1)** shall be used unless otherwise permitted in 430.52(C)(1)(a) or (C)(1)(b). [Table 430.52©(1) (a) Where the values as determined by **Table 430.52(C)(1)** do not correspond to the standard ampere ratings and settings provided in 240.6, the next higher standard rating or setting shall be permitted. (b) Where the rating specified in **Table 430.52(C)(1)**, or the rating modified by 430.52(C)(1)(a), is not sufficient for the starting current of the motor, any of the following shall apply:	Revised section and Table 430.52(C)(1) to include Design B premium efficiency motors. Impacts: No negative impact.	**2**

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	Exception No. 2: *Where the rating specified in Table 430.52, or the rating modified by Exception No. 1, is not sufficient for the starting current of the motor:* *(1) The rating of a nontime-delay fuse not exceeding 600 amperes or a time-delay Class CC fuse shall be permitted to be increased but shall in no case exceed 400 percent of the full-load current.* *(2) The rating of a time-delay (dual-element) fuse shall be permitted to be increased but shall in no case exceed 225 percent of the full-load current.* *(3) The rating of an inverse time circuit breaker shall be permitted to be increased but shall in no case exceed 400 percent for full-load currents of 100 amperes or less or 300 percent for full-load currents greater than 100 amperes.* *(4) The rating of a fuse of 601–6000 ampere classification shall be permitted to be increased but shall in no case*		(1) The rating of a nontime-delay fuse not exceeding 600 amperes or a time-delay Class CC fuse shall be permitted to be increased but shall in no case exceed 400 percent of the full-load current. (2) The rating of a time-delay (dual-element) fuse shall be permitted to be increased but shall in no case exceed 225 percent of the full-load current. (3) The rating of an inverse time circuit breaker shall be permitted to be increased but shall in no case exceed 400 percent for full-load currents of 100 amperes or less or 300 percent for full-load currents greater than 100 amperes. (4) The rating of a fuse of 601–6000 ampere classification shall be permitted to be increased but shall in no case exceed 300 percent of the full-load current. **(2) Overload Relay Table.** Where maximum branch-circuit short-circuit and ground-fault protective device ratings are shown in		

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	exceed 300 percent of the full-load current. **(2) Overload Relay Table.** Where maximum branch-circuit short-circuit and ground-fault protective device ratings are shown in the manufacturer's overload relay table for use with a motor controller or are otherwise marked on the equipment, they shall not be exceeded even if higher values are allowed as shown above. **(3) Instantaneous Trip Circuit Breaker.** An instantaneous trip circuit breaker shall be used only if adjustable and if part of a listed combination motor controller having coordinated motor overload and short-circuit and ground-fault protection in each conductor, and the setting is adjusted to no more than the value specified in Table 430.52. *Exception No. 1:* *Where the setting specified in Table 430.52 is not sufficient for the starting current of the motor, the setting of an instantaneous trip circuit breaker shall be permitted to be*		the manufacturer's overload relay table for use with a motor controller or are otherwise marked on the equipment, they shall not be exceeded even if higher values are allowed as shown above. **(3) Instantaneous-Trip Circuit Breaker.** An instantaneous-trip circuit breaker shall be permitted if the conditions of 430.52(C)(3)(a) and (C)(3)(b) are met. (a) *Application.* Instantaneous-trip circuit breakers shall be adjustable and part of a listed combination motor controller having coordinated motor overload and short-circuit and ground-fault protection in each conductor. (b) *Setting.* The instantaneous-trip circuit breaker shall be adjusted to a setting in accordance with one of the following: (1) No greater than the value specified in **Table 430.52(C)(1)** (2) Where the value specified in **Table 430.52(C)(1)** is not sufficient for the starting current of the motor, one of the following settings shall be permitted:		

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	increased but shall in no case exceed 1300 percent of the motor full-load current for other than Design B energy-efficient motors and no more than 1700 percent of motor full-load current for Design B energy-efficient motors. Trip settings above 800 percent for other than Design B energy-efficient motors and above 1100 percent for Design B energy-efficient motors shall be permitted where the need has been demonstrated by engineering evaluation. In such cases, it shall not be necessary to first apply an instantaneous-trip circuit breaker at 800 percent or 1100 percent. *Exception No. 2:* *Where the motor full-load current is 8 amperes or less, the setting of the instantaneous-trip circuit breaker with a continuous current rating of 15 amperes or less in a listed combination motor controller that provides coordinated motor branch-circuit overload and short-circuit and ground-fault protection shall be permitted to be increased to the value marked on the controller.* **(4) Multispeed Motor.**		a. Motors other than design B energy-efficient and Design B premium efficiency motors shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current. b. Design B energy-efficient and Design B premium efficiency motors shall be permitted to be increased but shall in no case exceed 1700 percent of the motor full-load current. c. Where an engineering analysis determines the value is not sufficient for the starting current of the motor, it shall not be necessary to first apply the value specified in Table 430.52(C)(1). (3) Where the motor full-load current is 8 amperes or less, the setting of the instantaneous-trip circuit breaker with a continuous current rating of 15 amperes or less in a listed combination motor controller that provides coordinated		

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	For a multispeed motor, a single short-circuit and ground-fault protective device shall be permitted for two or more windings of the motor, provided the rating of the protective device does not exceed the above applicable percentage of the nameplate rating of the smallest winding protected. *Exception:* *For a multispeed motor, a single short-circuit and ground-fault protective device shall be permitted to be used and sized according to the full-load current of the highest current winding, where all of the following conditions are met:* *(1) Each winding is equipped with individual overload protection sized according to its full-load current.* *(2) The branch-circuit conductors supplying each winding are sized according to the full-load current of the highest full-load current winding.* *(3) The controller for each winding has a horsepower rating not less than that*		motor branch-circuit overload and short-circuit and ground-fault protection shall be permitted to be increased to the value marked on the motor controller. **(4) Multispeed Motor.** For a multispeed motor, a single short-circuit and ground-fault protective device shall be permitted for two or more windings of the motor if the rating of the protective device does not exceed the above applicable percentage of the nameplate rating of the smallest winding protected. *Exception:* *For a multispeed motor, a single short-circuit and ground-fault protective device shall be permitted to be used and sized according to the full-load current of the highest current winding, where all of the following conditions are met:* *(1) Each winding is equipped with individual overload protection sized according to its full-load current.* *(2) The branch-circuit conductors supplying each winding are sized according to the full-*		

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	required for the winding having the highest horsepower rating. **(5) Power Electronic Devices.** Semiconductor fuses intended for the protection of electronic devices shall be permitted in lieu of devices listed in Table 430.52 for power electronic devices, associated electromechanical devices (such as bypass contactors and isolation contactors), and conductors in a solid-state motor controller system, provided that the marking for replacement fuses is provided adjacent to the fuses. **(6) Self-Protected Combination Controller.** A listed self-protected combination controller shall be permitted in lieu of the devices specified in Table 430.52. Adjustable instantaneous-trip settings shall not exceed 1300 percent of full-load motor current for other than Design B energy-efficient motors and not more than 1700 percent of full-load motor current for Design B energy-efficient motors.		*load current of the highest full-load current winding.* *(3) The motor controller for each winding has a horsepower rating not less than that required for the winding having the highest horsepower rating.* **(5) Power Electronic Devices.** Semiconductor fuses intended for the protection of electronic devices shall be permitted in lieu of devices listed in **Table 430.52(C)(1)** for power electronic devices, associated electromechanical devices (such as bypass contactors and isolation contactors), and conductors in a solid-state motor controller system if the marking for replacement fuses is provided adjacent to the fuses. **(6) Self-Protected Combination Motor Controller.** A listed self-protected combination motor controller shall be permitted in lieu of the devices specified in **Table 430.52(C)(1)**. Adjustable instantaneous-trip settings shall not exceed 1300 percent of the full-load motor current for other than Design B energy-efficient and Design B premium efficiency motors and not more than 1700 percent of the full-load		

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	(7) Motor Short-Circuit Protector. A motor short-circuit protector shall be permitted in lieu of devices listed in Table 430.52 if the motor short-circuit protector is part of a listed combination motor controller having coordinated motor overload protection and short-circuit and ground-fault protection in each conductor and it will open the circuit at currents exceeding 1300 percent of motor full-load current for other than Design B energy-efficient motors and 1700 percent of motor full-load motor current for Design B energy-efficient motors.		motor current for Design B energy-efficient and Design B premium efficiency motors. **(7) Motor Short-Circuit Protector.** A motor short-circuit protector shall be permitted in lieu of devices listed in **Table 430.52(C)(1)** if the motor short-circuit protector is part of a listed combination motor controller having coordinated motor overload protection and short-circuit and ground-fault protection in each conductor and it will open the circuit at currents exceeding 1300 percent of the motor full-load current for other than Design B energy-efficient and Design B premium efficiency motors and 1700 percent of the motor full-load current for Design B energy-efficient and Design B premium efficiency motors.		
430.83(F)	[Did not exist]	FR-8034	**(F) Short-Circuit Current Rating.** A motor controller shall not be installed where the available fault current exceeds the motor controller's short-circuit current rating.	Added section to provide requirements for the motor controller short-circuit rating. Impacts: No negative impact.	**2**
430.204	[Did not exist]	FR-8044	**430.204 Wire-Bending Space in Enclosures.**	Added section with requirements for wire-bending space in motor controller enclosures. Impacts: No negative impact.	**2**

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			Motor controllers rated over 1000 volts shall provide wire-bending space within the enclosure for conductors installed in accordance with 305.5.		
430.205	**430.224 Size of Conductors.** Conductors supplying motors shall have an ampacity not less than the current at which the motor overload protective device(s) is selected to trip.	FR-8045, SR-7555	**430.205 Size of Conductors.** The ampacities of conductors supplying equipment rated over 1000 volts, nominal, shall be determined in accordance with 315.60or 430.205(A) and (B). **(A) General Motor Systems.** Conductors supplying motors shall be sized not less than the current trip setting of the motor overload protective device(s). **(B) Adjustable-Speed Drive Systems.** For an adjustable-speed drive system, the conductors supplying the power conversion equipment shall have an ampacity not less than 125 percent of the rated input current to the power conversion equipment.	Revised to reference requirements for power conversion equipment and sizing conductors used in adjustable-speed drive systems. Impacts: No negative impact.	**2**
430.206	**430.225 Motor-Circuit Overcurrent Protection.** **(A) General.** Each motor circuit shall include coordinated protection to automatically interrupt overload and fault currents in the motor, the motor-	FR-8046	**430.206 Motor-Circuit Overcurrent Protection.** **(A) General.** Each motor circuit shall include coordinated protection to automatically interrupt overload and fault currents in the motor, the motor-circuit conductors, and the motor control	Revised to reference requirements for adjustable-speed drive systems. Impacts: No negative impact.	**2**

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	circuit conductors, and the motor control apparatus. *Exception:* *Where a motor is critical to an operation and the motor should operate to failure if necessary to prevent a greater hazard to persons, the sensing device(s) shall be permitted to be connected to a supervised annunciator or alarm instead of interrupting the motor circuit.*		apparatus. Adjustable-speed drive systems with input or output voltages over 1000 volts, nominal, shall comply with 430.124 and 430.126. All other motors shall comply with 430.206(B) through (C). *Exception:* *Where a motor is critical to an operation and the motor should operate to failure if necessary to prevent a greater hazard to persons, the sensing device(s) shall be permitted to be connected to a supervised annunciator or alarm instead of interrupting the motor circuit.* **(B) Overload Protection.** **(1) Type of Overload Device.** Each motor shall be protected against dangerous heating due to motor overloads and failure to start by a thermal protector integral with the motor or external current-sensing devices, or both. Protective device settings for each motor circuit shall be determined under engineering supervision. **(2) Wound-Rotor Alternating-Current Motors.** The secondary circuits of wound-rotor ac motors, including conductors, motor controllers, and resistors rated for the application, shall be considered as		

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			protected against overcurrent by the motor overload protection means. **(3) Operation.** Operation of the overload interrupting device shall simultaneously disconnect all ungrounded conductors. **(4) Automatic Reset.** Overload sensing devices shall not automatically reset after trip unless resetting of the overload sensing device does not cause automatic restarting of the motor or there is no hazard to persons created by automatic restarting of the motor and its connected machinery. **(C) Fault-Current Protection.** **(1) Type of Protection.** Fault-current protection shall be provided in each motor circuit as specified by either 430.206(C)(1)(a) or (C)(1)(b). (a) A circuit breaker of suitable type and rating arranged so that it can be serviced without hazard. The circuit breaker shall simultaneously disconnect all ungrounded conductors. The circuit breaker shall be permitted to sense the		

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			fault current by means of integral or external sensing elements. (b) Fuses of a suitable type and rating placed in each ungrounded conductor. Fuses shall be used with suitable disconnecting means, or they shall be of a type that can also serve as the disconnecting means. They shall be arranged so that they cannot be serviced while they are energized. **(2) Reclosing.** Fault-current interrupting devices shall not automatically reclose the circuit. *Exception:* *Automatic reclosing of a circuit shall be permitted where the circuit is exposed to transient faults and where such automatic reclosing does not create a hazard to persons.* **(3) Combination Protection.** Overload protection and fault-current protection shall be permitted to be provided by the same device.		

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430.208	**430.227 Disconnecting Means.** The controller disconnecting means shall be lockable in accordance with 110.25.	FR-8047, SR-7565, SR-7569	**430.208 Disconnecting Means.** The motor controller disconnecting means shall be a switch or circuit breaker having a voltage rating not less than that of the circuit involved, and shall be lockable in accordance with 110.25. The disconnecting means shall have a current rating of not less than 100 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have a current rating not less than 100 percent of the rated input current of the power conversion equipment.	Revised to reference requirements for power conversion equipment used in adjustable-speed drive systems, added voltage and current rating requirements.	**2**
430, Part XIV	See Tables.	SR-7559	See Tables.	Revised Table 430.249 and Table 430.250 to include 2300 to 2400 volt system voltage ranges.	**2**
Article 440	**Air-Conditioning and Refrigerating Equipment**				
440.11	**440.11 General.** Part II is intended to require disconnecting means capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers from the circuit conductors.	FR-8063, SR-7604	**440.11 General.** Disconnecting means shall be capable of disconnecting air-conditioning and refrigerating equipment, including motor-compressors and controllers, from the circuit conductors. If the disconnecting means is readily accessible to unqualified persons, any enclosure door or hinged cover of a disconnecting means enclosure that	Revised section to add requirements to protect unqualified persons. Impacts: No negative impact.	**2**

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			exposes energized parts when open shall require a tool to open or be capable of being locked.		
440.14	**440.14 Location.** Disconnecting means shall be located within sight from, and readily accessible from the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or to obscure the equipment nameplate(s). *Exception No. 1:* *Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons service the equipment, a*	FR-8078	**440.14 Location.** Disconnecting means shall be located within sight from, and readily accessible from, the air-conditioning or refrigerating equipment. The disconnecting means shall be permitted to be installed on or within the air-conditioning or refrigerating equipment. Disconnecting means shall meet the working space requirements of 110.26(A). The disconnecting means shall not be located on panels that are designed to allow access to the air-conditioning or refrigeration equipment or where it obscures the equipment nameplate(s). *Exception No. 1:* *Where the disconnecting means provided in accordance with 430.102(A) is lockable in accordance with 110.25 and the refrigerating or air-conditioning equipment is essential to an industrial process in a facility with written safety procedures, and where the conditions of maintenance and supervision ensure that only qualified persons*	Revised section to reference 110.26(A) for working space requirements and deleted Informational Note No. 2. Impacts: No negative impact.	**1**

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	disconnecting means within sight from the equipment shall not be required. *Exception No. 2:* *Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.*		*service the equipment, a disconnecting means within sight from the equipment shall not be required.* *Exception No. 2:* *Where an attachment plug and receptacle serve as the disconnecting means in accordance with 440.13, their location shall be accessible but shall not be required to be readily accessible.*		
440.22(A)	**(A) Rating or Setting for Individual Motor-Compressor.** The motor-compressor branch-circuit short-circuit and ground-fault protective device shall be capable of carrying the starting current of the motor. A protective device having a rating or setting not exceeding 175 percent of the motor-compressor rated-load current or branch-circuit selection current, whichever is greater, shall be permitted, provided that, where the protection specified is not sufficient for the starting current of the motor, the rating or setting shall be permitted to be increased but shall not exceed 225 percent of the motor rated-load	FR-8081, SR-7605	**(A) Rating or Setting for Individual Motor-Compressor.** The motor-compressor branch-circuit short-circuit and ground-fault protective device shall be capable of carrying the starting current of the motor. A protective device having a rating or setting not exceeding 175 percent of the motor-compressor rated-load current or branch-circuit selection current, whichever is greater, shall be permitted. *Exception No. 1:* *If the values for branch-circuit short-circuit and ground-fault protection in accordance with 440.22(A) do not correspond to the standard sizes or ratings of fuses, nonadjustable circuit breakers, thermal protective devices, or available settings of adjustable circuit breakers, a higher size, rating, or available setting that does not exceed the*	Revised language for clarity and added two exceptions. Impacts: No negative impact.	**1**

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	current or branch-circuit selection current, whichever is greater. *Exception:* *The rating of the branch-circuit short-circuit and ground-fault protective device shall not be required to be less than 15 amperes.*		*next higher standard ampere rating shall be permitted.* *Exception No. 2:* *If the values for branch-circuit short-circuit and ground-fault protection in accordance with 440.22(A) or the rating modified by Exception No. 1 is not sufficient for the starting current of the motor, the rating or setting shall be permitted to be increased but shall not exceed 225 percent of the motor rated-load current or branch-circuit selection current, whichever is greater.* *Exception No. 3:* *The rating of the branch-circuit short-circuit and ground-fault protective device shall not be required to be less than 15 amperes.*		
Article 445	**Generators**				
445.6	**445.6 Listing.** Stationary generators 600 volts and less shall be listed. *Exception:* *One of a kind or custom manufactured generators shall be permitted to be field labeled by a field evaluation body.*	FR-8981	**445.6 Listing.** Stationary generators shall be listed. *Exception:* *One of a kind or custom manufactured generators shall be permitted to be field labeled.*	Revised section to remove voltage limitations. Impacts: No negative impact.	**2**

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445.11	**445.11 Marking.** Each generator shall be provided with a nameplate giving the manufacturer's name, the rated frequency, the number of phases if ac, the rating in kilowatts or kilovolt-amperes, the power factor, the normal volts and amperes corresponding to the rating, and the rated ambient temperature. Nameplates or manufacturer's instructions shall provide the following information for all stationary generators and portable generators rated more than 15 kW: (1) Subtransient, transient, synchronous, and zero sequence reactances (2) Power rating category (3) Temperature rise at rated load and insulation system class (4) Indication if the generator is protected against overload by inherent design, an	FR-8991, SR-8051	**445.11 Marking.** Each generator shall be provided with an accessible nameplate giving the manufacturer's name, the rated frequency, the number of phases if ac, the rating in kilowatts or kilovolt-amperes, the power factor, the normal volts and amperes corresponding to the rating, and the rated ambient temperature. Nameplates or manufacturer's instructions shall provide the following information for all stationary generators and portable generators rated more than 15 kW: (1) Alternator subtransient, transient, synchronous, and zero sequence reactances (2) Generator set power rating category (including but not limited to prime, standby, or continuous) (3) Alternator temperature rise at rated load and insulation system class (4) Indication if the generator is protected against overload by inherent design, an	Revised list items (1) and (3) and added list item (2) requiring that equipment mounted to a generator assembly cannot conceal or obscure the nameplate. Impacts: No negative impact.	**1**

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	overcurrent protective relay, a circuit breaker, or a fuse (5) Available fault current for inverter-based generators, in lieu of the synchronous, subtransient, and transient reactances Marking shall be provided by the manufacturer to indicate whether or not the generator neutral is bonded to its frame. Where the bonding is modified in the field, additional marking shall be required to indicate whether the neutral is bonded to the frame.		overcurrent protective relay, a circuit breaker, or a fuse (5) Available fault current for inverter-based generators, in lieu of the synchronous, subtransient, and transient reactances Marking shall be provided by the manufacturer to indicate whether or not the generator neutral is bonded to its frame. Where the bonding is modified in the field, additional marking shall be required to indicate whether the neutral is bonded to the frame.		
445.18	**445.18 Disconnecting Means and Emergency Shutdown.** **(A) Disconnecting Means.** Generators other than cord-and-plug-connected portable generators shall have one or more disconnecting means. Each disconnecting means shall simultaneously open all associated ungrounded conductors. Each disconnecting means shall be lockable open in accordance with 110.25.	FR-9028	**445.18 Disconnecting Means.** **(A) Disconnecting Means.** Generators other than cord-and-plug-connected portable generators shall have one or more disconnecting means. Each disconnecting means shall simultaneously open all associated ungrounded conductors. Each disconnecting means shall be lockable open in accordance with 110.25.	Revised section to split out generator emergency shutdown and to clarify requirements for generators in parallel.	**X**

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	(B) Emergency Shutdown of Prime Mover. Generators shall have provisions to shut down the prime mover. The means of shutdown shall comply with all of the following: (1) Be equipped with provisions to disable all prime mover start control circuits to render the prime mover incapable of starting (2) Initiate a shutdown mechanism that requires a mechanical reset The provisions to shut down the prime mover shall be permitted to satisfy the requirements of 445.18(A) where it is capable of being locked in the open position in accordance with 110.25. **(C) Remote Emergency Shutdown.** Generators with greater than 15 kW rating shall be provided with a remote emergency stop switch to shut down the prime mover. The remote emergency stop switch shall be located outside the equipment room or		The disconnecting means shall be permitted to be located within the generator behind a hinged cover, door, or enclosure panel. Where the generator disconnecting means is located within the generator, a field applied label meeting the requirements of 110.21(B) shall be provided indicating the location of the generator disconnecting means. **(B) Generators Installed in Parallel.** Where a generator is installed in parallel with other generators, the provisions of 445.18(A) shall be capable of isolating the generator output terminals from the paralleling system bus. The disconnecting means shall not be required to be located at the generator.		

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	generator enclosure and shall also meet the requirements of 445.18(B)(1) and (B)(2). **(D) Emergency Shutdown in One- and Two-Family Dwelling Units.** For other than cord-and-plug-connected portable generators, an emergency shutdown device shall be located outside the dwelling unit at a readily accessible location. **(E) Generators Installed in Parallel.** Where a generator is installed in parallel with other generators, the provisions of 445.18(A) shall be capable of isolating the generator output terminals from the paralleling equipment. The disconnecting means shall not be required to be located at the generator.				
Article 450	**Transformers and Transformer Vaults (Including Secondary Ties)**				
450.2	**450.2 Definition.** The definitions in this section shall apply only within this article. **Transformer.** An individual transformer, single- or polyphase, identified by a single nameplate, unless otherwise indicated in this article.	SR-7862	**450.2 Interconnection of Transformers.** Transformers shall individually comply with the requirements of this article unless specific provisions allow for interconnection and operation as a single unit.	Added section for interconnection of transformers. Impacts: No negative impact.	**2**

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450.3(B) [See also Tables]	**(B) Transformers 1000 Volts, Nominal, or Less.** Overcurrent protection shall be provided in accordance with Table 450.3(B). [Table 450.3B] *Exception:* *Where the transformer is installed as a motor control circuit transformer in accordance with 430.72(C)(1) through (C)(5).*	FR-7833	**(B) Transformers 1000 Volts, Nominal, or Less.** Overcurrent protection shall be provided in accordance with Table 450.3(B) unless the transformer is installed as a motor control circuit transformer in accordance with 430.72(C)(1) through (C)(5). [Tables 430.3(A) and (B)]	Revised to delete the exception and reformatted the notes in Table 450.3(A) and Table 450.3(B). Impacts: No negative impact.	**1**
450.43(C)	**(C) Locks.** Doors shall be equipped with locks, and doors shall be kept locked, with access being allowed only to qualified persons. Personnel doors shall open in the direction of egress and be equipped with listed fire exit hardware.	FR-7791	**(C) Accessibility.** Doors shall be equipped with locks, and doors shall be kept locked, with access being allowed only to qualified persons. Personnel doors shall be capable of opening not less than 90 degrees in the direction of egress and be equipped with listed fire exit hardware.	Revised section title to "Accessibility" and added an additional requirement for personnel doors to open at least 90 degrees. Impacts: No negative impact.	**2**
Article 460	**Capacitors**				
460.1	**460.1 Scope.** This article covers the installation of capacitors on electrical circuits. Surge capacitors or capacitors included as a component part of other apparatus and	FCR-40	**460.1 Scope.** This article covers the installation of capacitors on electrical circuits. Surge capacitors or capacitors included as a component part of other apparatus and conforming	Revised to remove last sentence of scope. Impacts: No negative impact.	**1**

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	conforming with the requirements of such apparatus are excluded from these requirements. This article also covers the installation of capacitors in hazardous (classified) locations as modified by Articles 501 through 503.		with the requirements of such apparatus are excluded from these requirements.		
460.24(A)	**(A) Load Current.** Group-operated switches shall be used for capacitor switching and shall be capable of the following: (1) Carrying continuously not less than 135 percent of the rated current of the capacitor installation (2) Interrupting the maximum continuous load current of each capacitor, capacitor bank, or capacitor installation that will be switched as a unit (3) Withstanding the maximum inrush current, including contributions from adjacent capacitor installations (4) Carrying currents due to faults on capacitor side of switch	FR-8111, SR-7598	**(A) Load Current.** Switches shall be rated for switching of capacitive loads. Capacitor switch operation shall open all ungrounded conductors and the switch shall be capable of the following: (1) Carrying continuously not less than 135 percent of the rated current of the capacitor installation (2) Interrupting the maximum continuous load current of each capacitor, capacitor bank, or capacitor installation that will be switched as a unit (3) Withstanding the maximum inrush current, including contributions from adjacent capacitor installations	Revised to clarify that switches must be rated for switching of capacitive loads and must open all ungrounded conductors. Impacts: No negative impact.	**2**

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			(4) Carrying currents due to faults on capacitor side of switch		
Article 480	**Stationary Standby Batteries**				
480.1	**480.1 Scope.** This article applies to all stationary installations of storage batteries.	FR-9030, SR-8104	**480.1 Scope** This article applies to all installations of stationary standby batteries having a capacity greater than 3.6 MJ (1 kWh).	Revised scope of Article 480 to stationary standby batteries having a capacity greater than 3.6 MJ (1 kWh) and added a reference to NFPA 855. Impacts: No negative impact.	**2**
495	**Article 490, Equipment over 1000 Volts, Nominal**	FR-7941	**Article 495, Equipment over 1000 Volts ac, 1500 Volts dc, Nominal**	Relocated requirements primarily from former Article 490 to create new Article 495, Equipment Over 1000 Volts ac, 1500 Volts dc, Nominal. Impacts: No negative impact.	**2**

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Chapter 5 Special Occupancies					
Article 500	**Hazardous (Classified) Locations, Classes I, II, and III, Divisions 1 and 2**				
500.4	**500.4 Documentation.** All areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.	FR-8955, SR-7506	**500.4 Documentation.** Areas designated as hazardous (classified) locations or determined to be unclassified shall be documented on an area classification drawing and other associated documentation. This documentation shall be available to the authority having jurisdiction (AHJ) and those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.	Revised text and Informational Notes to clarify that documentation needs to be made available to the AHJ. Impacts: No negative impact.	**2**
500.7	**500.7 Protection Techniques.** Electrical and electronic equipment in hazardous (classified) locations shall be protected by one or more of the techniques in 500.7(A) through (P).	FR-8653	**500.7 Protection Techniques.** Electrical and electronic equipment in hazardous (classified) locations shall be protected by one or more of the techniques in 500.7(A) through (P). Suitability of the protection techniques for specific hazardous locations is shown in Chapter 9, Table 13.	Revised to provide reference to new Table 13 in Chapter 9. Impacts: No negative impact.	**1**
500.7(P)	[Did not exist]	FR-8624	**(P) Protection by Electrical Resistance Trace Heating "60079-30-1".** This protection technique shall be permitted for electrical resistance trace heating equipment in Class I, Division 1; Class I, Division 2; Class II,	Added section for protection by electrical resistance trace heating "60079-30-1". Impacts: No negative impact.	**2**

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			Division 1; Class II, Division 2; Class III, Division 1; or Class III, Division 2 locations for which it is listed.		
500.7(Q)	[Did not exist]	FR-8624	**(Q) Protection by Impedance Heating "IEEE 844.3".** This protection technique shall be permitted for impedance heating equipment in Class I, Division 2; Class II, Division 2; or Class III, Division 2 locations for which it is listed.	Added section for protection by impedance heating "IEEE 844.3". Impacts: No negative impact.	**2**
500.7(R)	[Did not exist]	FR-8624	**(R) Enclosed-Break.** This protection technique shall be permitted for equipment in Class I, Division 2 locations.	Added section for enclosed-break protection. Impacts: No negative impact.	**2**
500.7(S)	[Did not exist]	FR-8624	**S) Nonsparking.** This protection technique shall be permitted for equipment in Class I, Division 2 locations.	Added section for nonsparking protection. Impacts: No negative impact.	**2**
500.7(T)	[Did not exist]	FR-8624	**(T) Sealed.** This protection technique shall be permitted for equipment in Class I, Division 2; Class II, Division 2; Class III, Division 1; or Class III, Division 2 locations.	Added section for sealed protection. Impacts: No negative impact.	**2**
500.7(U)	[Did not exist]	FR-8624, SR-7542	**(U) Special Protection Techniques.** Protection techniques not specified in 500.7(A) through (T) shall be permitted	Revised title to reflect proper context on protection permitted and revised text for clarity. Impacts: No negative impact.	**2**

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			for use in equipment listed for use in hazardous (classified) locations.		
Article 501	**Class I Locations**				
501.10(A)(1)	**(A) Class I, Division 1.** **(1) General.** In Class I, Division 1 locations, the following wiring methods shall be permitted: (1) Threaded rigid metal conduit (Type RMC) or threaded steel intermediate metal conduit (Type IMC). *Exception:* *Type PVC conduit, Type RTRC conduit, and Type HDPE conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. The concrete encasement shall be permitted to be omitted where subject to the*	FR-8647, SR-7709	**(A) Class I, Division 1.** **(1) General.** In Class I, Division 1 locations, the following wiring methods shall be permitted: (1) Threaded rigid metal conduit (RMC) or threaded intermediate metal conduit (IMC), including RMC or IMC conduit systems with supplemental corrosion protection coatings. (2) PVC conduit, RTRC conduit, or HDPE conduit, where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. The concrete encasement shall be permitted to be omitted where it is in accordance with514.8(C) or 515.8(A). RMC or IMC conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of	Revised for clarity and consistency, added Informational Note, and added cable tray applications. Impacts: No negative impact.	**2**

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	provisions of 514.8, Exception No. 2, or 515.8(A). Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts. (2) Type MI cable terminated with fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings. (3) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated		the raceway system and for grounding of non–current-carrying metal parts. (3) Type MI cable terminated with fittings listed for the location. Type MI cable shall be installed and supported to avoid tensile stress at the termination fittings. (4) In restricted industrial establishments, Type MC-HL cable listed for use in Class I, Zone 1 or Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, and a separate equipment grounding conductor(s) in accordance with 250.122, and terminated with fittings listed for the application. If installed in a ladder, ventilated trough, or ventilated channel cable tray, the cable shall be installed in accordance with 392.22. Type MC-HL cable shall be installed in accordance with Part II of Article 330. (5) In restricted industrial establishments, Type ITC-HL cable listed for use in Class I, Division 1 or Zone 1 locations, with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, terminated with fittings listed for the		

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	metallic sheath, an overall jacket of suitable polymeric material, and a separate equipment grounding conductor(s) in accordance with 250.122, and terminated with fittings listed for the application. Type MC-HL cable shall be installed in accordance with the provisions of Article 330, Part II. (4) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type ITC-HL cable listed for use in Class I, Division 1 or Zone 1 locations, with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, and terminated with fittings listed for the application, and installed in accordance with 727.4. (5) Optical fiber cable Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC shall be permitted to be installed in raceways in accordance with 501.10(A). These optical fiber cables shall be sealed in accordance with 501.15.		application, and installed in accordance with 335.4. (6) Optical fiber cable Type OFNP, Type OFCP, Type OFNR, Type OFCR, Type OFNG, Type OFCG, Type OFN, or Type OFC installed in raceways in accordance with 501.10(A). These optical fiber cables shall be sealed in accordance with 501.15. (7) In restricted industrial establishments for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage and is terminated with fittings listed for the location, Type TC-ER-HL cable. If installed in a ladder, ventilated trough, or ventilated channel cable tray, the cable shall be installed in accordance with 392.22. Type TC-ER-HL cable shall be listed for use in Class I, Division 1 or Zone 1 locations and shall be installed in accordance with 336.10. (8) In restricted industrial establishments, listed Type P cable with metal braid armor and an overall jacket, terminated with fittings listed for the location, and installed in accordance with Part II of Article 337. If installed in a ladder, ventilated trough, or ventilated channel		

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	(6) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage, and terminated with fittings listed for the location, Type TC-ER-HL cable. Type TC-ER-HL cable shall be listed for use in Class I, Division 1 or Zone 1 locations and shall be installed in accordance with 336.10. (7) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, listed Type P cable with metal braid armor, with an overall jacket, terminated with fittings listed for the location, and installed in accordance with 337.10.		cable tray, the cable shall be installed in accordance with 392.22.		
501.10(B)(2)	**(2) Flexible Connections.** Where provision must be made for flexibility, one or more of the following shall be permitted:	FR-8500	**(2) Flexible Connections.** If flexibility is necessary to minimize the transmission of vibration from equipment during operation or to allow for movement after	Revised to delete Informational Note, to relocate concepts into list items (2) and (4), and to add Type P cable. Impacts: No negative impact.	**2**

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	(1) Listed flexible metal fittings. (2) Flexible metal conduit with listed fittings. (3) Interlocked armor Type MC cable with listed fittings. (4) Liquidtight flexible metal conduit with listed fittings. (5) Liquidtight flexible nonmetallic conduit with listed fittings. (6) Flexible cord listed for extra-hard usage and terminated with listed fittings. A conductor for use as an equipment grounding conductor shall be included in the flexible cord. (7) For elevator use, an identified elevator cable of Type EO, ETP, or ETT, shown under the "use" column in Table 400.4 for "hazardous (classified) locations" and terminated with listed fittings.		installation during maintenance, one or more of the following shall be permitted: (1) Listed flexible metal fittings (2) Flexible metal conduit with listed fittings and bonded in accordance with 501.30(B) (3) Interlocked armor Type MC cable with listed fittings (4) Liquidtight flexible metal conduit with listed fittings and bonded in accordance with 501.30(B) (5) Liquidtight flexible nonmetallic conduit with listed fittings (6) Flexible cord listed for extra-hard usage and terminated with listed fittings, with a conductor for use as an equipment grounding conductor (7) For elevator use, an identified elevator cable of Type EO, Type ETP, or Type ETT, shown under the "use" column in Table 400.4 for "hazardous (classified) locations" and terminated with listed fittings		

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			(8) In restricted industrial establishments, listed Type P cable with or without metal braid armor, with an overall jacket, terminated with listed fittings and installed in accordance with Part II of Article 337		
501.15(B)(2)	**(2) Class I, Division 2 Boundary.** A conduit seal shall be required in each conduit run leaving a Class I, Division 2 location. The sealing fitting shall be permitted to be installed on either side of the boundary within 3.05 m (10 ft) of the boundary and it shall be designed and installed to minimize the amount of gas or vapor within the portion of the conduit installed in the Division 2 location that can be communicated beyond the seal. Rigid metal conduit or threaded steel intermediate metal conduit shall be used between the sealing fitting and the point at which the conduit leaves the Division 2 location, and a threaded connection shall be used at the sealing fitting. The conduit run between the conduit seal and the point at which the conduit leaves the Division 2 location shall contain no union, coupling, box, or other fitting except for a listed	FR-8680	**(2) Class I, Division 2 Boundary.** A conduit seal shall be required in each conduit run leaving a Class I, Division 2 location. The sealing fitting shall be permitted to be installed on either side of the boundary within 3.05 m (10 ft) of the boundary and it shall be designed and installed to minimize the amount of gas or vapor within the portion of the conduit installed in the Division 2 location that can be communicated beyond the seal. Wiring methods permitted in 501.10(B)(1)(1) or (B)(1)(6) shall be used between the sealing fitting and the point at which the conduit leaves the Division 2 location, and a threaded connection shall be used at the sealing fitting. The conduit run between the conduit seal and the point at which the conduit leaves the Division 2 location shall contain no union, coupling, box, or other fitting except for a listed explosionproof reducer installed at the conduit seal. Such seals shall not be required to be explosionproof but shall be identified for the purpose	Revised to allow methods from 501.10(B)(1)(1) and 501.10(B)(6) be used and to clarify exceptions. Impacts: No negative impact.	**2**

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	explosionproof reducer installed at the conduit seal. Such seals shall not be required to be explosionproof but shall be identified for the purpose of minimizing the passage of gases permitted under normal operating conditions and shall be accessible. *Exception No. 1:* *Metal conduit that contains no unions, couplings, boxes, or fittings, that passes completely through a Division 2 location with no fittings installed within 300 mm (12 in.) of either side of the boundary, shall not be required to be sealed if the termination points of the unbroken conduit are located in unclassified locations.* *Exception No. 2:* *Conduit systems terminating in an unclassified location where the metal conduit transitions to cable tray, cablebus, ventilated busway, or Type MI cable, or to cable not installed in any cable tray or raceway system, shall not be required to be sealed where passing from the Division 2 location into the unclassified location under the following conditions:*		of minimizing the passage of gases permitted under normal operating conditions and shall be accessible. *Exception No. 1:* *Metal conduit that contains no unions, couplings, boxes, or fittings and that passes completely through a Division 2 location with no fittings installed within 300 mm (12 in.) of either side of the boundary shall not require a seal if the termination points of the unbroken conduit are located in unclassified locations.* *Exception No. 2:* *Conduit terminating in an unclassified location where the metal conduit transitions to cable tray, cablebus, ventilated busway, or Type MI cable, or to cable not installed in any cable tray or raceway system, shall not require a seal where passing from the Division 2 location into the unclassified location under the following conditions:* *(1) The unclassified location is outdoors, or the unclassified location is indoors and the conduit system is entirely in one room.*		

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	(1) The unclassified location is outdoors, or the unclassified location is indoors and the conduit system is entirely in one room. *(2) The conduits shall not terminate at an enclosure containing an ignition source in normal operation.* *Exception No. 3:* *Conduit systems passing from an enclosure or a room that is unclassified, as a result of pressurization, into a Division 2 location shall not require a seal at the boundary.* *Exception No. 4:* *Segments of aboveground conduit systems shall not be required to be sealed where passing from a Division 2 location into an unclassified location if all of the following conditions are met:* *(1) No part of the conduit system segment passes through a Division 1 location where the conduit segment contains unions, couplings, boxes, or fittings that*		*(2) The conduits do not terminate at an enclosure containing an ignition source in normal operation.* *Exception No. 3:* *Conduit passing from an enclosure or a room permitted to use general-purpose equipment as a result of pressurization into a Division 2 location shall not require a seal at the boundary.* Informational Note No. 2: See NFPA 496,*Standard for Purged and Pressurized Enclosures for Electrical Equipment*, for further information. *Exception No. 4:* *Aboveground conduit shall not require a seal where passing from a Division 2 location into an unclassified location if all of the following conditions are met:* *(1) No part of the conduit passes through a Division 1 location where the conduit contains unions, couplings, boxes, or fittings that are located within 300 mm (12 in.) of the Division 1 location.*		

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	are located within 300 mm (12 in.) of the Division 1 location. *(2) The conduit system segment is located entirely in outdoor locations.* *(3) The conduit system segment is not directly connected to canned pumps, process or service connections for flow, pressure, or analysis measurement, and so forth, that depend on a single compression seal, diaphragm, or tube to prevent flammable or combustible fluids from entering the conduit system.* *(4) The conduit system segment contains only threaded metal conduit, unions, couplings, conduit bodies, and fittings in the unclassified location.* *(1) The conduit system segment is sealed at its entry to each enclosure or fitting located in the Division 2 location that contains terminals, splices, or taps.*		*(2) The conduit is located entirely outdoors.* *(3) The conduit is not directly connected to canned pumps, process or service connections for flow, pressure, or analysis measurement, and so forth, that depend on a single compression seal, diaphragm, or tube to prevent flammable or combustible fluids from entering the conduit system.* *(4) The conduit contains only threaded metal conduit, unions, couplings, conduit bodies, and fittings in the unclassified location.* *(5) The conduit is sealed at its entry to each enclosure or fitting located in the Division 2 location that contains terminals, splices, or taps.*		

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501.15(D)(1)	**(D) Cable Seals, Class I, Division 1.** In Division 1 locations, cable seals shall be located according to 501.15(D)(1) through (D)(3). **(1) At Terminations.** Cables shall be sealed with sealing fittings that comply with 501.15(C) at all terminations. Type MC-HL cables with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material shall be sealed with a listed fitting after the jacket and any other covering have been removed so that the sealing compound can surround each individual insulated conductor in such a manner as to minimize the passage of gases and vapors. Seals for cables entering enclosures shall be installed within 450 mm (18 in.) of the enclosure or as required by the enclosure marking. Only threaded couplings, or explosionproof fittings such as	FR-8682, SR-7730	**(D) Cable Seals, Class I, Division 1.** In Division 1 locations, cable seals shall be located according to 501.15(D)(2) through (D)(3). **(1) At Terminations.** Cables shall be sealed at all terminations with sealing fittings. The seals at all terminations shall be in accordance with 501.15(C) and shall be installed within 450 mm (18 in.) of the enclosure or as required by the enclosure marking. Only threaded couplings or explosionproof fittings such as unions, reducers, elbows, and capped elbows not larger than the trade size of the conduit shall be permitted between the sealing fitting and the enclosure. Type MC-HL cable with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, Type TC-ER-HL cable, and Type P cable shall be sealed with a listed fitting after the jacket and any other covering have been removed so that the sealing compound can surround each individual insulated conductor to minimize the passage of gases and vapors.	Revised and reorganized for clarity and to include Type P and Type TC-ER-HL cable as permissible wiring methods. Impacts: No negative impact.	**2**

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	unions, reducers, elbows, and capped elbows that are not larger than the trade size of the conduit, shall be permitted between the sealing fitting and the enclosure. *Exception:* *Shielded cables and twisted pair cables shall not require the removal of the shielding material or separation of the twisted pairs, provided the termination is sealed by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.*		Shielded cables and twisted pair cables that have their conductors sealed in accordance with the instructions provided with their listed fitting to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core shall not be required to have the shielding material removed or the twisted pairs separated.		
501.15(E)(1)	**(1) Terminations.** Cables entering enclosures that are required to be explosionproof shall be sealed at the point of entrance. The sealing fitting shall comply with 501.15(B)(1) or be explosionproof. Multiconductor or optical multifiber cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core that are installed in a Division 2 location shall be sealed with a listed fitting after the jacket and any other coverings have been removed, so that the	FR-8688, SR-7735	**(1) Terminations.** Cables entering enclosures that are required to be explosionproof shall be sealed at the point of entrance into the enclosure. The sealing fitting shall comply with 501.15(B)(1) or be explosionproof. Multiconductor or optical multifiber cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core that are installed in a Division 2 location shall be sealed with a listed fitting after the jacket and any other coverings have been removed such that the sealing compound surrounds each individual	Revised text and exceptions for clarity and revised Exception No. 2 to align with NFPA 496. Impacts: No negative impact.	**1**

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	sealing compound can surround each individual insulated conductor or optical fiber tube in such a manner as to minimize the passage of gases and vapors. Multiconductor or optical multifiber cables installed in conduit shall be sealed as described in 501.15(D). *Exception No. 1:* *Cables leaving an enclosure or room that is unclassified as a result of Type Z pressurization and entering into a Division 2 location shall not require a seal at the boundary.* *Exception No. 2:* *Shielded cables and twisted pair cables shall not require the removal of the shielding material or separation of the twisted pairs, provided the termination is by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.*		insulated conductor or optical fiber tube to minimize the passage of gases and vapors. Multiconductor or optical multifiber cables installed in conduit shall be sealed in accordance with501.15(D). *Exception No. 1:* *Cables leaving an enclosure or room that is permitted to use general-purpose equipment as a result of Type Z pressurization and entering a Division 2 location shall not require a seal at the boundary.* *Exception No. 2:* *Removal of shielding material from shielded cables and separation of twisted pair cables shall not be required if the conductors are sealed in accordance with instructions provided with the listed fitting to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.*		
501.30	**501.30 Grounding and Bonding, Class I, Divisions 1 and 2.** Regardless of the voltage of the electrical system, wiring and equipment in Class I,	FR-8391, SR-7852	**501.30 Grounding and Bonding.** Regardless of the voltage of the electrical system, wiring systems and equipment shall comply with501.30(A) and (B).	Revised to separate grounding and bonding into two separate items, which allows for more stringent requirements to be created for bonding. Impacts: No negative impact.	**2**

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	Division 1 and 2 locations shall be grounded as specified in Article 250 and in accordance with the requirements of 501.30(A) and (B). **(A) Bonding.** The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, and so forth between Class I locations and the point of grounding for service equipment or point of grounding of a separately derived system. *Exception:* *The specific bonding means shall be required only to the nearest point where the grounded circuit conductor and the grounding electrode are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B), provided the branch-circuit overcurrent protection is located on the load side of the disconnecting means.* **(B) Types of Equipment Grounding Conductors.**		**(A) Grounding.** Wiring systems and equipment shall be grounded in accordance with Part I and Part VI of Article 250, as applicable. **(B) Bonding.** Bonding shall comply with Part I and Part V of Article 250, as applicable, and 501.30(B)(1) and (B)(2). **(1) Specific Bonding Means.** Bonding shall comply with 501.30(B)(1)(a) and (B)(1)(b). (a) The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with identified fittings or other approved means of bonding shall be used. These bonding means shall apply to all metal raceways, fittings, boxes, cable trays, and enclosures, and other parts of raceway systems between Class I locations and the point of grounding for service equipment or point of grounding for a separately derived system. Metal struts, angles, or channels provided for support and mechanical or physical protection as permitted		

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	Flexible metal conduit and liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in compliance with 250.102. *Exception:* *In Class I, Division 2 locations, the bonding jumper shall be permitted to be deleted where all of the following conditions are met:* *(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used.* *(2) Overcurrent protection in the circuit is limited to 10 amperes or less.* *(3) The load is not a power utilization load.*		in 335.4(5), 336.10(7)(c), or 722.135(C) shall be bonded in accordance with 250.102. (b) Where the branch-circuit overcurrent protection is located on the load side of the disconnecting means, the specific bonding means shall be permitted to end at the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B). **(2) Flexible Metal Conduit and Liquidtight Flexible Metal Conduit.** Flexible metal conduit and liquidtight flexible metal conduit shall comply with 501.30(B)(2)(a) and (B)(2)(b). (a) Flexible metal conduit and liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in accordance with 250.102. (b) In Class I, Division 2 locations, the bonding jumper shall not be required where all of the following conditions are met:		

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			(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used. (2) Overcurrent protection in the circuit is limited to 10 amperes or less. (3) The load is part of a meter, instrument, or relay circuit.		
501.105(B)(6)	**(6) Connections.** To facilitate replacements, process control instruments shall be permitted to be connected through flexible cord, attachment plug and receptacle, provided that all of the following conditions apply: (1) The attachment plug and receptacle are listed for use in Class I, Division 2 locations and listed for use with flexible cords. *Exception No. 1:* *A Class I, Division 2 listing is not required if the circuit involves only nonincendive field wiring.*	SR-7747	**(6) Connections.** To facilitate replacements, process control instruments shall be permitted to be connected through flexible cord and attachment plug and receptacle if all of the following conditions apply: (1) The attachment plug and receptacle are listed for use in Class I, Division 2 locations and listed for use with flexible cords. *Exception No. 1 to (1):* *A Class I, Division 2 listing shall not be required if the circuit involves only nonincendive field wiring.* *Exception No. 2 to (1):*	Revised to use defined term *restricted industrial establishment [as applied to hazardous (classified) locations]* for clarity and to correlate with other sections and articles. Impacts: No negative impact.	**2**

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	Exception No. 2: *In industrial establishments where the conditions of maintenance and supervision ensure that only qualified individuals service the installation, the Class I, Division 2 listing is not required when the requirements of 501.105(B)(6)(2), (B)(6)(3), and (B)(6)(4) are satisfied and the receptacle carries a label warning against plugging or unplugging when energized.* (2) The flexible cord does not exceed 900 mm (3 ft), is of a type listed for extra-hard usage, or if listed for hard usage is protected by location. (3) Only necessary receptacles are provided. (4) Unless the attachment plug and receptacle are interlocked mechanically or electrically, or otherwise designed so that they cannot be separated when the contacts are energized and the contacts cannot be energized when the plug and		*In restricted industrial establishments, the Class I, Division 2 listing shall not be required if the requirements of 501.105(B)(6)(2), (B)(6)(3), and (B)(6)(4) are satisfied and the receptacle carries a label warning against plugging or unplugging when energized.* (2) The flexible cord does not exceed 900 mm (3 ft), is of a type listed for extra-hard usage, or is listed for hard usage and protected by location. (3) Only necessary receptacles are provided. (4) Unless the attachment plug and receptacle are interlocked mechanically or electrically, or otherwise designed so that they cannot be separated when the contacts are energized and the contacts cannot be energized when the plug and socket outlet are separated, a switch complying with 501.105(B)(2)is provided so that the attachment plug or receptacle is not necessary to interrupt current. *Exception to (4):* *The switch shall not be required if the circuit is nonincendive field wiring.*		

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	socket outlet are separated, a switch complying with 501.105(B)(2) shall be provided so that the attachment plug or receptacle is not depended on to interrupt current. *Exception:* *The switch shall not be required if the circuit is nonincendive field wiring.*				
501.140(A)	**(A) Permitted Uses.** Flexible cord shall be permitted: (1) For connection between portable lighting equipment or other portable utilization equipment and the fixed portion of their supply circuit. The flexible cord shall be attached to the utilization equipment with a cord connector listed for the protection technique of the equipment wiring compartment. An attachment plug in accordance with 501.140(B)(4) shall be employed. (2) For that portion of the circuit where the fixed wiring methods of 501.10(A) cannot provide the	SR-7758	**(A) Permitted Uses.** Flexible cord shall be permitted as follows: (1) For connection between portable lighting equipment or other portable utilization equipment and the fixed portion of their supply circuit. The flexible cord shall be attached to the utilization equipment with a cord connector listed for the protection technique of the equipment wiring compartment. An attachment plug in accordance with 501.140(B)(4) shall be employed. (2) For that portion of the circuit where the fixed wiring methods of 501.10(A) cannot provide the necessary degree of movement for fixed and mobile electrical utilization equipment, and the flexible cord is protected by location or by a	Revised to correlate with definition of new defined term *restricted industrial establishment [as applied to hazardous (classified) locations]*. Impacts: No negative impact.	**2**

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	necessary degree of movement for fixed and mobile electrical utilization equipment, and the flexible cord is protected by location or by a suitable guard from damage and only in an industrial establishment where conditions of maintenance and engineering supervision ensure that only qualified persons install and service the installation. (3) For electric submersible pumps with means for removal without entering the wet-pit. The extension of the flexible cord within a suitable raceway between the wet-pit and the power source shall be permitted. (4) For electric mixers intended for travel into and out of open-type mixing tanks or vats. (5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.		suitable guard from damage and only in a restricted industrial establishment. (3) For electric submersible pumps with means for removal without entering the wet-pit. The extension of the flexible cord within a suitable raceway between the wet-pit and the power source shall be permitted. (4) For electric mixers intended for travel into and out of open-type mixing tanks or vats. (5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.		
501.141	[Did not exist]	FR-9025, SR-7759	**501.141 Flexible Cables, Class I, Division 2.**	Added section for flexible cables, Class I, Division 2. Impacts: No negative impact.	**2**

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			Flexible cables installed in Class I, Division 2 locations shall comply with 501.141(A)and (B). **(A) Permitted Uses.** Flexible cables shall be permitted to be installed in accordance with 501.141(A)(1) and (A)(2). **(1) Other Than Nonincendive Field Wiring Applications.** Flexible cables in other than nonincendive field wiring applications shall be permitted in accordance with the following: (1) Flexible cables shall be permitted to connect two pieces of electrical equipment by means of a cable assembly installed in accordance with 501.141(B)(2)(a) or (B)(2)(b). (2) Flexible cables shall be permitted to connect a piece of electrical equipment to the premises wiring by means of a cable assembly installed in accordance with 501.141(B)(2)(c). **(2) Nonincendive Field Wiring Applications.** Flexible cables in nonincendive field wiring applications shall be permitted to be used in accordance with 501.10(B)(3). **(B) Installation.**		

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			If flexible cables are used as permitted in 501.141(A), the associated cable assemblies shall comply with 501.141(B)(1) through (B)(3). **(1) Cable Types.** Listed Type P cables shall comply with 501.141(A)(1) and shall be installed as required in Part II of Article 337. The associated cable assemblies shall comply with the requirements of 501.141(B)(2). **(2) Termination Means.** Terminations shall comply with 501.141(B)(2)(a), (B)(2)(b), or (B)(2)(c). (a) *Connecting Two Devices or Pieces of Electrical Utilization Equipment Together.* The cable connectors on each end of the cable shall be listed for use in Class I, Division 2 locations and listed for the type of cable being used. (b) *Connecting Two Devices or Pieces of Electrical Utilization Equipment Together.* A cable connector listed for Class I, Division 2 and listed for the type of cable being used shall be used on one end and a fitting listed for the type of protection and the type of cable being used shall be used on the other end.		

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			(c) *Connecting an Electrical Device or Utilization Equipment to Premises Wiring.* The cable connectors used on both ends shall be listed for Class I, Division 2 locations and for the type of cable being used. On one end of the cable, the cable connector shall also be listed for the type of protection. **(3) Disconnection.** Flexible cable shall be installed in accordance with 501.141(B)(3)(a) through (B)(3)(c) to protect against the disconnection of the cable connectors when energized. (a) *Switch.* A switch complying with the requirements of 501.105(B)(2) shall be provided to disconnect power so that cable connectors are not depended on as a disconnecting means. (b) *Cable Connectors Mechanically or Electrically Interlocked.* Switches shall not be required where the cable connectors are interlocked mechanically or electrically, or are otherwise designed to ensure the cable connectors cannot be separated when energized and cannot be energized when separated. (c*) Warning Label.* The fixed equipment and the cable assembly shall both carry a label warning		

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			against plugging or unplugging when energized, with both labels as close to the cable connector termination as possible.		
Article 502	**Class II Locations**				
502.10(A)	**(A) Class II, Division 1.** **(1) General.** In Class II, Division 1 locations, the following wiring methods shall be permitted: (1) Threaded rigid metal conduit (Type RMC) or threaded steel intermediate metal conduit (Type IMC). (2) Type MI cable with termination fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings. (3) In industrial establishments with limited public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, Type MC-HL cable, listed for use in Class II, Division 1 locations, with a	SR-7799	**A) Class II, Division 1.** **(1) General.** In Class II, Division 1 locations, the following wiring methods shall be permitted: (1) Threaded rigid metal conduit (RMC) or threaded intermediate metal conduit (IMC), including conduit systems with supplemental corrosion protection coatings. (2) Type MI cable with termination fittings listed for the location. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings. (3) In restricted industrial establishments, Type MC-HL cable, listed for use in Class II, Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and provided with	Revised to change references and to correlate with definition of new defined term *restricted industrial establishment [as applied to hazardous (classified) locations]*. Impacts: No negative impact.	**2**

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	gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, a separate equipment grounding conductor(s) in accordance with 250.122, and provided with termination fittings listed for the location, shall be permitted. (4) Optical fiber cable Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC shall be permitted to be installed in raceways in accordance with 502.10(A). Optical fiber cables shall be sealed in accordance with 502.15. (5) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, listed Type ITC-HL cable with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, and terminated with fittings listed for the application, and installed in accordance with 727.4. (6) In industrial establishments with restricted public access, where the conditions of maintenance and		termination fittings listed for the location, shall be permitted. (4) Optical fiber cable Type OFNP, Type OFCP, Type OFNR, Type OFCR, Type OFNG, Type OFCG, Type OFN, or Type OFC shall be permitted to be installed in raceways in accordance with 502.10(A). Optical fiber cables shall be sealed in accordance with 502.15. (5) In restricted industrial establishments, listed Type ITC-HL cable with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, and terminated with fittings listed for the application, and installed in accordance with 335.4. (6) In restricted industrial establishments, for applications limited to 600 volts nominal or less, where the cable is not subject to physical damage and is terminated with fittings listed for the location, listed Type TC-ER-HL cable. When installed in ladder, ventilated trough, or ventilated channel cable trays, cables shall be installed in a single layer, with a space not less than the larger cable diameter between the two adjacent cables unless otherwise protected against dust buildup resulting in increased heat,		

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	supervision ensure that only qualified persons service the installation, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage, and terminated with fittings listed for the location, listed Type TC-ER-HL cable. When installed in ladder, ventilated trough, or ventilated channel cable trays, cables shall be installed in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, unless otherwise protected against dust buildup resulting in increased heat, Type TC-ER-HL cable shall be installed in accordance with 336.10. (7) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, listed Type P cable with metal braid armor, with an overall jacket, terminated with fittings listed for the location and installed in accordance with 337.10. When installed in ladder, ventilated trough, or ventilated channel cable trays, cables shall be installed in a single layer, with a space not less than the larger cable		Type TC-ER-HL cable shall be installed in accordance with 336.10. (7) In restricted industrial establishments, listed Type P cable with metal braid armor, with an overall jacket, that is terminated with fittings listed for the location and installed in accordance with 337.10. When installed in ladder, ventilated trough, or ventilated channel cable trays, cables shall be installed in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, unless otherwise protected against dust buildup resulting in increased heat. **(2) Flexible Connections.** Where flexible connections are necessary, one or more of the following shall also be permitted: (1) Dusttight flexible connectors. (2) Liquidtight flexible metal conduit (LFMC) with listed fittings and bonded in accordance with 502.30(B). (3) Liquidtight flexible nonmetallic conduit (LFNC) with listed fittings.		

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	diameter between the two adjacent cables, unless otherwise protected against dust buildup resulting in increased heat. **(2) Flexible Connections.** Where necessary to employ flexible connections, one or more of the following shall also be permitted: (1) Dusttight flexible connectors. (2) Liquidtight flexible metal conduit (Type LFMC) with listed fittings. (3) Liquidtight flexible nonmetallic conduit (Type LFNC) with listed fittings. (4) Interlocked armor Type MC cable having an overall jacket of suitable polymeric material and provided with termination fittings listed for Class II, Division 1 locations. (5) Flexible cord listed for extra-hard usage and terminated with listed dusttight cord connectors. Where flexible cords are used, they shall comply with 502.140.		(4) Interlocked armor Type MC cable having an overall jacket of suitable polymeric material and provided with termination fittings listed for Class II, Division 1 locations. (5) Flexible cord listed for extra-hard usage and terminated with listed dusttight cord connectors. Where used, flexible cords shall comply with 502.140. (6) For elevator use, an identified elevator cable of Type EO, Type ETP, or Type ETT, shown under the "use" column in Table 400.4 for "hazardous (classified) locations" and terminated with listed dusttight fittings. (7) In restricted industrial establishments, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage and is terminated with fittings listed for the location, listed Type TC-ER-HL cable. Type TC-ER-HL cable shall be installed in accordance with 336.10. (8) In restricted industrial establishments, listed Type P cable with metal braid armor, with an overall jacket, terminated with fittings listed for the location, and installed in accordance with 337.10.		

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	(6) For elevator use, an identified elevator cable of Type EO, ETP, or ETT, shown under the "use" column in Table 400.4 for "hazardous (classified) locations" and terminated with listed dusttight fittings. (7) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage, and terminated with fittings listed for the location, listed Type TC-ER-HL cable. Type TC-ER-HL cable shall be installed in accordance with 336.10. (8) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, listed Type P cable with metal braid armor, with an overall jacket, terminated with fittings listed for the location, and installed in accordance with 337.10.		**(3) Boxes and Fittings.** Boxes and fittings shall be provided with threaded bosses for connection to conduit or cable terminations and shall be dusttight. Boxes and fittings in which taps, joints, or terminal connections are made, or that are used in Group E locations, shall be identified for Class II locations.		

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	(3) Boxes and Fittings. Boxes and fittings shall be provided with threaded bosses for connection to conduit or cable terminations and shall be dusttight. Boxes and fittings in which taps, joints, or terminal connections are made, or that are used in Group E locations, shall be identified for Class II locations.				
502.10(B)	(2) Rigid metal conduit (Type RMC), intermediate metal conduit (Type IMC), with listed threaded or threadless fittings. (3) Electrical metallic tubing (Type EMT) or dusttight wireways.	FR-8398, SCR-53	(2) Rigid metal conduit (RMC)or intermediate metal conduit (IMC) with listed threaded or threadless fittings, including conduit systems with supplemental corrosion protection coatings. (3) Dusttight wireways or electrical metallic tubing (EMT) with listed compression-type connectors or listed compression-type couplings.	Revised list item (2) to include supplemental corrosion protection coatings and added text to item (3) to allow for listed compression type connectors or couplings for correlation with other articles. Impacts: No negative impact.	**2**
502.15	**502.15 Sealing, Class II, Divisions 1 and 2.** Where a raceway provides communication between an enclosure that is required to be dust-ignitionproof and one that is not, suitable means shall be provided to prevent the entrance of dust into the dust-ignitionproof enclosure through the raceway. One of the following means shall be permitted:	FR-8531	**502.15 Sealing, Class II, Divisions 1 and 2.** If a raceway provides communication between an enclosure that is required to be dust-ignitionproof and one that is not, suitable means shall be provided to prevent the entrance of dust into the dust-ignitionproof enclosure through the raceway. One of the following means shall be permitted: (1) A permanent and effective seal	Revised former Informational Note into enforceable list item (5) and revised other text for conciseness. Impacts: No negative impact.	**2**

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	(1) A permanent and effective seal (2) A horizontal raceway not less than 3.05 m (10 ft) long (3) A vertical raceway not less than 1.5 m (5 ft) long and extending downward from the dust-ignitionproof enclosure (4) A raceway installed in a manner equivalent to (2) or (3) that extends only horizontally and downward from the dust-ignition proof enclosures Where a raceway provides communication between an enclosure that is required to be dust-ignitionproof and an enclosure in an unclassified location, seals shall not be required. Sealing fittings shall be accessible. Seals shall not be required to be explosionproof.		(2) A horizontal raceway not less than 3.05 m (10 ft) long (3) A vertical raceway not less than 1.5 m (5 ft) long and extending downward from the dust-ignitionproof enclosure (4) A raceway installed in a manner equivalent to 502.15(2) or (3) that extends only horizontally and downward from the dust-ignition proof enclosures (5) Electrical sealing putty If a raceway provides communication between an enclosure that is required to be dust-ignitionproof and an enclosure in an unclassified location, seals shall not be required. Sealing fittings shall be accessible and shall not be required to be explosionproof.		
502.30	**502.30 Grounding and Bonding, Class II, Divisions 1 and 2.**	FR-8383, SR-7855	**502.30 Grounding and Bonding.**	Revised to separate grounding and bonding into two separate items, which allows for additional methods to be created for bonding.	**2**

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	Regardless of the voltage of the electrical system, wiring and equipment in Class II, Division 1 and 2 locations shall be grounded as specified in Article 250 and in accordance with the requirements of 502.30(A) and (B). **(A) Bonding.** The locknut-bushing and double-locknut types of contact shall not be depended on for bonding purposes, but bonding jumpers with proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, and so forth, between Class II locations and the point of grounding for service equipment or point of grounding of a separately derived system. *Exception:* *The specific bonding means shall only be required to the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B) if the branch-circuit overcurrent*		Regardless of the voltage of the electrical system, wiring systems and equipment shallcomply with502.30(A) and (B). **(A) Grounding.** Wiring systems and equipment shall be grounded in accordance with Part I and Part VI of Article 250, as applicable. **(B) Bonding.** Bonding shall comply with Part I and Part V of Article 250, as applicable, and 502.30(B)(1) and (B)(2). **(1) Specific Bonding Means.** Bonding shall comply with 502.30(B)(1)(a) and (B)(1)(b). (a) The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with identified fittings or other approved means of bonding shall be used. These bonding means shall apply to all metal raceways, fittings, boxes, cable trays, and enclosures, and other parts of raceway systems between hazardous (classified) locations and the point of grounding for service equipment or point of grounding for a separately derived system. Metal struts, angles, or channels	Impacts: No negative impact.	

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	protection is located on the load side of the disconnecting means. **(B) Types of Equipment Grounding Conductors.** Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in compliance with 250.102. *Exception:* *In Class II, Division 2 locations, the bonding jumper shall be permitted to be deleted where all of the following conditions are met:* *(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used.* *(2) Overcurrent protection in the circuit is limited to 10 amperes or less.* *(3) The load is not a power utilization load.*		provided for support and mechanical or physical protection as permitted in 335.4(5), 336.10(7)(c), or 722.135(C) shall be bonded in accordance with 250.102. (b) Where the branch-circuit overcurrent protection is located on the load side of the disconnecting means, the specific bonding means shall be permitted to end at the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B). **(2) Liquidtight Flexible Metal Conduit.** Liquidtight flexible metal conduit shall comply with 502.30(B)(2)(a) and (B)(2)(b). (a) Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in accordance with 250.102. (b) In Class II, Division 2 locations, the bonding jumper shall not be required where all of the following conditions are met: (1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length,		

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			with fittings listed for grounding, is used. (2) Overcurrent protection in the circuit is limited to 10 amperes or less. (3) The load is part of a meter, instrument, or relay circuit.		
502.140(A)	**(A) Permitted Uses.** Flexible cords used in Class II locations shall comply with all of the following: (1) For connection between portable lighting equipment or other portable utilization equipment and the fixed portion of its supply circuit. The flexible cord shall be attached to the utilization equipment with a cord connector listed for the protection technique of the equipment wiring compartment. An attachment plug in accordance with 502.145 shall be employed. (2) Where flexible cord is permitted by 502.10(A)(2) for fixed and mobile electrical utilization equipment; where the flexible cord is protected by location or by a suitable guard from damage; and only in an industrial establishment where	SR-7854	**(A) Permitted Uses.** Flexible cords used in Class II locations shall be permitted as follows: (1) For connection between portable lighting equipment or other portable utilization equipment and the fixed portion of its supply circuit. The flexible cord shall be attached to the utilization equipment with a cord connector listed for the protection technique of the equipment wiring compartment. An attachment plug in accordance with 502.145 shall be employed. (2) Where flexible cord is permitted by 502.10(A)(2) for fixed and mobile electrical utilization equipment; where the flexible cord is protected by location or by a suitable guard from damage; and only in a restricted industrial establishment.	Revised to use the defined term *restricted industrial establishment [as applied to hazardous (classified) locations* for correlation. Impacts: No negative impact.	**2**

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	conditions of maintenance and engineering supervision ensure that only qualified persons install and service the installation. (3) For electric submersible pumps with means for removal without entering the wet-pit. The extension of the flexible cord within a suitable raceway between the wet-pit and the power source shall be permitted. (4) For electric mixers intended for travel into and out of open-type mixing tanks or vats. (5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.		(3) For electric submersible pumps with means for removal without entering the wet-pit. The extension of the flexible cord within a suitable raceway between the wet-pit and the power source shall be permitted. (4) For electric mixers intended for travel into and out of open-type mixing tanks or vats. (5) For temporary portable assemblies consisting of receptacles, switches, and other devices that are not considered portable utilization equipment but are individually listed for the location.		
502.150(B)(5)	**(5) Connections.** To facilitate replacements, process control instruments shall be permitted to be connected through flexible cord, attachment plug, and receptacle, provided that all of the following conditions apply:	SR-7807	**(5) Connections.** To facilitate replacements, process control instruments shall be permitted to be connected through flexible cord, attachment plug, and receptacle if all of the following conditions apply:	Revised to use new defined term *restricted industrial establishment [as applied to hazardous (classified) locations]* for correlation. Impacts: No negative impact.	**2**

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	(1) Attachment plug and receptacle are listed for use in Class II, Division 2 locations, and listed for use with flexible cords. *Exception No. 1:* *A Class II, Division 2 listing is not required if the circuit involves only nonincendive field wiring.* *Exception No. 2:* *In industrial establishments where the conditions of maintenance and supervision ensure that only qualified individuals service the installation, the Class II, Division 2 listing is not required when the requirements of list items 502.150(B)(5)(2), (B)(5)(3), and (B)(5)(4) are satisfied and the receptacle carries a label warning against plugging or unplugging when energized.* (2) The flexible cord does not exceed 900 mm (3 ft), is of a type listed for extra-		(1) Attachment plug and receptacle are listed for use in Class II, Division 2 locations, and listed for use with flexible cords. *Exception No. 1 to (1):* *A Class II, Division 2 listing shall not be required if the circuit involves only nonincendive field wiring.* *Exception No. 2 to (1):* *In restricted industrial establishments, the Class II, Division 2 listing shall not be required when the requirements of 502.150(B)(5)(2), (B)(5)(3), and (B)(5)(4) are satisfied and the receptacle carries a label warning against plugging or unplugging when energized.* (2) The flexible cord does not exceed 900 mm (3 ft), is of a type listed for extra-hard usage, or, if listed for hard usage, is protected by location. (3) Only necessary receptacles are provided.		

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	hard usage, or if listed for hard usage is protected by location. (3) Only necessary receptacles are provided. (4) Unless the attachment plug and receptacle are interlocked mechanically or electrically, or otherwise designed so that they cannot be separated when the contacts are energized, and the contacts cannot be energized when the plug and socket outlet are separated, a switch complying with 502.115(B) shall be provided so that the attachment plug or receptacle is not depended on to interrupt current. *Exception:* *The switch shall not be required if the circuit is nonincendive field wiring.*		(4) Unless the attachment plug and receptacle are interlocked mechanically or electrically, or otherwise designed so that they cannot be separated when the contacts are energized, and the contacts cannot be energized when the plug and socket outlet are separated, a switch complying with 502.115(B)is provided so that the attachment plug or receptacle is not depended on to interrupt current. *Exception to (4):* *The switch shall not be required if the circuit is nonincendive field wiring.*		
Article 503	**Class III Locations**				
503.30	**503.30 Grounding and Bonding — Class III, Divisions 1 and 2.** Regardless of the voltage of the electrical system, wiring and equipment in Class III,	FR-8431, SR-7814	**503.30 Grounding and Bonding.** Regardless of the voltage of the electrical system, wiring systems and equipment shall comply with503.30(A) and (B).	Revised to separate grounding and bonding into two separate items, which allows for additional methods to be created for bonding. Impacts: No negative impact.	**2**

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	Division 1 and 2 locations shall be grounded as specified in Article 250 and with the following additional requirements in 503.30(A) and (B). **(A) Bonding.** The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, and so forth, between Class III locations and the point of grounding for service equipment or point of grounding of a separately derived system. *Exception:* *The specific bonding means shall only be required to the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B) if the branch-circuit overcurrent*		**(A) Grounding.** Wiring systems and equipment shall be grounded in accordance with Part I and Part VI of Article 250, as applicable. **(B) Bonding.** Bonding shall comply with Part I and Part V of Article 250, as applicable, and 503.30(B)(1) and (B)(2). **(1) Specific Bonding Means.** Bonding shall comply with 503.30(B)(1)(a) and (B)(2)(b). (a) The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with identified fittings or other approved means of bonding shall be used. These bonding means shall apply to all metal raceways, fittings, boxes, cable trays, and enclosures, and other parts of raceway systems between hazardous (classified) locations and the point of grounding for service equipment or point of grounding for a separately derived system. Metal struts, angles, or channels provided for support and mechanical or physical protection as permitted		

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	protection is located on the load side of the disconnecting means. **(B) Types of Equipment Bonding Conductors.** Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in compliance with 250.102. *Exception:* *In Class III, Division 1 and 2 locations, the bonding jumper shall be permitted to be deleted where all of the following conditions are met:* *(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used.* *(2) Overcurrent protection in the circuit is limited to 10 amperes or less.* *(3) The load is not a power utilization load.*		in 335.4(5), 336.10(7)(c), or 722.135(C) shall be bonded in accordance with 250.102. (b) Where the branch-circuit overcurrent protection is located on the load side of the disconnecting means, the specific bonding means shall be permitted to end at the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B). **(2) Liquidtight Flexible Metal Conduit.** Liquidtight flexible metal conduit shall comply with 503.30(B)(2)(a) and (B)(2)(b). (a) Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in accordance with 250.102. (b) In Class III locations, the bonding jumper shall not be required where all of the following conditions are met: (1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length,		

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			with fittings listed for grounding, is used. (2) Overcurrent protection in the circuit is limited to 10 amperes or less. (3) The load is part of a meter, instrument, or relay circuit.		
Article 505	**Zone 0, 1, and 2 Locations**				
505.4	**505.4 Documentation.** All areas in industrial occupancies designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.	FR-8689, SR-7766	**505.4 Documentation.** Areas designated as hazardous (classified) locations or as unclassified shall be documented on an area classification drawing and other associated documentation. This documentation shall be made available to the AHJ and those authorized to design, install, inspect, maintain, or operate electrical equipment at the location.	Revised text and Informational Notes to clarify that documentation needs to be made available to the AHJ. Impacts: No negative impact.	**2**
505.8(O)	[Did not exist]	FR-8593	**(O) Protection by Impedance Heating "IEEE 844.3".** This protection technique shall be permitted for impedance heating of pipelines, and equipment in Zone 2 locations for which it is listed.	Added section for protection by impedance heating "IEEE 844.3." Impacts: No negative impact.	**2**
505.8(P)	[Did not exist]	FR-8593	**(P) Pressurized Room "p".**	Added section for pressurized room "p." Impacts: No negative impact.	**2**

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			This protection technique shall be permitted for equipment in Zone 1 or Zone 2 locations for which it is identified.		
505.8(Q)	[Did not exist]	FR-8593, SR-7790	**(Q) Special Protection "s".** This protection technique shall be permitted for equipment in Zone 0, Zone 1, or Zone 2 locations for which it is listed.	Added section for special protection "s." Impacts: No negative impact.	**2**
505.15(B)	**(B) Zone 1.** **(1) General.** In Zone 1 locations, the following wiring methods shall be permitted: (1) All wiring methods permitted by 505.15(A). (2) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage, Type MC-HL cable listed for use in Zone 1 or Class I, Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, and a separate equipment grounding	FR-8414, SCR-55	**(1) General.** In Zone 1 locations, the following wiring methods shall be permitted: (1) All wiring methods permitted by 505.15(A). (2) In restricted industrial establishments where the cable is not subject to physical damage, Type MC-HL cable listed for use in Zone 1 or Class I, Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath, an overall jacket of suitable polymeric material, and a separate equipment grounding conductor(s) in accordance with 250.122. Type MC-HL cable shall be terminated with fittings listed for the application and installed in accordance with Part II of Article 330. (3) In restricted industrial establishments where the cable is not subject to physical damage,	Revised for correlation and to use defined term *restricted industrial establishment [as applied to hazardous (classified) locations]*. Impacts: No negative impact.	**2**

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	conductor(s) in accordance with 250.122, and terminated with fittings listed for the application. Type MC-HL cable shall be installed in accordance with Part II of Article 330. (3) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, and where the cable is not subject to physical damage, Type ITC-HL cable listed for use in Zone 1 or Class I, Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material, and terminated with fittings listed for the application. Type ITC-HL cable shall be installed in accordance with 727.4. (4) Type MI cable terminated with fittings listed for Zone 1 or Class I, Division 1 locations. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings.		Type ITC-HL cable listed for use in Zone 1 or Class I, Division 1 locations, with a gas/vaportight continuous corrugated metallic sheath and an overall jacket of suitable polymeric material. Type ITC-HL cable shall be terminated with fittings listed for the application and installed in accordance with 335.4 (4) Type MI cable terminated with fittings listed for Zone 1 or Class I, Division 1 locations. Type MI cable shall be installed and supported in a manner to avoid tensile stress at the termination fittings. (5) Threaded rigid metal conduit (RMC) or threaded intermediate metal conduit (IMC), including RMC or IMC conduit systems with supplemental corrosion protection coatings. (6) Where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade, PVC or RTRC conduit. RMC or IMC conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of		

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	(5) Threaded rigid metal conduit (Type RMC) or threaded steel intermediate metal conduit (Type IMC). (6) Type PVC or RTRC conduit shall be permitted where encased in a concrete envelope a minimum of 50 mm (2 in.) thick and provided with not less than 600 mm (24 in.) of cover measured from the top of the conduit to grade. Threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (24 in.) of the underground run to emergence or to the point of connection to the aboveground raceway. An equipment grounding conductor shall be included to provide for electrical continuity of the raceway system and for grounding of non–current-carrying metal parts. (7) Intrinsic safety type of protection "ib" shall be permitted using the wiring methods in accordance with 504.20. (8) Optical fiber cable Types OFNP, OFCP, OFNR, OFCR, OFNG, OFCG, OFN, and OFC shall be permitted to be installed in raceways in accordance		the raceway system and for grounding of non–current-carrying metal parts. (7) Intrinsic safety type of protection "ib" using the wiring methods in accordance with 504.20. (8) Optical fiber cable Type OFNP, Type OFCP, Type OFNR, Type OFCR, Type OFNG, Type OFCG, Type OFN, or Type OFC installed in raceways in accordance with 505.15(B). Optical fiber cable shall be sealed in accordance with 505.16. (9) In restricted industrial establishments for applications limited to 600 volts nominal or less where the cable is not subject to physical damage, Type TC-ER-HL shall be terminated with fittings listed for the location and installed in accordance with 336.10. (10) In restricted industrial establishments, listed Type P cable with metal braid armor and an overall jacket. Type P cable shall be terminated with fittings listed for the location and installed in accordance with Part II of Article 337.		

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	with 505.15(B). Optical fiber cable shall be sealed in accordance with 505.16. (9) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage and terminated with fittings listed for the location, Type TC-ER-HL cable shall be listed for use in Class I, Division 1 or Zone 1 locations and shall be installed in accordance with 336.10. (10) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, listed Type P cable with metal braid armor, with an overall jacket, and terminated with fittings listed for the location, and installed in accordance with 337.10.				

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505.15(B)(2)	**(2) Flexible Connections.** Where necessary to employ flexible connections, as at motor terminals, one of the following shall be permitted: (1) Flexible fittings listed for the location. (2) Flexible cord in accordance with 505.17(A), terminated with cord connectors listed for the location. (3) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified persons service the installation, for applications limited to 600 volts nominal or less, and where the cable is not subject to physical damage, and terminated with fittings listed for the location, Type TC-ER-HL cable. Type TC-ER-HL cable shall be listed for use in Class I, Division 1 or Zone 1 locations and shall be installed in accordance with 336.10. (4) In industrial establishments with restricted public access, where the conditions of maintenance and supervision ensure that only qualified	FR-8544	**(2) Flexible Connections.** If flexibility is necessary to minimize the transmission of vibration from equipment during operation or to allow for movement after installation during maintenance, one of the following shall be permitted: (1) Flexible fittings listed for the location. (2) Flexible cord in accordance with 505.17(A), terminated with cord connectors listed for the location. (3) In restricted industrial establishments for applications limited to 600 volts nominal or less, where the cable is not subject to physical damage and is terminated with fittings listed for the location, Type TC-ER-HL cable. Type TC-ER-HL cable shall be listed for use in Class I, Division 1 or Zone 1 locations and shall be installed in accordance with 336.10. (4) In restricted industrial establishments listed Type P cable with metal braid armorand an overall jacket. Type P cable shall be terminated with fittings listed for the location and installed in accordance with Part II of Article 337.	Revised for clarity and to use defined term *restricted industrial establishment [as applied to hazardous (classified) locations]*. Impacts: No negative impact.	**2**

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	persons service the installation, listed Type P cable with metal braid armor, with an overall jacket, and terminated with fittings listed for the location, and installed in accordance with 337.10.				
505.16(C)(2)	**(2) Cable Seals.** Cable seals shall be located in accordance with 505.16(C)(2)(a), (C)(2)(b), and (C)(2)(c). (a) *Explosionproof and Flameproof Enclosures.* Cables entering enclosures required to be flameproof or explosionproof shall be sealed at the point of entrance. The seal shall comply with 505.16(D). Multiconductor or optical multifiber cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core shall be sealed in the Zone 2 location after removing the jacket and any other coverings so that the sealing compound surrounds each individual insulated conductor or optical fiber tube in such a manner as to minimize the passage of gases and vapors. Multiconductor or optical multifiber cables in conduit shall be sealed as described in 505.16(B)(4). *Exception No. 1:*	FR-8555, SR-7783	**(2) Cable Seals.** Cable seals shall be installed in accordance with 505.16(C)(2)(a) through (C)(2)(c). (a) *Explosionproof and Flameproof Enclosures.* Cables entering enclosures required to be flameproof or explosionproof shall be sealed at the point of entrance. The seal shall comply with 505.16(D). Multiconductor or optical multifiber cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core shall be sealed in the Zone 2 location after removing the jacket and any other coverings so that the sealing compound surrounds each individual insulated conductor or optical fiber tube to minimize the passage of gases and vapors. Multiconductor or optical multifiber cables in conduit shall be sealed as described in 505.16(B)(4). *Exception No. 1:* *Cables passing from an enclosure or room that is unclassified as a result of Type Z*	Cables permitted in 505.16 are capable of passing gases and vapors creating a need to seal the cables. Added enforceable requirements for sealing cables and revised text for consistency. Impacts: No negative impact.	**2**

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	Cables passing from an enclosure or room that is unclassified as a result of Type Z pressurization into a Zone 2 location shall not require a seal at the boundary. *Exception No. 2:* *Shielded cables and twisted pair cables shall not require the removal of the shielding material or separation of the twisted pairs, provided the termination is by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.* (b) *Cables That Will Not Transmit Gases or Vapors.* Cables with a gas/vaportight continuous sheath and that will not transmit gases or vapors through the cable core in excess of the quantity permitted for seal fittings shall not be required to be sealed except as required in 505.16(C)(2)(b). The minimum length of such cable run shall not be less than the length that limits gas or vapor flow through the cable core to the rate		*pressurization into a Zone 2 location shall not require a seal at the boundary.* *Exception No. 2:* *Shielded cables and twisted pair cables shall not require removal of the shielding material or separation of the twisted pairs if the termination is by an approved means to minimize the entrance of gases or vapors and prevent propagation of flame into the cable core.* (b*) Restricted Breathing Enclosures "nR".* Cables entering restricted breathing enclosures required to be restricted breathing shall be sealed at the point of entrance into the enclosure. These seals shall be installed in accordance with 505.16(D). Multiconductor cables or multifiber optical fiber cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core shall be sealed in the Zone 2 location. The jacket and any other coverings shall be removed to allow the sealing compound to surround each individual insulated conductor or optical fiber tube to minimize the passage of gases and vapors. Multiconductor cables or optical fiber		

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	permitted for seal fittings [200 cm^3/hr (0.007 ft^3/hr) of air at a pressure of 1500 pascals (6 in. of water)]. (c) *Cables Capable of Transmitting Gases or Vapors.* Cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core shall not be required to be sealed except as required in 505.16(C)(2)(b), unless the cable is attached to process equipment or devices that may cause a pressure in excess of 1500 pascals (6 in. of water) to be exerted at a cable end, in which case a seal, barrier, or other means shall be provided to prevent migration of flammables into an unclassified area. *Exception:* *Cables with an unbroken gas/vaportight continuous sheath shall be permitted to pass through a Zone 2 location without seals.* (d) *Cables Without Gas/Vaportight Continuous Sheath.* Cables that do not have gas/vaportight continuous sheath shall be sealed at the boundary of the Zone 2 and unclassified location in such a		cables in conduit shall be sealed as described in 505.16(C)(1)(b). *Exception No. 1:* *Cables passing from an enclosure or room that is unclassified as a result of Type Z pressurization into a Zone 2 location shall not require a seal at the boundary.* *Exception No. 2:* *Shielded cables and twisted pair cables terminated with fittings listed for the location shall not require removal of the shielding material or separation of the twisted pairs.* (c) *Cables That Will Not Transmit Gases or Vapors.* Cables with a gas/vaportight continuous sheath that will not transmit gases or vapors through the cable core in excess of the quantity permitted for seal fittings shall not be required to be sealed except as required in 505.16(C)(2)(b). The minimum length of such cable run shall not be less than the length that limits gas or vapor flow through the cable core to the rate permitted		

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	manner as to minimize the passage of gases or vapors into an unclassified location.		for seal fittings [200 cm^3/hr (0.007 ft^3/hr) of air at a pressure of 1500 pascals (6 in. of water)]. (d) *Cables Capable of Transmitting Gases or Vapors.* Cables with a gas/vaportight continuous sheath capable of transmitting gases or vapors through the cable core shall not be required to be sealed except as required in 505.16(C)(2)(b), unless the cable is attached to process equipment or devices that might cause a pressure in excess of 1500 pascals (6 in. of water) to be exerted at a cable end, in which case a seal, barrier, or other means shall be provided to prevent migration of flammables into an unclassified area. *Exception:* *Cables with an unbroken gas/vaportight continuous sheath shall be permitted to pass through a Zone 2 location without seals.* (e) *Cables Without a Gas/Vaportight Continuous Sheath.* Cables that do not have a gas/vaportight continuous sheath shall be sealed at the boundary of the Zone 2 and unclassified location to minimize the passage of gases or vapors into an unclassified location.		

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505.30	**505.25 Grounding and Bonding.** Regardless of the voltage of the electrical system, grounding and bonding shall comply with Article 250 and the requirements in 505.25(A) and (B). **(A) Bonding.** The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, and so forth, between Class I locations and the point of grounding for service equipment or point of grounding of a separately derived system. *Exception:* *The specific bonding means shall be required only to the nearest point where the grounded circuit conductor and the grounding electrode are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B), provided the branch-*	FR-8386, SR-7842	**505.30 Grounding and Bonding.** Regardless of the voltage of the electrical system, wiring systems and equipment shall comply with 505.30(A) and (B). **(A) Grounding.** Wiring systems and equipment shall be grounded in accordance with Part I and Part VI of Article 250, as applicable. **(B) Bonding.** Wiring systems and equipment shall be bonded in accordance with Part I and Part V of Article 250, as applicable, and 505.30(B)(1) and (B)(2).	Relocated requirements from 505.25 and revised text to separate grounding and bonding into two separate items, which allows for additional methods to be created for bonding. Impacts: No negative impact.	**2**

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	circuit overcurrent protection is located on the load side of the disconnecting means. **(B) Types of Equipment Grounding Conductors.** Flexible metal conduit and liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in compliance with 250.102. *Exception:* *In Zone 2 locations, the bonding jumper shall be permitted to be deleted where all of the following conditions are met:* *(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used.* *(2) Overcurrent protection in the circuit is limited to 10 amperes or less.* *(3) The load is not a power utilization load.*				
Article 506	**Zone 20, 21, and 22 Locations for Combustible Dusts and Ignitable Fibers/Flyings**				
506.4	**506.4 Documentation.**	FR-8690, SR-7843	**506.4 Documentation.**	Revised text and Informational Notes to clarify that documentation needs to be made available to the AHJ.	**2**

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	Areas designated as hazardous (classified) locations shall be properly documented. This documentation shall be available to those authorized to design, install, inspect, maintain, or operate electrical equipment.		Areas designated as hazardous (classified) or unclassified locations shall be documented on an area classification drawing and other associated documentation. This documentation shall be made available to the AHJ and to those authorized to design, install, inspect, maintain, or operate electrical equipment.	Impacts: No negative impact.	
506.8(O)	[Did not exist]	FR-8626	**(O) Pressurized Room "p".** This protection technique shall be permitted in Zone 21 and Zone 22 locations for which it is identified.	Added section for pressurized room “p.” Impacts: No negative impact.	**2**
506.8(P)	[Did not exist]	FR-8626, SR-7857	**(P) Special Protection "s".** This protection technique shall be permitted for equipment in Zone 20, Zone 21, or Zone 22 locations for which they are listed.	Added section for special protection “s.” Impacts: No negative impact.	**2**
506.30	**506.25 Grounding and Bonding.** Regardless of the voltage of the electrical system, grounding and bonding shall comply with Article 250 and the requirements in 506.25(A) and (B). **(A) Bonding.** The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with	FR-8404, SR-7856	**506.30 Grounding and Bonding.** Regardless of the voltage of the electrical system, wiring systems and equipment shall comply with 506.30(A)and (B). **(A) Grounding.** Wiring systems and equipment shall be grounded in accordance with Part I and Part VI of Article 250, as applicable. **(B) Bonding.**	Relocated requirements from former 506.25 and revised text to separate grounding and bonding into two separate items, which allows for additional methods to be created for bonding. Impacts: No negative impact.	**2**

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	proper fittings or other approved means of bonding shall be used. Such means of bonding shall apply to all intervening raceways, fittings, boxes, enclosures, and so forth, between Zone 20, Zone 21, and Zone 22 locations and the point of grounding for service equipment or point of grounding of a separately derived system. *Exception:* *The specific bonding means shall be required only to the nearest point where the grounded circuit conductor and the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B) if the branch side overcurrent protection is located on the load side of the disconnecting means.* **(B) Types of Equipment Grounding Conductors.** Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in compliance with 250.102. *Exception:*		Bonding shall comply with Part I and Part V of Article 250, as applicable, and 506.30(B)(1) and (B)(2). **(1) Specific Bonding Means.** Bonding shall comply with 506.30(B)(1)(a) and (B)(1)(b). (a) The locknut-bushing and double-locknut types of contacts shall not be depended on for bonding purposes, but bonding jumpers with identified fittings or other approved means of bonding shall be used. These bonding means shall apply to all metal raceways, fittings, boxes, cable trays, and enclosures, and other parts of raceway systems between hazardous (classified) locations and the point of grounding for service equipment or point of grounding for a separately derived system. Metal struts, angles, or channels provided for support and mechanical or physical protection as permitted in 335.4(5), 336.10(7)(c), or 722.135(C) shall be bonded in accordance with 250.102. (b) Where the branch-circuit overcurrent protection is located on the load side of the disconnecting means, the specific bonding means shall be permitted to end at the nearest point where the grounded circuit conductor and		

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	In Zone 22 locations, the bonding jumper shall be permitted to be deleted where all of the following conditions are met: *(1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used.* *(2) Overcurrent protection in the circuit is limited to 10 amperes or less.* *(3) The load is not a power utilization load.*		the grounding electrode conductor are connected together on the line side of the building or structure disconnecting means as specified in 250.32(B). **(2) Liquidtight Flexible Metal Conduit.** Liquidtight flexible metal conduit shall comply with 506.30(B)(2)(a) and (B)(2)(b). (a) Liquidtight flexible metal conduit shall include an equipment bonding jumper of the wire type in accordance with 250.102. (b) In Zone 22 locations, the bonding jumper shall not be required where all of the following conditions are met: (1) Listed liquidtight flexible metal conduit 1.8 m (6 ft) or less in length, with fittings listed for grounding, is used. (2) Overcurrent protection in the circuit is limited to 10 amperes or less. (3) The load is part of a meter, instrument, or relay circuit.		
Article 511	**Commercial Garages, Repair and Storage**				

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511.8	**511.8 Underground Wiring Below Class I Locations.** Underground wiring shall be installed in threaded rigid metal conduit or intermediate metal conduit. *Exception:* *Type PVC conduit, Type RTRC conduit, and Type HDPE conduit shall be permitted where buried under not less than 600 mm (2 ft) of cover. Where Type PVC conduit, Type RTRC conduit, or Type HDPE conduit is used, threaded rigid metal conduit or threaded steel intermediate metal conduit shall be used for the last 600 mm (2 ft) of the underground run to emergence or to the point of connection to the aboveground raceway, and an equipment grounding conductor shall be included to provide electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.*	FR-8561, SR-7871	**511.8 Underground Wiring Below Hazardous (Classified) Locations.** Underground wiring shall be installed in accordance with one of the following wiring methods: (1) Threaded rigid metal conduit (RMC) or threaded intermediate metal conduit (IMC) with listed threaded fittings. (2) Rigid polyvinyl chloride conduit (PVC), reinforced thermosetting resin conduit (RTRC), or high-density polyethylene conduit (HDPE) where buried under not less than 600 mm (2 ft) of cover. Where PVC conduit, RTRC conduit, or HDPE conduit is used, threaded rigid metal conduit or threaded intermediate metal conduit shall be used for the last 600 mm (2 ft) of the underground run to emergence or to the point of connection to the aboveground raceway, and an equipment grounding conductor shall be included to provide electrical continuity of the raceway system and for grounding of non–current-carrying metal parts.	Revised former exception into positive enforceable language, added requirement of threaded to RMC and IMC, and corrected change in classification term. Impacts: No negative impact.	**2**
Article 515	**Bulk Storage Plants**				

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515.10	515.10 Special Equipment — Gasoline Dispensers. Where gasoline or other volatile flammable liquids or liquefied flammable gases are dispensed at bulk stations, the applicable provisions of Article 514 shall apply.	FR-8490, SR-7884	515.10 Special Equipment — Motor Fuel Dispensers. In addition to the requirements of this article, dispensers for gasoline or other volatile flammable liquids or liquified flammable gases shall comply with the requirements for motor fuel dispensing facilities, as applicable, except as modified by this article.	Revised to replace "Gasoline" with "Motor Fuel" in reference to dispensers since the text refers to other types of dispensers. Impacts: No negative impact.	**2**
Article 520	**Theaters, Audience Areas of Motion Picture and Television Studios, Performance Areas, and Similar Locations**				
520.68(D)	[Did not exist]	FR-8007, SCR-60	**(D) Special-Purpose Multicircuit Cable Systems.** Special-purpose multicircuit cable systems shall comply with the following requirements: (1) Branch circuits shall be rated at not more than 20 amperes and not more than 150 volts to ground. (2) Trunk cable types shall be extra-hard usage (hard service) or hard usage (junior hard service). (3) The ampacity of trunk cables shall be determined in accordance with Table 520.44(C)(2)(1).	Added section for special-purpose multi-circuit cable systems. Impacts: No negative impact.	**2**

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			(4) Trunk cables, breakout assemblies, and multicircuit enclosures shall be listed. (5) Section 406.4(F) shall not apply to multicircuit, multipole plugs or receptacles that are part of a special-purpose multicircuit cable system. (6) All multicircuit, multipole connectors shall be clearly marked with the voltage of the branch circuits serviced by the connector. (7) Installation and operation shall be performed by qualified persons.		
Article 590	**Temporary Installations**				
590.4(B)	**(B) Feeders.** Overcurrent protection shall be provided in accordance with 240.4, 240.5, 240.100, and 240.101. Conductors shall be permitted within cable assemblies or within multiconductor cords or cables of a type identified in Table 400.4 for hard usage or extra-hard usage. For the purpose of this section, the following wiring methods shall be permitted:	FR-9459	**(B) Feeders.** Overcurrent protection shall be provided in accordance with 240.4, 240.5, 245.26, 445.12, and 445.13. Conductors shall be permitted within cable assemblies or within multiconductor cords or cables of a type identified in Table 400.4 for hard usage or extra-hard usage. For the purpose of this section, the following wiring methods shall be permitted: (1) Type NM, Type NMC, and Type SE cables shall be permitted to be used in any dwelling,	Revised to add the appropriate rules in Article 445 for OCP along with Article 240 to eliminate possible redundant protection. Impacts: No negative impact.	**2**

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	(1) Type NM, Type NMC, and Type SE cables shall be permitted to be used in any dwelling, building, or structure without any height limitation or limitation by building construction type and without concealment within walls, floors, or ceilings. (2) Type SE cable shall be permitted to be installed in a raceway in an underground installation. *Exception:* *Single insulated conductors shall be permitted where installed for the purpose(s) specified in 590.3(C), where accessible only to qualified persons.*		building, or structure without any height limitation or limitation by building construction type and without concealment within walls, floors, or ceilings. (2) Type SE cable shall be permitted to be installed in a raceway in an underground installation. *Exception:* *Single insulated conductors shall be permitted where installed for the purpose(s) specified in 590.3(C) and accessible only to qualified persons.*		
590.4(F)	**(F) Lamp Protection.** All lamps for general illumination shall be protected from accidental contact or breakage by a suitable luminaire or lampholder with a guard. Brass shell, paper-lined sockets, or other metal-cased sockets shall not be used unless	FR-9460	**(F) Lamp Protection.** All lamps for general illumination shall be protected from accidental contact or breakage by a suitable luminaire or lampholder with a guard. Metal guarded sockets shall not be used unless the metal guard is connected to the circuit equipment grounding conductor.	Revised to require metal guards for lamps be connected to EGC, if used. Impacts: No negative impact.	**2**

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	the shell is connected to the circuit equipment grounding conductor.				
590.6(A)(3)	**(3) Receptacles on 15-kW or less Portable Generators.** All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15-kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection for personnel. All 15- and 20-ampere, 125- and 250-volt receptacles, including those that are part of a portable generator, used in a damp or wet location shall comply with 406.9(A) and (B). Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15-kW or less portable generators manufactured or remanufactured prior to January 1, 2011.	FR-9461	**3) Receptacles on 15-kW or less Portable Generators.** All 125-volt and 125/250-volt, single-phase, 15-, 20-, and 30-ampere receptacle outlets that are a part of a 15-kW or smaller portable generator shall have listed ground-fault circuit-interrupter protection for personnel. All 15- and 20-ampere, 125- and 250-volt receptacles, including those that are part of a portable generator, used in a damp or wet location shall comply with 406.9(A) and (B). Listed cord sets or devices incorporating listed ground-fault circuit-interrupter protection for personnel identified for portable use shall be permitted for use with 15-kW or less portable generators manufactured or remanufactured prior to January 1, 2015.	Revised to update manufacture or re-manufacture date and requirements of GFCI for generators built before the date. This updated reference date in this revision simply recognizes older generators that are permitted to be used with devices that are listed as “portable GFCI”. Impacts: No negative impact.	**2**
590.8(B)	**(B) Service Overcurrent Protective Devices.** Overcurrent protective devices for solidly grounded wye electrical services of more than	FR-9464	**(B) Service Overcurrent Protective Devices.** Overcurrent protective devices for solidly grounded wye electrical services of more than 150 volts to ground but not exceeding 1000 volts phase-to-phase,	Revised text requiring current-limiting OCP where available fault current is greater than 10,000 amperes. For circuits where the available fault current is less than 10kA, conventional devices typically operate in a time frame that limits the amount of	**2**

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	150 volts to ground but not exceeding 1000 volts phase-to-phase shall be current limiting.		available fault current greater than 10,000 amperes, shall be current limiting.	energy being released under fault conditions to a level that is manageable. While current limiting devices will open fault conditions in less amount of time, the reduction in energy being released during fault conditions has a diminished benefit to safety compared to current limiting devices applied where circuits have significantly more energy to release. A conventional molded-case circuit breaker with an instantaneous trip capability typically will trip in about 1.5 cycles under fault conditions whereas a current limiting fuse will typically open in half a cycle. For smaller amounts of fault current, like 10kA and less, reducing the clearing time by only a cycle has little effect on safety. Impacts: No negative impact.	

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Chapter 6 Special Equipment					
Article 600	**Electric Signs and Outline Lighting**				
600.7(B)(7)	**(7) Bonding Conductors.** Bonding conductors shall comply with (1) and (2). (1) Bonding conductors shall be copper and not smaller than 14 AWG. (2) Bonding conductors installed externally of a sign or raceway shall be protected from physical damage.	FR-7632, SR-8197	**(7) Bonding Conductors.** Bonding conductors installed outside of a sign or raceway shall be protected from physical damage. Bonding conductors shall comply with 250.120 and 250.122. Bonding conductor size shall also comply with one of the following: (1) Bonding conductors shall be copper and not smaller than 14 AWG. (2) Bonding conductors shall be copper-clad aluminum and not smaller than 12 AWG.	Revised to include copper-clad aluminum as a bonding conductor and added “also” to clarify size intent. Impacts: No negative impact.	**2**
Article 604	**Manufactured Wiring Systems**				
604.100(A)(2)	**(2) Conduits.** Conduit shall be listed flexible metal conduit or listed liquidtight flexible conduit containing nominal 600-volt, 8 to 12 AWG insulated copper conductors with a bare or insulated copper equipment grounding conductor equivalent in size to the ungrounded conductor. *Exception No. 1 to (1) and (2):*	FR-7745, FR-7714, SR-8620	**(2) Conduits and Tubing.** Conduit shall be listed flexible metal conduit (FMC), listed liquidtight flexible metal conduit (LFMC), liquidtight flexible nonmetallic conduit (LFNC), or electrical metallic tubing (EMT) containing nominal 600-volt, 8 AWG to 12 AWG insulated copper-clad aluminum or copper conductors with a bare or insulated copper-clad aluminum or copper equipment grounding	Revised to add EMT to list, add acronyms, and to correlate with 110.14 changes around copper-clad aluminum conductors not being dissimilar metals to copper. Impacts: No negative impact.	**2**

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	A luminaire tap, no longer than 1.8 m (6 ft) and intended for connection to a single luminaire, shall be permitted to contain conductors smaller than 12 AWG but not smaller than 18 AWG. *Exception No. 2 to (1) and (2):* *Listed manufactured wiring assemblies containing conductors smaller than 12 AWG shall be permitted for remote-control, signaling, or communications circuits.* *Exception No. 3 to (2):* *Listed manufactured wiring systems containing unlisted flexible metal conduit of noncircular cross section or trade sizes smaller than permitted by 348.20(A), or both, shall be permitted where the wiring systems are supplied with fittings and conductors at the time of manufacture.*		conductor equivalent in size to the ungrounded conductor. *Exception No. 1 to (1) and (2):* *A luminaire tap, no longer than 1.8 m (6 ft) and intended for connection to a single luminaire, shall be permitted to contain conductors smaller than 12 AWG but not smaller than 18 AWG.* *Exception No. 2 to (1) and (2):* *Listed manufactured wiring assemblies containing conductors smaller than 12 AWG shall be permitted for remote-control, signaling, or communications circuits.* *Exception No. 3 to (2):* *Listed manufactured wiring systems containing unlisted flexible metal conduit of noncircular cross section or trade sizes smaller than permitted by 348.20(A), or both, shall be permitted where the wiring systems are supplied with fittings and conductors at the time of manufacture.*		
Article 620	**Elevators, Dumbwaiters, Escalators, Moving Walks, Platform Lifts, and Stairway Chairlifts**				
620.12(A)(2)	[Did not exist]	FR-9328, SR-7510	**(2) Class 2 and Communications Circuits.** Communications cables used for Class 2 or communications circuits shall have a current limit equal to or greater than the current required to power	Added section on Class 2 wiring and to provide minimum cable sizes. Impacts: No negative impact.	**2**

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			the powered Class 2 or communications device. Communications cables shall comply with 800.179. The minimum conductor size for communications circuits shall be 24 AWG.		
620.12(A)(4)	[Did not exist]	FR-9328	**(4) Paralleled Conductors.** Where ampacity requirements or voltage drop conditions in a traveling cable circuit prevent the use of a single conductor of AWG 14 or smaller, conductors shall be permitted in parallel in compliance with all the following: (1) Each conductor shall be no smaller than 20 AWG copper. (2) The paralleled conductors shall be the same type and have the same ampacity rating. (3) No more than 3 conductors shall be paralleled. (4) The overcurrent protection shall be such that the ampacity of each individual conductor will not be exceeded if one of the parallel conductors becomes inadvertently disconnected.	Added section allowing parallel conductors in elevator traveling cables. Impacts: No negative impact.	**2**
620.21(A)(1)	**(A) Elevators.** **(1) Hoistways and Pits.**	FR-9327	**(A) Elevators.** **(1) Hoistways and Pits.**	Revised to list cable types for Class 2 wiring and to grant permission to use substitute cables.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	(a) Cables used in Class 2 power-limited circuits shall be permitted, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type. (b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type. (c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft): (1) Flexible metal conduit. (2) Liquidtight flexible metal conduit. (3) Liquidtight flexible nonmetallic conduit. (4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be		(a) Types CL2P, CL2R, and CL2 cables shall be permitted, provided the cables are supported and protected from physical damage. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted. (b) Flexible cords and cables that are components of listed equipment and used in circuits operating at 30 volts rms or less or 42 volts dc or less shall be permitted, provided the cords and cables are supported and protected from physical damage and are of a jacketed and flame-retardant type. (c) The following wiring methods shall be permitted in the hoistway in lengths not to exceed 1.8 m (6 ft): (1) Flexible metal conduit. (2) Liquidtight flexible metal conduit. (3) Liquidtight flexible nonmetallic conduit. (4) Flexible cords and cables, or conductors grouped together and taped or corded, shall be permitted to be installed without a raceway. They shall be located to be protected from	Impacts: No negative impact.	

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	permitted to be installed without a raceway. They shall be located to be protected from physical damage, shall be of a flame-retardant type, and shall be part of one of the following: a. Listed equipment b. Driving machine c. Driving machine brake *Exception 620.21(A)(1)(c)(1), (A)(1)(c)(2), and (A)(1)(c)(3):* *The conduit length shall not be required to be limited between risers and limit switches, interlocks, operating buttons, and similar devices.* (d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard		physical damage, shall be of a flame-retardant type, and shall be part of one of the following: a. Listed equipment b. Driving machine c. Driving machine brake *Exception to 620.21(A)(1)(c)(1), (A)(1)(c)(2), and (A)(1)(c)(3):* *The conduit length shall not be required to be limited between risers and limit switches, interlocks, operating buttons, and similar devices.* (d) A sump pump or oil recovery pump located in the pit shall be permitted to be cord connected. The cord shall be a hard usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage. (e) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as		

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	usage oil-resistant type, of a length not to exceed 1.8 m (6 ft), and shall be located to be protected from physical damage. (e) Hard-service cords and junior hard-service cords that conform to the requirements of Article 400 (Table 400.4) shall be permitted as flexible connections between the fixed wiring in the hoistway and hoistway access switches when located in the hoistway door sight guard.		flexible connections between the fixed wiring in the hoistway and hoistway access switches when located in the hoistway door sight guard.		
620.21(B)(2)	**(2) Class 2 Circuit Cables.** Cables used in Class 2 power-limited circuits shall be permitted to be installed within escalators and moving walkways, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.	FR-9309	**(2) Class 2 Circuit Cables.** Types CL2P, CL2R, and CL2 cables shall be permitted to be installed within escalators and moving walkways, provided the cables are supported and protected from physical damage. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted.	Revised to list cable types for Class 2 wiring and to grant permission to use substitute cables. Impacts: No negative impact.	**2**
620.21(C)(2)	**(2) Class 2 Circuit Cables.** Cables used in Class 2 power-limited circuits shall be permitted to be installed within platform lifts and stairway chairlift runways and machinery spaces, provided the cables are supported and protected from physical damage and are of a jacketed and flame-retardant type.	FR-9304	**(2) Class 2 Circuit Cables.** Types CL2P, CL2R, and CL2 cables shall be permitted to be installed within platform lifts and stairway chairlift runways and machinery spaces, provided the cables are supported and protected from physical damage. Substitute cables for Class 2 cables installed in accordance with 722.135(E) shall be permitted.	Revised to list cable types for Class 2 wiring and to grant permission to use substitute cables. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
620.22(A)	**(A) Car Light Receptacles, Auxiliary Lighting, and Ventilation.** A separate branch circuit shall supply the car lights. The car lights branch circuit shall be permitted to supply receptacles, accessory equipment (alarm devices, alarm bells, monitoring devices not part of the control system), auxiliary lighting power source, and ventilation on each elevator car or inside the operation controller. The overcurrent device protecting the branch circuit shall be located in the elevator machine room, control room, machinery space, or control space. Where there is no machine room, control room, machinery space, or control space outside the hoistway, the overcurrent device shall be located outside the hoistway and accessible to qualified persons only. Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.	SR-7515	**(A) Car Light Receptacles, Auxiliary Lighting, and Ventilation.** A separate branch circuit shall supply the car lights. The car lights branch circuit shall be permitted to supply receptacles (alarm devices, emergency responder radio coverage (ERRC), car ventilation purification systems, monitoring devices not part of the control system), auxiliary lighting power source, car emergency signaling, communications devices (including their associated charging circuits), and ventilation on each elevator car or inside the operation controller. The overcurrent device protecting the branch circuit shall be located in the elevator machine room, control room, machinery space, or control space. Where there is no machine room, control room, machinery space, or control space outside the hoistway, the overcurrent device shall be located outside the hoistway and accessible to qualified persons only. Required lighting shall not be connected to the load side of a ground-fault circuit interrupter.	Revised to permit additional loads on car lighting branch circuit. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
620.36	**620.36 Different Systems in One Raceway or Traveling Cable.** Optical fiber cables and conductors for operating devices, operation and motion control, power, signaling, fire alarm, lighting, heating, and air-conditioning circuits of 1000 volts or less shall be permitted to be run in the same traveling cable or raceway system if all conductors are insulated for the maximum voltage applied to any conductor within the cables or raceway system and if all live parts of the equipment are insulated from ground for this maximum voltage. Such a traveling cable or raceway shall also be permitted to include shielded conductors and/or one or more coaxial cables if such conductors are insulated for the maximum voltage applied to any conductor within the cable or raceway system. Conductors shall be permitted to be covered with suitable shielding for telephone, audio, video, or higher frequency communications circuits.	FR-9333, SR-7545	**620.36 Different Systems in One Raceway or Traveling Cable.** Optical fiber cables and conductors for operating devices, operation and motion control, power, signaling, fire alarm, lighting, heating, and air-conditioning circuits of 1000 volts or less shall be permitted to be run in the same traveling cable or raceway system if all conductors are insulated for the maximum voltage applied to any conductor within the cables or raceway system and if all live parts of the equipment are insulated from ground for this maximum voltage. Traveling cable or raceway shall also be permitted to include shielded pairs, coaxial cables, and other communications circuits. Type CMP-LP or CMR-LP cables complying with 800.179 shall be permitted in raceways.	Revised to permit communications limited power cable, shielded pairs, coaxial cables, and communications circuits in traveling cables to accommodate communications and Class 2 applications and for compliance with 800.179. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
620.51(A)	**(A) Type.** The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable only in the open position in accordance with 110.25. The disconnecting means shall be a listed device. *Exception No. 1:* *Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.* *Exception No. 2:* *Where an individual branch circuit supplies a stairway chairlift, the stairway chairlift shall be permitted to be cord-and-plug-connected, provided it complies with 422.16(A) and the cord does not exceed 1.8 m (6 ft) in length.*	FR-9342, SR-7549	**(A) Type.** The disconnecting means shall be an enclosed externally operable fused motor circuit switch or circuit breaker that is lockable only in the open position in accordance with 110.25. The disconnecting means shall be a listed device. *Exception No. 1:* *Where an individual branch circuit supplies a platform lift, the disconnecting means required by 620.51(C)(4) shall be permitted to comply with 430.109(C). This disconnecting means shall be listed and shall be lockable open in accordance with 110.25.* *Exception No. 2:* *Where an individual branch circuit supplies a stairway chairlift or where a stairway chairlift is supplied by batteries as the primary source, the stairway chairlift shall be permitted to be cord-and-plug-connected, provided it complies with 422.16(A) and the cord does not exceed 1.8 m (6 ft) in length.*	Revised text in Exception No. 2 to identify situations where a cord-and-plug connection is permitted. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
620.51(E)	**(E) Surge Protection.** Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, a legally required system load, or a critical operation power system load, listed surge protection shall be provided.	FR-9361, SCR-8	**(E) Surge Protection.** Where any of the disconnecting means in 620.51 has been designated as supplying an emergency system load, a legally required system load, or a critical operation power system load, a listed SPD shall be installed.	Added text requiring installation of a listed SPD. Impacts: No negative impact.	**1**
Article 625	**Electric Vehicle Power Transfer System**				
625.40	625.40 Electric Vehicle Branch Circuit. Each outlet installed for the purpose of charging electric vehicles shall be supplied by an individual branch circuit. Each circuit shall have no other outlets.	FR-9416, SR-7714	625.40 Electric Vehicle Branch Circuit. Each outlet installed for the purpose of supplying EVSE greater than 16 amperes or 120 volts shall be supplied by an individual branch circuit. *Exception:* *Branch circuits shall be permitted to feed multiple EVSEs as permitted by 625.42(A) or (B).*	Revised to clarify branch circuit requirements and to add an exception. Impacts: No negative impact.	**2**
625.41	**625.41 Overcurrent Protection.** Overcurrent protection for feeders and branch circuits supplying EVSE and WPTE, including bidirectional EVSE and WPTE, shall be sized for continuous duty and shall have a current rating of not less than 125 percent of the maximum load of the equipment. Where noncontinuous loads are	FR-9418	**625.41 Overcurrent Protection.** Overcurrent protection for feeders and branch circuits supplying EVSE, including bidirectional EVSE, and WPTE shall be sized for continuous duty and shall have a rating of not less than 125 percent of the maximum load of the equipment. Where noncontinuous loads are supplied from the same feeder, the overcurrent device shall have a rating of	Revised to include WPTE in text. Impacts: No negative impact.	**2**

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	supplied from the same feeder, the overcurrent device shall have a current rating of not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.		not less than the sum of the noncontinuous loads plus 125 percent of the continuous loads.		
625.42	**625.42 Rating.** The power transfer equipment shall have sufficient rating to supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article. Service and feeder shall be sized in accordance with the product ratings. Where an automatic load management system is used, the maximum equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system. Adjustable settings shall be permitted on fixed-in-place equipment only. If adjustments have an impact on the rating label, those changes shall be in accordance with manufacturer's instructions, and the adjusted rating shall appear with sufficient durability to	FR-9565, SR-7715, SCR-9, SCR-10	**625.42 Rating.** The EVSE shall have sufficient rating to supply the load served. Electric vehicle charging loads shall be considered to be continuous loads for the purposes of this article. Service and feeder shall be sized in accordance with the product ratings, unless the overall rating of the installation can be limited through controls as permitted by 625.42(A) or (B).	Revised text into subsections on energy management systems and EVSE with adjustable settings. Impacts: No negative impact.	**2**

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	withstand the environment involved on the rating label. Electric vehicle supply equipment with restricted access to an ampere adjusting means shall be permitted to have ampere ratings that are equal to the adjusted current setting. Sizing the service and feeder to match the adjusting means shall be permitted. Restricted access shall prevent the user from gaining access to the adjusting means. Restricted access shall be accomplished by at least one of the following: (1) A cover or door that requires the use of a tool to open (2) Locked doors accessible only to qualified personnel (3) Password protected commissioning software accessible only to qualified personnel				
625.43	**625.43 Disconnecting Means.** For equipment rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and	FR-9465, SR-7722	**625.43 Disconnecting Means.** For EVSE and WPTE rated more than 60 amperes or more than 150 volts to ground, the disconnecting means shall be provided and installed in a readily	Revised terms for consistency and added language to allow remote disconnecting means locations. Impacts: No negative impact.	**2**

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	installed in a readily accessible location. The disconnecting means shall be lockable open in accordance with 110.25.		accessible location. If the disconnecting means is installed remote from the equipment, a plaque shall be installed on the equipment denoting the location of the disconnecting means. The disconnecting means shall be lockable open in accordance with 110.25.		
625.44(A)	**(A) Portable Equipment.** Portable equipment shall be connected to the premises wiring system by one or more of the following methods: (1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes (2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes (3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes (4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes	FR-9466, SR-7725	**(A) Portable Equipment.** Portable equipment shall be connected to the premises wiring system by one or more of the following methods: (1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 125 volts, single phase, 15 or 20 amperes (2) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 250 volts, single phase, 15 or 20 amperes (3) A nonlocking, 2-pole, 3-wire or 3-pole, 4-wire grounding-type receptacle outlet rated at 250 volts, single phase, 30 or 50 amperes, or 125/250 volts, single-phase, 30, 50, or 60 amperes	Revised to add 3-pole, 4-wire configuration and permit 60-amp receptacles. Impacts: No negative impact.	**2**

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			(4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated at 60 volts dc maximum, 15 or 20 amperes		
625.44(B)	**(B) Fastened-in-Place Equipment.** Equipment that is fastened in place shall be connected to the premises wiring system by one of the following methods: (1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volts or 250 volts, single phase, up to 50 amperes (2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volts, three phase, up to 50 amperes (3) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volts, single phase, 30 or 50 amperes (4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 60 volts dc maximum, 15 or 20 amperes	FR-9467, SR-7727	**(B) Fastened-in-Place Equipment.** Equipment that is fastened-in-place shall be connected to the premises wiring system by one of the following methods: (1) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 125 volts or 250 volts, single phase, up to 50 amperes (2) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 250 volts, three phase, up to 50 amperes (3) A nonlocking, 3-pole, 4-wire grounding-type receptacle outlet rated 125/250 volts, single phase, 30, 50, or 60 amperes (4) A nonlocking, 2-pole, 3-wire grounding-type receptacle outlet rated 60 volts dc maximum, 15 or 20 amperes	Revised to add 125/250 volts as 3-pole, 4-wire configuration and permit 60-amp receptacles. Impacts: No negative impact.	**2**
625.44(C)	**(C) Fixed Equipment.**	FR-9467	**(C) Fixed-in-Place Equipment.** All other EVSE and WPTE shall be permanently wired and fixed-in-place to the supporting surface.	Revised to add 125/250 volts as 3-pole, 4-wire configuration. Impacts: No negative impact.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
	All other EVSE and WPTE shall be permanently wired and fixed in place to the supporting surface.				
625.48	**625.48 Interactive Systems.** EVSE that incorporates a power export function and that is part of an interactive system that serves as an optional standby system, an electric power production source, or a bidirectional power feed shall be listed and marked as suitable for that purpose. When used as an optional standby system, the requirements of Article 702 shall apply; when used as an electric power production source, the requirements of Article 705 shall apply. EVPE that consists of a receptacle outlet only shall be in accordance with 625.60.	FR-9469	**625.48 Interactive Equipment.** EVSE or WPTE that incorporates a power export function and that is part of an interactive system that serves as an optional standby system, an electric power production source, or a bidirectional power feed shall be listed and marked as suitable for that purpose. When used as an optional standby system, the requirements of Parts I and II of Article 702 shall apply; when used as an electric power production source, the requirements of Parts I and II of Article 705 shall apply. EVPE that provides a receptacle outlet as its point of power export shall be in accordance with 625.60.	Revised to facilitate the integration of WPT into Article 625 and revised Informational Notes. Impacts: No negative impact.	**1**
625.49	[Did not exist]	FR-9470	**625.49 Island Mode.** EVPE and bidirectional EVSE that incorporate a power export function shall be permitted to be a part of an interconnected power system operating in island mode.	Added section for island mode for EVPE and bidirectional EVSE. Impacts: No negative impact.	**2**
Article 630	**Electric Welders**				

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
630.8	[Did not exist]	FR-9510, SCR-11	**630.8 Ground-Fault Circuit-Interrupter Protection for Personnel.** All 125-volt, 15- and 20-ampere receptacles for electrical hand tools or portable lighting equipment, supplied by single-phase branch circuits rated 150 volts or less to ground, installed in work areas where welders are operated shall have ground-fault circuit-interrupter protection for personnel.	Added section for ground-fault circuit-interrupter protection for personnel. Impacts: No negative impact.	**2**
630.13	**630.13 Disconnecting Means.** A disconnecting means shall be provided in the supply circuit for each arc welder that is not equipped with a disconnect mounted as an integral part of the welder. The disconnecting means identity shall be marked in accordance with 110.22(A). The disconnecting means shall be a switch or circuit breaker, and its rating shall be not less than that necessary to accommodate overcurrent protection as specified under 630.12.	FR-9506, SR-7589	**630.13 Disconnecting Means.** A disconnecting means shall be provided in the supply circuit for each arc welder that is not equipped with a disconnect mounted as an integral part of the welder. The disconnecting means shall be a switch, circuit breaker, or listed cord-and-plug connector, and its rating shall be not less than that necessary to accommodate overcurrent protection as specified in 630.12.	Revised to allow for listed cord-and-plug connector as a disconnecting means. Impacts: No negative impact.	**2**
Article 640	**Audio Signal Processing, Amplification, and Reproduction Equipment**				
640.3(C)	[Did not exist]	FR-9211	**(C) Communications Cables.**	Added section for communications cables.	**2**

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			Types CMP, CMR, CMG, and CM communications cables shall be permitted to substitute for Class 2 and Class 3 cables in accordance with 722.135(E).	Impacts: No negative impact.	
640.3(D)	**(C) Cable Trays.** Cable trays and cable tray systems shall be installed in accordance with Article 392.	FR-9211	**(D) Cable Trays.** Cable trays and cable tray systems shall be installed in accordance with Part II of Article 392. The installation of Class 2, Class 3, and Type PLTC cables in cable trays shall be in accordance with 722.135(B).	Revised to include Class 2, Class 3, and Type PLTC cables in cable trays and to correct cross reference. Impacts: No negative impact.	**2**
640.21(B), (C), (D)	**(B) Between Loudspeakers and Amplifiers or Between Loudspeakers.** Cables used to connect loudspeakers to each other or to an amplifier shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. **(C) Between Equipment.** Cables used for the distribution of audio signals between equipment shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. Other	FR-9215	**(B) Between Loudspeakers and Amplifiers or Between Loudspeakers.** Cables used to connect loudspeakers to each other or to an amplifier shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. **(C) Between Equipment.** Cables used for the distribution of audio signals between equipment shall comply with Article 725. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. Other cable types and assemblies specified by the	Revised for “hybrid” optical fiber cables, to update cross reference to correlate with new Article 722, and to align with current US and international definitions. Impacts: No negative impact.	**2**

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	cable types and assemblies specified by the equipment manufacturer as acceptable for the use shall be permitted in accordance with 110.3(B). **(D) Between Equipment and Power Supplies Other Than Branch-Circuit Power.** The following power supplies, other than branch-circuit power supplies, shall be installed and wired between equipment in accordance with the requirements of this *Code* for the voltage and power delivered: (1) Storage batteries (2) Transformers (3) Transformer rectifiers (4) Other ac or dc power supplies		equipment manufacturer as acceptable for the use shall be permitted in accordance with 110.3(B). **(D) Between Equipment and Power Supplies Other Than Branch-Circuit Power.** The following power supplies, other than branch-circuit power supplies, shall be installed and wired between equipment in accordance with the requirements of this *Code* for the voltage and power delivered: (1) Storage batteries (2) Transformers (3) Transformer rectifiers (4) Other ac or dc power supplies		
640.42(B), (C), (D)	**(B) Between Loudspeakers and Amplifiers, or Between Loudspeakers.** Installation of flexible cords and cables used to connect loudspeakers to each other or to an amplifier shall comply with Part I of Article 400 and Parts I, II, III, and IV of	FR-9216	**(B) Between Loudspeakers and Amplifiers, or Between Loudspeakers.** Installation of flexible cords and cables used to connect loudspeakers to each other or to an amplifier shall comply with Part I of Article 400 and Parts I, II, and III of Article 725, respectively. Cords and	Revised for "hybrid" optical fiber cables and to align with current US and international definitions. Impacts: No negative impact.	**2**

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	Article 725, respectively. Cords and cables listed for portable use, either hard or extra-hard usage as defined by Article 400, shall also be permitted. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. **(C) Between Equipment and/or Between Equipment Racks.** Installation of flexible cords and cables used for the distribution of audio signals between equipment shall comply with Parts I and II of Article 400 and Parts I, II, and III of Article 725, respectively. Cords and cables listed for portable use, either hard or extra-hard service as defined by Article 400, shall also be permitted. Other listed cable types and assemblies, including optional hybrid communications, signal, and composite optical fiber cables, shall be permitted. **(D) Between Equipment, Equipment Racks, and Power Supplies Other Than Branch-Circuit Power.** Wiring between the following power supplies, other than branch-circuit power supplies, shall		cables listed for portable use, either hard or extra-hard usage as defined by Article 400, shall also be permitted. Other listed cable types and assemblies, including optional hybrid communications, signal, and hybrid optical fiber cables, shall be permitted. **(C) Between Equipment and/or Between Equipment Racks.** Installation of flexible cords and cables used for the distribution of audio signals between equipment shall comply with Parts I and II of Article 400 and Parts I, II, and III of Article 725, respectively. Cords and cables listed for portable use, either hard or extra-hard service as defined by Article 400, shall also be permitted. Other listed cable types and assemblies, including optional hybrid communications, signal, and hybrid optical fiber cables, shall be permitted. **(D) Between Equipment, Equipment Racks, and Power Supplies Other Than Branch-Circuit Power.** Wiring between the following power supplies, other than branch-circuit power supplies, shall be installed, connected, or wired in accordance with this *Code* for the voltage and power required:		

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	be installed, connected, or wired in accordance with the requirements of this *Code* for the voltage and power required: (1) Storage batteries (2) Transformers (3) Transformer rectifiers (4) Other ac or dc power supplies		(1) Storage batteries (2) Transformers (3) Transformer rectifiers (4) Other ac or dc power supplies		
Article 646	**Modular Data Centers**				
646.3(H)	**(H) Storage Batteries.** Installation of storage batteries shall comply with Article 480. *Exception:* *Batteries that are part of listed and labeled equipment and installed in accordance with the listing requirements.*	SR-7694	[Deleted]	Deleted redundant section on storage batteries and replaced with section on surge-protective devices (SPDs) from 646.3(I) in 2020 edition. Impacts: No negative impact.	**1**
646.19	**646.19 Entrance to and Egress from Working Space.** For equipment over 1.8 m (6 ft) wide or deep, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1⁄2 ft) high	FR-9255, SR-7699	**646.19 Entrance to and Egress from Working Space.** For equipment over 1.8 m (6 ft) wide or deep, there shall be one entrance to and egress from the required working space not less than 610 mm (24 in.) wide and 2.0 m (6 1⁄2 ft) high at each end of the working	Revised to require doors open to the full extent of the designed opening. Impacts: No negative impact.	**2**

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	at each end of the working space. Doors shall open in the direction of egress and be equipped with listed panic hardware or listed fire exit hardware. A single entrance to and egress from the required working space shall be permitted where either of the conditions in 646.19(A) or (B) is met. **(A) Unobstructed Egress.** Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted. **(B) Extra Working Space.** Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.		space. Doors shall open to the full extent of their designed egress opening and be equipped with listed panic hardware or listed fire exit hardware. A single entrance to and egress from the required working space shall be permitted where either of the conditions in 646.19(A) or (B) is met. **(A) Unobstructed Egress.** Where the location permits a continuous and unobstructed way of egress travel, a single entrance to the working space shall be permitted. **(B) Extra Working Space.** Where the depth of the working space is twice that required by 110.26(A)(1), a single entrance shall be permitted. It shall be located such that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 110.26(A)(1) for equipment operating at that voltage and in that condition.		
Article 670	**Industrial Machinery**				

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670.5	**670.5 Short-Circuit Current Rating.** **(1)** Industrial machinery shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4). **(2)** Industrial machinery shall be legibly marked in the field with the available fault current. The field marking(s) shall include the date the available fault current calculation was performed and be of sufficient durability to withstand the environment involved.	FR-9525	**670.5 Short-Circuit Current Rating.** **(A) Installation.** Industrial machinery shall not be installed where the available fault current exceeds its short-circuit current rating as marked in accordance with 670.3(A)(4). **(B) Available Short-Circuit Current Field Marking.** Industrial machinery shall be legibly marked in the field with the available fault current. The field marking(s) shall include the date the available fault current calculation was performed and be of sufficient durability to withstand the environment involved.	Revised text into subsections on installation and available short-circuit current field marking for usability. Impacts: No negative impact.	**1**
670.6	**670.6 Surge Protection.** Industrial machinery with safety interlock control devices not effectively protected from voltage surges on the incoming supply circuit shall have surge protection installed.	FR-9578, SR-7644	**670.6 Overvoltage Protection.** Industrial machinery with safety circuits shall have overvoltage protection.	Revised title from “Surge” to “Overvoltage” and added “overvoltage” to first sentence of text to clarify protection requirements. Impacts: No negative impact.	**1**
Article 682	**Natural and Artificially Made Bodies of Water**				

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682.31(A)	[Did not exist]	FR-8706, SR-8319	**(A) Equipment to Be Connected to Equipment Grounding Conductor.** The following shall be connected to an equipment grounding conductor run with the circuit conductors in the same raceway, cable, or trench: (1) Metal boxes, metal cabinets, and all other metal enclosures (2) Metal frames of utilization equipment (3) Grounding terminals of grounding-type receptacles	Added section to clarify what must be connected to the EGC and renumbered remaining subsections accordingly. Impacts: No negative impact	**2**
682.31(E)	**(D) Cord-and-Plug-Connected Appliances.** Where grounded, cord-and-plug-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug.	FR-8706	**(E) Cord-and-Plug-Connected Appliances.** Unless double insulated, cord-and-plug-connected appliances shall be grounded by means of an equipment grounding conductor in the cord and a grounding-type attachment plug. *Exception:* *An equipment grounding conductor shall be permitted to be uninsulated if the EGC is part of a listed cable assembly identified for the environment and not subject to environments such as, but not limited to, storm water basins, sewage treatment ponds, and natural bodies of water containing salt.*	Added exception to recognize that an insulated EGC is not required if listed assembly is used in areas other than those that demonstrate the need for such an insulated conductor. Impacts: No negative impact.	**2**
Article 690	**Solar Photovoltaic (PV) Systems**				
690.4(G)	[Did not exist]	FR-9199	**(G) PV Equipment Floating on Bodies of Water.** PV equipment floating on or attached to structures floating on bodies of water shall be identified as	Added section for PV equipment floating on bodies of water. Impacts: No negative impact.	**2**

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			being suitable for the purpose and shall utilize wiring methods that allow for any expected movement of the equipment.		
690.7	690.7 Maximum Voltage. The maximum voltage of PV system dc circuits shall be the highest voltage between any two conductors of a circuit or any conductor and ground. The maximum voltage shall be used to determine the voltage and voltage to ground of circuits in the application of this *Code*. Maximum voltage shall be used for conductors, cables, equipment, working space, and other applications where voltage limits and ratings are used. PV system dc circuits on or in buildings shall be permitted to have a maximum voltage no greater than 1000 volts. PV system dc circuits on or in one- and two-family dwellings shall be permitted to have a maximum voltage no greater than 600 volts. Where not located on or in buildings, listed dc PV equipment, rated at a maximum voltage no greater	FR-9213, SCR-70	690.7 Maximum Voltage. The maximum voltage shall be used to determine the voltage and voltage to ground of circuits in the application of this *Code*. Maximum voltage shall be used for conductors, cables, equipment, working space, and other applications where voltage limits and ratings are used. The maximum voltage of PV system dc circuits shall be the highest voltage between any two conductors of a circuit or any conductor and ground and shall comply with the following: (1) PV system dc circuits shall not exceed 1000 volts within or originating from arrays located on or attached to buildings and PV system dc circuits inside buildings. (2) PV system dc circuits shall not exceed 600 volts on or in one- and two-family dwellings. (3) PV system dc circuits exceeding 1000 volts shall comply with 690.31(G).	Revised text into list format for clarity and removed requirements for systems over 1000 volts. Impacts: No negative impact.	**2**

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	than 1500 volts, shall not be required to comply with Parts II and III of Article 490.				
690.9(B)	**(B) Device Ratings.** Overcurrent devices used in PV system dc circuits shall be listed for use in PV systems. Electronic devices that are listed to prevent backfeed current in PV system dc circuits shall be permitted to prevent overcurrent of conductors on the PV array side of the device. Overcurrent devices, where required, shall be rated in accordance with one of the following and permitted to be rounded up to the next higher standard size in accordance with 240.4(B): (1) Not less than 125 percent of the maximum currents calculated in 690.8(A). (2) An assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be used at 100 percent of its rating.	FR-9441	**(B) Device Ratings.** Overcurrent devices used in PV source circuits shall be listed for use in PV systems. Electronic devices that are listed to prevent backfeed current in PV system dc circuits shall be permitted to prevent overcurrent of conductors on the PV array side of the device. Overcurrent devices, where required, shall be rated in accordance with one of the following and permitted to be rounded up to the next higher standard size in accordance with 240.4(B): (1) Overcurrent devices shall be rated not less than 125 percent of the maximum currents calculated in 690.8(A). (2) An assembly, together with its overcurrent device(s), that is listed for continuous operation at 100 percent of its rating shall be permitted to be used at 100 percent of its rating.	Revised to constrain the requirement of PV-rated OCPD in a PV system to PV source circuits. Since a specific PV rating as applied to overcurrent devices is unique for circuits directly connected to PV cells, this change excludes dc-to-dc converter circuits that do not have the same characteristics as PV source circuits. Impacts: No negative impact.	**2**

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690.11	690.11 Arc-Fault Circuit Protection (Direct Current). Photovoltaic systems with PV system dc circuits operating at 80 volts dc or greater between any two conductors shall be protected by a listed PV arc-fault circuit interrupter or other system components listed to provide equivalent protection. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the PV system dc circuits. *Exception:* *For PV systems not installed on or in buildings, PV output circuits and dc-to-dc converter output circuits that are installed in metallic raceways or metal-clad cables, or installed in enclosed metallic cable trays, or are underground shall be permitted without arc-fault circuit protection. Detached structures whose sole purpose is to house PV system equipment shall not be considered buildings according to this exception.*	FR-9222, SR-8431	690.11 Arc-Fault Circuit Protection (dc). Photovoltaic systems with PV system dc circuits operating at 80 volts dc or greater between any two conductors shall be protected by a listed PV arc-fault circuit interrupter or other system components listed to provide equivalent protection. The system shall detect and interrupt arcing faults resulting from a failure in the intended continuity of a conductor, connection, module, or other system component in the PV system dc circuits. *Exception:* *PV system dc circuits that utilize metal-clad cables, are installed in metal raceways or enclosed metal cable trays, or are underground shall be permitted without arc-fault circuit protection if the installation complies with at least one of the following:* *(1) The PV system dc circuits are not installed in or on buildings.* *(2) The PV system dc circuits are located in or on detached structures whose sole purpose is to support or contain PV system equipment.*	Revised to generalize the exception to all PV system dc circuits not installed on buildings and in metal wiring methods, revised terms in the exception, and deleted Informational Note due to redundancy. Impacts: No negative impact.	**2**

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690.12	690.12 Rapid Shutdown of PV Systems on Buildings. PV system circuits installed on or in buildings shall include a rapid shutdown function to reduce shock hazard for firefighters in accordance with 690.12(A) through (D). *Exception:* *Ground-mounted PV system circuits that enter buildings, of which the sole purpose is to house PV system equipment, shall not be required to comply with 690.12.*	FR-9278	690.12 Rapid Shutdown of PV Systems on Buildings. PV system circuits installed on or in buildings shall include a rapid shutdown function to reduce shock hazard for firefighters in accordance with 690.12(A) through (D). *Exception No. 1:* *Ground-mounted PV system circuits that enter buildings, of which the sole purpose is to house PV system equipment, shall not be required to comply with 690.12.* *Exception No. 2:* *PV equipment and circuits installed on nonenclosed detached structures including but not limited to parking shade structures, carports, solar trellises, and similar structures shall not be required to comply with 690.12.*	Added Exception No. 2 to align with existing exception to correlate requirements for firefighter rooftop access. Impacts: No negative impact.	**2**
690.12(B)(2)	**(2) Inside the Array Boundary.** The PV system shall comply with one of the following: (1) A PV hazard control system listed for the purpose shall be installed in accordance with the instructions included with the listing or	FR-9235, SR-8328	**(2) Inside the Array Boundary.** The PV system shall comply with one of the following: (1) The PV system shall provide shock hazard control for firefighters through the use of a PVHCS installed in accordance with the instructions included with the listing or field	Revised text to simplify option to reduce shock hazard and added Informational Note. Impacts: No negative impact.	**2**

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	field labeling. Where a hazard control system requires initiation to transition to a controlled state, the rapid shutdown initiation device required in 690.12(C) shall perform this initiation. (2) Controlled conductors located inside the boundary shall be limited to not more than 80 volts within 30 seconds of rapid shutdown initiation. Voltage shall be measured between any two conductors and between any conductor and ground. (3) PV arrays shall have no exposed wiring methods or conductive parts and be installed more than 2.5 m (8 ft) from exposed grounded conductive parts or ground.		labeling. Where a PVHCS requires initiation to transition to a controlled state, the rapid shutdown initiation device required in 690.12(C) shall perform this initiation. (2) The PV system shall provide shock hazard control for firefighters by limiting the highest voltage inside equipment or between any two conductors of a circuit or any conductor and ground inside array boundary to not more than 80 volts within 30 seconds of rapid shutdown initiation.		
690.31(C)(2)	**(2) Cable Tray.** Single-conductor PV wire or cable of all sizes or distributed generation (DG) cable of all sizes, with or without a cable tray rating, shall be permitted in cable trays installed in outdoor locations, provided that the cables are supported at intervals not to exceed 300 mm (12 in.) and secured at intervals not to exceed 1.4 m (4½ ft).	FR-9283	**(2) Cable Tray.** Single-conductor PV wire or cable of all sizes or distributed generation (DG) cable of all sizes, with or without a cable tray rating, shall be permitted in cable trays installed in outdoor locations, provided that the cables are supported at intervals not to exceed 300 mm (12 in.) and secured at intervals not to exceed 1400 mm (54 in.).	Revised text into list format and to address cable tray use, aligning it with other sections. Impacts: No negative impact.	**2**

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			Where installed in uncovered cable trays, ampacity of single-conductor PV wire smaller than 1/0 AWG, the adjustment factors for 1/0 AWG single conductor cable in 392.80(A)(2) shall be permitted to be used. Where single-conductor PV wire smaller than 1/0 AWG is installed in ladder ventilated trough cable trays, the following shall apply: (1) All single conductors shall be installed in a single layer. (2) Conductors that are bound together to comprise each circuit pair shall be permitted to be installed in other than a single layer. (3) The sum of diameters of all single conductor cables shall not exceed the cable tray width.		
690.31(G)	[Did not exist]	FR-9286, SR-8338	**(G) Over 1000 Volts DC.** Equipment and wiring methods containing PV system dc circuits with a maximum voltage greater than 1000 volts shall comply with the following: (1) Shall not be permitted on or in one- and two-family dwellings.	Added section for over 1000 volts dc. Impacts: No negative impact.	**2**

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			(2) Shall not be permitted within buildings containing habitable rooms. (3) Where installed on the exterior of buildings shall be located less than 3 m (10 ft) above grade. Wiring methods containing PV system dc circuits connected to this equipment shall not be permitted to attach to the building greater than 10 m (33 ft) along the building surface from the equipment.		
690.41	690.41 System Grounding. **(A) PV System Grounding Configurations.** One or more of the following system configurations shall be employed: (1) 2-wire PV arrays with one functionally grounded conductor (2) Bipolar PV arrays according to 690.7(C) with a functional ground reference (center tap) (3) PV arrays not isolated from the grounded inverter output circuit (4) Ungrounded PV arrays	FR-9288, FR-9287, SR-8344	690.41 PV System DC Circuit Grounding and Protection. **(A) PV System DC Circuit Grounding Configurations.** One or more of the following system configurations shall be employed for PV system dc circuits: (1) 2-wire circuits with one functionally grounded conductor (2) Bipolar circuits according to 690.7(C) with a functional ground reference (center tap) (3) Circuits not isolated from the grounded inverter output circuit (4) Ungrounded circuits	Revised to focus on dc grounding and added 690.41(B) for dc ground-fault detector-interrupter (GFDI) protection means to match UL1741 definition. Impacts: No negative impact.	**1**

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	(5) Solidly grounded PV arrays as permitted in 690.41(B) (6) PV systems that use other methods that accomplish equivalent system protection in accordance with 250.4(A) with equipment listed and identified for the use **(B) Ground-Fault Protection.** PV system dc circuits that exceed 30 volts or 8 amperes shall be provided with dc ground-fault protection meeting the requirements of 690.41(B)(1) and (B)(2) to reduce fire hazards. Solidly grounded PV source circuits with not more than two modules in parallel and not on or in buildings shall be permitted without ground-fault protection. **(1) Ground-Fault Detection.** The ground-fault protection device or system shall detect ground fault(s) in the PV system dc circuit conductors, including any functional grounded conductors, and be listed for		(5) Solidly grounded circuits as permitted in 690.41(B) (6) Circuits protected by equipment listed and identified for the use **(B) DC Ground-Fault Detector-Interrupter (GFDI) Protection.** PV system dc circuits that exceed 30 volts or 8 amperes shall be provided with GFDI protection meeting the requirements of 690.41(B)(1) and (B)(2) to reduce fire hazards. Solidly grounded PV source circuits with not more than two modules in parallel and not on or in buildings shall be permitted without GFDI protection. **(1) Ground-Fault Detection.** The GFDI device or system shall detect ground fault(s) in the PV system dc circuits, including any functionally grounded conductors, and be listed for providing GFDI protection. For dc-to-dc converters not listed as providing GFDI protection, where required, listed GFDI protection equipment identified for the combination of the dc-to-dc		

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	providing PV ground-fault protection. For dc-to-dc converters not listed as providing ground-fault protection, where required, listed ground fault protection equipment identified for the combination of the dc-to-dc converter and ground-fault protection device shall be installed to protect the circuit. **(2) Faulted Circuits.** The faulted circuits shall be controlled by one of the following methods: (1) The current-carrying conductors of the faulted circuit shall be automatically disconnected. (2) The device providing ground-fault protection fed by the faulted circuit shall automatically cease to supply power to output circuits and interrupt the faulted PV system dc circuits from the ground reference in a functionally grounded system. **(3) Indication of Faults.**		converter and the GFDI device shall be installed to protect the circuit. **(2) Faulted Circuits.** The faulted circuits shall be controlled by one of the following methods: (1) The current-carrying conductors of the faulted circuit shall be automatically disconnected. (2) The device providing GFDI protection fed by the faulted circuit shall automatically cease to supply power to output circuits and interrupt the faulted PV system dc circuits from the ground reference in a functionally grounded system. **(3) Indication of Faults.** The GFDI protection equipment shall provide indication of ground faults at a readily accessible location.		

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	Ground-fault protection equipment shall provide indication of ground faults at a readily accessible location.				
690.42	690.42 Point of System Grounding Connection. Systems with a ground-fault protective device in accordance with 690.41(B) shall have any current-carrying conductor-to-ground connection made by the ground-fault protective device. For solidly grounded PV systems, the dc circuit grounding connection shall be made at any single point on the PV output circuit.	FR-9289, SR-8349	690.42 Point of PV System DC Circuit Grounding Connection. **(A) Circuits with GFDI Protection.** Circuits protected by GFDI equipment in accordance with 690.41(B) shall have any circuit-to-ground connection made by the GFDI equipment. **(B) Solidly Grounded Circuits.** For solidly grounded PV system dc circuits, the grounding connection shall be made from any single point on the PV dc system to a point in the grounding electrode system in 690.47(A).	Revised and reorganized into subsections and added section on ground-fault detector-interrupter (GFDI) protection. Impacts: No negative impact.	**1**
690.43(C)	**(C) With Circuit Conductors.** Equipment grounding conductors for the PV array and support structure where installed shall be contained within the same raceway or cable or otherwise run with the PV system conductors where those circuit conductors leave the vicinity of the PV array.	FR-9292	**(C) Location.** Equipment grounding conductors shall be permitted to be run separately from the PV system conductors within the PV array. Where PV system circuit conductors leave the vicinity of the PV array, equipment grounding conductors shall comply with 250.134.	Revised to clarify that EGCs may be run separately within the array. Impacts: No negative impact.	**2**

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Chapter 7 Special Conditions					
Article 700	**Emergency Systems**				
700.3(F)	**(F) Temporary Source of Power for Maintenance or Repair of the Alternate Source of Power.** If the emergency system relies on a single alternate source of power, which will be disabled for maintenance or repair, the emergency system shall include permanent switching means to connect a portable or temporary alternate source of power, which shall be available for the duration of the maintenance or repair. The permanent switching means to connect a portable or temporary alternate source of power shall comply with the following: (1) Connection to the portable or temporary alternate source of power shall not require modification of the permanent system wiring. (2) Transfer of power between the normal power source and the emergency power source shall be in accordance with 700.12.	FR-8786	**(F) Temporary Source of Power for Maintenance or Repair of the Alternate Source of Power.** If the emergency system relies on a single alternate source of power, which will be disabled for maintenance or repair, the emergency system shall include permanent switching means to connect a portable or temporary alternate source of power that shall be available for the duration of the maintenance or repair. The permanent switching means to connect a portable or temporary alternate source of power shall comply with the following: (1) Connection to the portable or temporary alternate source of power shall not require modification of the permanent system wiring. (2) Transfer of power between the normal power source and the emergency power source shall be in accordance with 700.12. (3) The connection point for the portable or temporary alternate source shall be marked with the phase rotation and system bonding requirements.	Revised section requirements addressing listing of interlocking equipment. Failure of such equipment to properly isolate the two out-of-phase sources from each other can result in catastrophic explosions and potential loss of life. As a result, this transfer switching means must be guaranteed to include all the safety features required for safe operation, and must be proven to perform properly under the worst-case conditions of operations. This can only be guaranteed by having the device listed to the requirements of the ANSI standard for transfer switches. Added new list items on connection points being located outdoors and labeled. The revision (Item 6) eliminates the potential of inadvertently leaving building openings “open” for transmission of emissions from the temporary source. The labeling (Item 7) is necessary to prevent a misapplication of a temporary power source. Impacts: No negative impact.	**2**

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	(3) The connection point for the portable or temporary alternate source shall be marked with the phase rotation and system bonding requirements. (4) Mechanical or electrical interlocking shall prevent inadvertent interconnection of power sources. (5) The switching means shall include a contact point that shall annunciate at a location remote from the generator or at another facility monitoring system to indicate that the permanent emergency source is disconnected from the emergency system. It shall be permissible to utilize manual switching to switch from the permanent source of power to the portable or temporary alternate source of power and to utilize the switching means for connection of a load bank.		(4) The switching means, including the interlocks, shall be listed and provided with mechanical or mechanical and electrical interlocking to prevent inadvertent interconnection of power sources. (5) The switching means shall include a contact point that shall annunciate at a location remote from the generator or at another facility monitoring system to indicate that the permanent emergency source is disconnected from the emergency system. (6) The permanent connection point for the temporary generator shall be located outdoors and shall not have cables from the connection point to the temporary generator routed through exterior windows, doors, or similar openings. (7) A permanent label shall be field applied at the permanent connection point to identify the system voltage, maximum amperage, short-circuit current rating of the load side of equipment supplied, and ungrounded conductor identification in accordance with 210.5. It shall be permissible to use manual switching to switch from the permanent source of power to the portable or temporary alternate source of power and		

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			to use the switching means for connection of a load bank.		
700.4(A)	**(A) Rating.** The emergency system equipment shall be suitable for the available fault current at its terminals.	FR-8790, SR-7942, SCR-75	**(A) Capacity.** An emergency system shall have adequate capacity in accordance with Parts I through IV of Article 220 or by another approved method. The system capacity shall be sufficient for the rapid load changes and transient power and energy requirements associated with any expected loads.	Deleted former section on "rating," relocated text from former 700.4(B), revised to require that the emergency system be sized to accommodate rapid load changes, and added reference to Parts I through IV of Article 220. Impacts: No negative impact.	**2**
700.4(C)	[Did not exist]	FR-8791	**(C) Parallel Operation.** Parallel operation of the emergency source(s) shall consist of the sources specified in 700.4(C)(1) and (C)(2). **(1) Normal Source.** The emergency source shall be permitted to operate in parallel with the normal source in compliance with Part I or Part II of Article 705 where the capacity required to supply the emergency load is maintained at all times. Any operating condition that results in less than the required emergency source capacity	Added section covering parallel operation and relocated text around peak load shaving from section 700.4(B). Impacts: No negative impact.	**2**

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			shall initiate a system malfunction signal in accordance with 700.6(A). Parallel operation shall be permitted for satisfying the test requirements of 700.3(B), provided all other conditions of 700.3 are met. **(2) Emergency Source.** Emergency sources shall be permitted to operate in parallel where the necessary equipment to establish and maintain a synchronous condition is provided.		
700.5(D)	[Did not exist]	FR-8796, SR-7952	**(D) Redundant Transfer Equipment.** If emergency loads are supplied by a single feeder, the emergency power system shall include redundant transfer equipment or a bypass isolation transfer switch to facilitate maintenance as required in 700.3(C) without jeopardizing continuity of power. If the redundant transfer equipment or bypass isolation transfer switch is manual (or nonautomatic), then it shall be actively supervised by a qualified person when the primary (automatic) transfer equipment is disabled for maintenance or repair. *Exception:*	Added section on redundant and bypass isolation transfer equipment.	**2**

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			The requirement for redundancy with the transfer equipment shall not apply where any of the following conditions exist: *(1) All processes that rely on the emergency system source are capable of being disabled during maintenance or repair activities without jeopardizing the safety to human life.* *(2) The building or structure is unoccupied and fire protection systems are fully functional and do not require an alternate power source.* *(3) Other temporary means shall be permitted to be substituted for the emergency system.* *(4) A written emergency plan that includes mitigation actions and responsibilities for qualified persons to address the recognized site hazards for the duration of the maintenance or repair activities shall be developed and implemented. The emergency plan shall be made available to the authority having jurisdiction.*		
700.6(C)	**(C) Not Functioning.** To indicate that the battery charger is not functioning.	FR-8798, SR-7959	**(C) Storage Battery Charging Malfunction.** Storage battery charging malfunction signals indicate a charging malfunction on a battery required for	Revised section title and text to focus on battery charging. Impacts: No negative impact.	**1**

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			source readiness, including starting the prime mover, is not functioning.		
700.10(B)	**(B) Wiring.** Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment unless otherwise permitted in 700.10(B)(1) through (B)(5): (1) Wiring from the normal power source located in transfer equipment enclosures (2) Wiring supplied from two sources in exit or emergency luminaires (3) Wiring from two sources in a listed load control relay supplying exit or emergency luminaires, or in a common junction box, attached to exit or emergency luminaires (4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit	FR-8803, SR-8000	**(B) Wiring.** Wiring from an emergency source or emergency source distribution overcurrent protection to emergency loads shall be kept entirely independent of all other wiring and equipment unless otherwise permitted in the following: (1) Wiring from the normal power source located in transfer equipment enclosures (2) Wiring supplied from two sources in exit or emergency luminaires (3) Wiring from two sources in a listed load control relay supplying exit or emergency luminaires, or in a common junction box, attached to exit or emergency luminaires (4) Wiring within a common junction box attached to unit equipment, containing only the branch circuit supplying the unit equipment and the emergency circuit supplied by the unit equipment	Revised to delete references to other Article 700 sections, added new list item (5) addressing traveling cable to an elevator, and added new list item (6)(e) addressing overcurrent protective devices for mixed loads and separation between emergency and nonemergency loads. Impacts: No negative impact.	**2**

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	equipment and the emergency circuit supplied by the unit equipment (5) Wiring from an emergency source to supply emergency and other (nonemergency) loads in accordance with 700.10(B)(5)a., (B)(5)b., (B)(5)c., and (B)(5)d. as follows: a. Separate vertical switchgear sections or separate vertical switchboard sections, with or without a common bus, or individual disconnects mounted in separate enclosures shall be used to separate emergency loads from all other loads. b. The common bus of separate sections of the switchgear, separate sections of the switchboard, or the individual enclosures shall be either of the following: (i) Supplied by single or multiple feeders without overcurrent protection at the source		(5) Wiring within a traveling cable to an elevator (6) Wiring from an emergency source to supply emergency and other (nonemergency) loads in accordance with the following: a. Separate vertical switchgear sections or separate vertical switchboard sections, with or without a common bus, or individual disconnects mounted in separate enclosures shall be used to separate emergency loads from all other loads. b. The common bus of separate sections of the switchgear, separate sections of the switchboard, or the individual enclosures shall be either of the following: (i) Supplied by single or multiple feeders without overcurrent protection at the source (ii) Supplied by single or multiple feeders with overcurrent protection, provided that the overcurrent protection that is common to		

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	(ii) Supplied by single or multiple feeders with overcurrent protection, provided that the overcurrent protection that is common to an emergency system and any nonemergency system(s) is selectively coordinated with the next downstream overcurrent protective device in the nonemergency system(s)		an emergency system and any nonemergency system(s) is selectively coordinated with the next downstream overcurrent protective device in the nonemergency system(s) c. Emergency circuits shall not originate from the same vertical switchgear section, vertical switchboard section, panelboard enclosure, or individual disconnect enclosure as other circuits. d. It shall be permissible to use single or multiple feeders to supply distribution equipment between an emergency source and the point where the emergency loads are separated from all other loads. e. At the emergency power source, such as a generator, multiple integral overcurrent protective devices shall each be permitted to supply a designated emergency or a designated nonemergency load, provided that there is complete separation between emergency and		

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			nonemergency loads beginning immediately after the overcurrent protective device line-side connections.		
700.10(D)(4)	**(4) Generator Control Wiring.** Control conductors installed between the transfer equipment and the emergency generator shall be kept entirely independent of all other wiring and shall meet the conditions of 700.10(D)(2). The integrity of the generator remote start circuit shall be monitored for broken, disconnected, or shorted wires. Loss of integrity shall start the generator(s).	FR-8807, SR-7990	**(4) Source Control Wiring.** Control conductors installed between the emergency power supply system/stored-energy power supply system (EPSS/SEPSS) and transfer equipment or control systems that initiate the operation of emergency sources or initiate the automatic connection to emergency loads shall be kept entirely independent of all other wiring and shall meet the conditions of 700.10(D)(2). The integrity of source control wiring shall be monitored for broken, disconnected, or shorted wires. Loss of integrity shall result in the following actions: (1) *Generators*. Shall start the generator(s). (2*) All other sources*. Shall be considered a system malfunction and initiate the designated signal(s) in 700.6(A).	Revised for clarity around requirements for control conductors from all approved emergency power sources to be kept entirely independent of all other wiring. The loss of integrity of the control wiring for all emergency power sources shall also be monitored for any malfunctions, and losses in integrity should signal a system malfunction and start the associated emergency source. Impacts: No negative impact.	**2**

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700.11	[Did not exist]	FR-8818, SCR-76, SR-7991, SR-7992	**700.11 Wiring, Class-2-Powered Emergency Lighting Systems.** **(A) General.** Line voltage supply wiring and installation of Class 2 emergency lighting control devices shall comply with 700.10. Class 2 emergency circuits shall comply with 700.11(B) through (D). **(B) Identification.** Emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system by the following methods: (1) All boxes and enclosures for Class 2 emergency circuits shall be permanently marked as a component of an emergency circuit or system. (2) Exposed cable, cable tray, or raceway systems shall be permanently marked to be identified as a component of an emergency circuit or system, within 900 mm (3 ft) of each connector and at intervals not to exceed 7.6 m (25 ft). **(C) Separation of Circuits.**	Added section covering Class 2 powered emergency lighting systems. The current requirements of article 700 regarding wiring of emergency circuits are directed to line voltage circuits. When the emergency system utilizes Class 2 circuits, additional alternative requirements are needed to ensure the system is installed with equivalent performance and safety to those systems using line-voltage conductors. Impacts: No negative impact.	**2**

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			Class 2 emergency circuits shall be wired in a listed, jacketed cable or with one of the wiring methods of Chapter 3. If installed alongside nonemergency Class 2 circuits that are bundled, Class 2 emergency circuits shall be bundled separately. If installed alongside nonemergency Class 2 circuits that are not bundled, Class 2 emergency circuits shall be separated by a nonconductive sleeve or nonconductive barrier from all other Class 2 circuits. Separation from other circuits shall comply with 725.136. **(D) Protection.** Wiring shall comply with the requirements of 300.4 and be installed in a raceway, armored or metal-clad cable, or cable tray. *Exception No. 1:* *Section 700.11(D) shall not apply to wiring that does not exceed 1.83 m (6 ft) in length and that terminates at an emergency luminaire or an emergency lighting control device.* *Exception No. 2:* *Section 700.11(D) shall not apply to locked rooms or locked enclosures that are accessible only to qualified persons.*		

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700.12(C)	[Did not exist]	FR-8843, SR-7995	**(C) Supply Duration.** The emergency power source shall be of suitable rating and capacity to supply and maintain the total load for the duration determined by the system design. In no case shall the duration be less than 2 hours of system operation unless used for emergency illumination in 700.12(C)(4) or unit equipment in 700.12(H). Additionally, the power source shall comply with 700.12(C)(1) through (C)(5) as applicable.	Added section covering supply duration, but the required durations did not change. A new last sentence is added in the exception to 700.12(C)(3) to permit, where approved, a public gas system need not comply with 700.12(C)(1). Impacts: No negative impact.	**2**
700.12(E)	**(E) Uninterruptible Power Supplies.** Uninterruptible power supplies used to provide power for emergency systems shall comply with the applicable provisions of 700.12(B) and (C).	FR-8827	**(E) Stored-Energy Power Supply Systems (SEPSS).** Stored energy power supply systems shall comply with 700.12(E)(1) and (E)(2). **(1) Types.** Systems shall consist of one or more of the following system types: (1) Uninterruptible power supply (UPS) (2) Fuel cell system (3) Energy storage system (ESS)	Revised section title to "Stored-Energy Power Supply Systems (SEPSS)" and added current available technology types that can be used with SEPSS. Impacts: No negative impact.	**2**

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			(4) Storage battery (5) Other approved equivalent stored energy sources that comply with 700.12 **(2) Fire Protection, Suppression, Ventilation, and Separation.** The systems in 700.12(E)(1) shall be installed with the fire protection, suppression, ventilation, and separation requirements specified in the manufacturer's instructions or equipment listing.		
700.12(H)(2)(3)	700.12.I(2)(3) The branch circuit feeding the unit equipment shall be one of the following: a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches b. Where the normal lighting circuit is served by one or more branch circuits, a separate branch circuit, provided with a lock-on feature, that originates from the same panelboard as the normal lighting circuits. The branch circuit disconnecting means for this branch circuit shall be provided with a lock-on feature.	FR9195	(3) The branch circuit feeding the battery-equipped emergency luminaire shall be one of the following: a. The same branch circuit as that serving the normal lighting in the area and connected ahead of any local switches. b. The same or a different branch circuit as that serving the normal lighting in the area if that circuit is equipped with means to monitor the status of that area's normal lighting branch circuit ahead of any local switches. c. A separate branch circuit originating from the same panelboard as one or more normal lighting circuits. This separate branch circuit disconnecting means shall be provided with a lock-on feature.	This section was revised and renumbered, with subsection 700.12(H)(2)(3)b. added to allow monitoring the status of the area's normal lighting as an option to ensure operation of emergency lighting. This change is acceptable and does not introduce additional risks. Subsection 700.12(H)(2)(3)c. - clarified and the redundant text removed. Impacts: The provisions of subsection 700.12(H)(2)(3) are increasing the risk to the workers (as compared to 2017 edition of the *NEC).* While not substantially changed from the 2020 edition of the *NEC,* this subsection remains inconsistent with the Life Safety Code (NFPA 101). See detailed	**3**

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				discussion of this subsection in the Technical Justification part of this document.	
700.24	**700.24 Directly Controlled Emergency Luminaires.** Where emergency illumination is provided by one or more directly controlled emergency luminaires that respond to an external control input, or loss thereof, to bypass normal control upon loss of normal power, such luminaires and external bypass controls shall be individually listed for use in emergency systems.	FR-8857	**700.24 Directly Controlled Emergency Luminaires.** Where emergency illumination is provided by one or more directly controlled emergency luminaires that, upon loss of normal power, respond to an external control input to establish the required emergency illumination level, such directly controlled emergency luminaries shall be listed for use in emergency systems. Luminaires that are energized to the required emergency illumination level by disconnection of their control input by a listed emergency lighting control device shall not be required to be listed for use in emergency systems.	Revised to clarify the means by which a directly controlled luminaire can be energized to an emergency lighting level. This revised wording acknowledges common safe industry practice for disconnection of control inputs upon loss of normal power while maintaining the need for emergency listing of the luminaire if an active control signal of any kind is used to drive the luminaire to an emergency lighting level. Impacts: No negative impact.	**2**
700.27	[Did not exist]	FR-8856	**700.27 Class 2 Powered Emergency Lighting Systems.** Devices that combine control signals with Class 2 emergency power on a single circuit shall be listed as emergency lighting control devices.	Added section to address Class 2 powered emergency lighting systems. Impacts: No negative impact.	**2**
Article 701	**Legally Required Standby Systems**				
701.2	[Did not exist]	SR-8009	**701.2 Reconditioned Equipment.**	Added section covering reconditioned equipment.	**2**

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			Reconditioned transfer switches shall not be permitted.	Impacts: No negative impact.	
701.4(B)	**(B) Capacity.** A legally required standby system shall have adequate capacity in accordance with Article 220 or by another approved method.	FR-8869, SR-8006	**(B) Capacity.** A legally required standby system shall have adequate capacity in accordance with Parts I through IV of Article 220 or by another approved method. The system capacity shall be sufficient for the rapid load changes and transient power and energy requirements associated with any expected loads.	Revised to require the system be sized to accommodate rapid load changes, such as large motor startup and corrected cross references. Impacts: No negative impact.	**2**
701.10	**701.10 Wiring Legally Required Standby Systems.** The legally required standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring.	FR-8881	**701.10 Wiring Legally Required Standby Systems.** **(A) General.** The legally required standby system wiring shall be permitted to occupy the same raceways, cables, boxes, and cabinets with other general wiring. **(B) Wiring.** Wiring from a legally required source to supply legally required and other (nonlegally required) loads shall be in accordance with the following: (1) The common bus of switchgear, sections of a switchboard, or individual enclosures shall be either of the following:	Revised text into a list format to add requirements around loads of legally required standby systems and correlate with 700.10(B)(5)(b). Legally required systems are installed to supply loads, such as heating and refrigeration systems, communications systems, ventilation and smoke removal systems, sewage disposal, lighting systems, and industrial processes, that, when stopped during any interruption of the normal electrical supply, could create hazards or hamper rescue or fire-fighting operations. Therefore, it is necessary to require a limited level of selective coordination where legally required systems are installed in accordance with this revised requirement.	**2**

Section	2020 NEC®	First Rev. Second Rev.	2023 NEC®	2023 NEC® Summary of Changes	Rank
			a. Supplied by single or multiple feeders without overcurrent protection at the source b. Supplied by single or multiple feeders with overcurrent protection, provided that the overcurrent protection that is common to a legally required system and any nonlegally required system(s) is selectively coordinated with the next downstream overcurrent protective device in the nonlegally required system(s)	Impacts: No negative impact.	
701.12(E)	**(E) Uninterruptible Power Supplies.** Uninterruptible power supplies used to provide power for legally required standby systems shall comply with 701.12(B) and (C).	FR-8886, SR-8015	**(E) Stored-Energy Power Supply Systems (SEPSS).** Stored energy power supply systems shall comply with 701.12(E)(1) and (E)(2). **(1) Types.** Systems shall consist of one or more of the following system types: a. Uninterruptible power supply (UPS) b. Fuel cell system c. Energy storage system (ESS)	Revised title to "Stored-Energy Power Supply Systems (SEPSS)," revised text into list format to add currently available technologies that can be used with SEPSS, and added Informational Note referencing NFPA 853 and 855. Impacts: No negative impact.	**2**

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			d. Storage battery e. Other approved equivalent stored energy sources that comply with 701.12 **(2) Fire Protection, Suppression, Ventilation, and Separation.** The systems in 701.12(E)(1) shall be installed with the fire protection, suppression, ventilation, and separation requirements specified in the manufacturer's instructions or equipment listing.		
701.32	**701.32 Selective Coordination.** Legally required standby system(s) overcurrent devices shall be selectively coordinated with all supply-side overcurrent protective devices. Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system.	FR-8895	**701.32 Selective Coordination.** **(A) General.** Legally required standby system(s) overcurrent protective devices (OCPDs shall be selectively coordinated with all supply-side and load-side OCPDs. Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those	Revised text into subsections and modified OCPD language to bring awareness to both upstream and downstream applications. This revision clarifies existing requirements where legally required standby system OCPD's are replaced, modified, added or deleted. This is done to ensure that selective coordination with all supply-side and load-side OCPD's is maintained. Impacts: No negative impact.	**2**

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	Exception: *Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.*		authorized to design, install, inspect, maintain, and operate the system. **(B) Replacements.** Where legally required standby OCPDs are replaced, they shall be reevaluated to ensure selective coordination is maintained with all supply-side and load-side OCPDs. **(C) Modifications.** If modifications, additions, or deletions to the legally required standby system(s) occur, selective coordination of the legally required system(s) OCPDs with all supply-side and load-side OCPDs shall be reevaluated. *Exception:* *Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.*		
Article 702	**Optional Standby Systems**				
702.2	[Did not exist]	SR-8024	**702.2 Reconditioned Equipment**. Reconditioned transfer switches shall not be permitted.	Added section for "Reconditioned Equipment" and to state that it is not permitted. Impacts: No negative impact.	**2**
Article 705	**Interconnected Electric Power Production**				

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705.11	**705.11 Supply-Side Source Connections.** An electric power production source, where connected on the supply side of the service disconnecting means as permitted in 230.82(6), shall comply with 705.11(A) through (E). **(A) Output Rating.** The sum of the power source continuous current output ratings on a service, other than those controlled in accordance with 705.13, shall not exceed the ampacity of the service conductors. **(B) Conductors.** The power source output circuit conductors from the service conductors point of connection to the first overcurrent protection device shall be sized in accordance with 705.28 and in no case sized smaller than 6 AWG copper or 4 AWG aluminum. These conductors shall be installed in accordance with 230.30 or 230.43. **(C) Overcurrent Protection.**	FR-9380, SR-8375	**705.11 Source Connections to a Service.** **(A) Service Connections.** An electric power production source shall be permitted to be connected to a service by one of the following methods: (1) To a new service in accordance with 230.2(A) (2) To the supply side of the service disconnecting means in accordance with 230.82(6) (3) To an additional set of service entrance conductors in accordance with 230.40, Exception No. 5 These connections shall comply with 705.11(B) through (F). **(B) Conductors.** Service conductors connected to power production sources shall comply with the following: (1) The ampacity of the service conductors connected to the power production source service disconnecting means shall not be	Revised section title to "Source Connections to a Service" and extensively revised subsections around conductor ampacity, disconnecting means, bonding and grounding, and overcurrent protection. Impacts: No negative impact.	**2**

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	The power source output circuit conductors shall be protected from overcurrent in accordance with 705.30. If fuses are not integral with the disconnecting means, the disconnecting means shall be located on the service side of the fuses. Where the power source output circuit conductors make their connection to the service outside of a building, they shall be protected by overcurrent devices in a readily accessible location outside the building or at the first readily accessible location where the power source conductors enter the building. Where the power source output circuit conductors make their connection to the service inside a building, they shall be protected with one of the following methods: (1) With an overcurrent device located within 3 m (10 ft) of conductor length in dwelling units and 5 m (16.5 ft) in other than dwelling units from the point of connection to the service (2) In other than a dwelling unit, with an overcurrent device located within 20 m		less than the sum of the power production source maximum circuit current in 705.28(A). (2) The service conductors connected to the power production source service disconnecting means shall be sized in accordance with 705.28 and not be smaller than 6 AWG copper or 4 AWG aluminum or copper-clad aluminum. (3) The ampacity of any other service conductors to which the power production sources are connected shall not be less than that required in 705.11(B). **(C) Connections.** Connections to service conductors or equipment shall comply with 705.11(C)(1) through (C)(3). **(1) Splices or Taps.** Service conductorsplices and taps shall be made in accordance with 230.33 or 230.46 and comply with all applicable enclosure fill requirements. **(2) Existing Equipment.** Any modifications to existing equipment shall be made in accordance with the manufacturer's		

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	(71 ft)of conductor length from the point of connection to the service, provided that cable limiters installed in all ungrounded conductors are located within 5 m (16.5 ft) of conductor length from the point of connection to the service		instructions, or the modification must be field evaluated for the application and be field labeled. **(3) Utility-Controlled Equipment.** For meter socket enclosures or other equipment under the exclusive control of the electric utility, only connections approved by the electric utility shall be permitted. **(D) Service Disconnecting Means.** A disconnecting means in accordance with Parts VI through VII of Article 230 shall be provided to disconnect all ungrounded conductors of a power production source from the conductors of other systems. **(E) Bonding and Grounding.** All metal enclosures, metal wiring methods, and metal parts associated with the service connected to a power production source shall be bonded in accordance with Parts II through V and VIII of Article 250. **(F) Overcurrent Protection.** The power production source service conductors shall be protected from overcurrent in accordance with Part VII of Article 230. The rating of the		

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			overcurrent protection device of the power production source service disconnecting means shall be used to determine if ground-fault protection of equipment is required in accordance with 230.95.		
705.12	**705.12 Load-Side Source Connections.** The output of an interconnected electric power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment or feeders are fed simultaneously by a primary source of electricity and one or more other power source and are capable of supplying multiple branch circuits or feeders, or both, the interconnecting equipment shall comply with 705.12(A) through (E). Where a power control system (PCS) is installed in accordance with 705.13, the setting of the PCS controller shall be considered the power-source output circuit current in 705.12(A) through (E). **(A) Dedicated Overcurrent and Disconnect.**	FR-9389, SR-8364	**705.12 Load-Side Source Connections.** The output of an interconnected electric power source shall be permitted to be connected to the load side of the service disconnecting means of the other source(s) at any distribution equipment on the premises. Where distribution equipment or feeders are fed simultaneously by a primary source of electricity and one or more other power source(s), the feeders or distribution equipment shall comply with relevant sections of 705.12(A) and (B). Currents from power source connections to feeders or busbars shall be based on the maximum circuit currents calculated in 705.28(A). The ampacity of feeders and taps shall comply with 705.12(A), and the ampere ratings of busbars shall comply with 705.12(B). **(A) Feeders and Feeder Taps.** Where the power source output connection is made to a feeder, the following shall apply:	Revised and reorganized section under new subsections “Feeders and Feeder Taps” and “Busbars.” Impacts: No negative impact.	**2**

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	Each source interconnection of one or more power sources installed in one system shall be made at a dedicated circuit breaker or fusible disconnecting means. **(B) Bus or Conductor Ampere Rating.** The power source output circuit current multiplied by 125 percent shall be used in ampacity calculations for 705.12(B)(1) through (B)(3). **(1) Feeders.** Where the power source output connection is made to a feeder, the feeder shall have an ampacity greater than or equal to 125 percent of the power-source output circuit current. Where the power-source output connection is made to a feeder at a location other than the opposite end of the feeder from the primary source overcurrent device, that portion of the feeder on the load side of the power source output connection shall be protected by one of the following:		(1) The feeder ampacity is greater than or equal to 125 percent of the power-source output circuit current. (2) Where the power-source output connection is made at a location other than the opposite end of the feeder from the primary source overcurrent device, that portion of the feeder on the load side of the power source output connection shall be protected by one of the following: a. The feeder ampacity shall be not less than the sum of the rating of the primary source overcurrent device and 125 percent of the power-source output circuit current. b. An overcurrent device at the load side of the power source connection point shall be rated not greater than the ampacity of the feeder. (3) For taps sized in accordance with 240.21(B)(2) or (B)(4), the ampacity of taps conductors shall not be less than one-third of the sum of the rating of the overcurrent device protecting the feeder plus the ratings of		

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	a. The feeder ampacity shall be not less than the sum of the primary source overcurrent device and 125 percent of the power-source output circuit current. b. An overcurrent device at the load side of the power source connection point shall be rated not greater than the ampacity of the feeder. **(2) Taps.** Where power source output connections are made at feeders, all taps shall be sized based on the sum of 125 percent of all power source(s) output circuit current(s) and the rating of the overcurrent device protecting the feeder conductors for sizing tap conductors using the calculations in 240.21(B). **(3) Busbars.** One of the following methods shall be used to determine the ratings of busbars: (1) The sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting		any power source overcurrent devices connected to the feeder. **(B) Busbars.** For power source connections to distribution equipment with no specific listing and instructions for combining multiple sources, one of the following methods shall be used to determine the required ampere ratings of busbars: (1) The sum of 125 percent of the power source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed the busbar ampere rating. (2) Where two sources, one a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the busbar ampere rating. The busbar shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment adjacent to the back-		

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	the busbar shall not exceed the ampacity of the busbar. (2) Where two sources, one a primary power source and the other another power source, are located at opposite ends of a busbar that contains loads, the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar shall not exceed 120 percent of the ampacity of the busbar. The busbar shall be sized for the loads connected in accordance with Article 220. A permanent warning label shall be applied to the distribution equipment adjacent to the back-fed breaker from the power source that displays the following or equivalent wording: WARNING: POWER SOURCE OUTPUT CONNECTION— DO NOT RELOCATE THIS OVERCURRENT DEVICE. The warning sign(s) or label(s) shall comply with 110.21(B).		fed breaker from the power source that displays the following or equivalent wording: **WARNING:** **POWER SOURCE OUTPUT DO NOT RELOCATE THIS OVERCURRENT DEVICE.** The warning sign(s) or label(s) shall comply with 110.21(B). (3) The sum of the ampere ratings of all overcurrent devices on panelboards, both load and supply devices, excluding the rating of the overcurrent device protecting the busbar, shall not exceed the ampacity of the busbar. The rating of the overcurrent device protecting the busbar shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment displaying the following or equivalent wording: **WARNING:** **EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL**		

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	(3) The sum of the ampere ratings of all overcurrent devices on panelboards, both load and supply devices, excluding the rating of the overcurrent device protecting the busbar, shall not exceed the ampacity of the busbar. The rating of the overcurrent device protecting the busbar shall not exceed the rating of the busbar. Permanent warning labels shall be applied to distribution equipment displaying the following or equivalent wording: WARNING: THIS EQUIPMENT FED BY MULTIPLE SOURCES. TOTAL RATING OF ALL OVERCURRENT DEVICES EXCLUDING MAIN SUPPLY OVERCURRENT DEVICE SHALL NOT EXCEED AMPACITY OF BUSBAR. The warning sign(s) or label(s) shall comply with 110.21(B). (4) A connection at either end of a center-fed panelboard in dwellings shall be permitted where the sum of 125 percent of the power-source(s) output circuit		**NOT EXCEED AMPACITY OF BUSBAR.** The warning sign(s) or label(s) shall comply with 110.21(B). (4) A connection at either end of a center-fed panelboard in dwellings shall be permitted where the sum of 125 percent of the power-source(s) output circuit current and the rating of the overcurrent device protecting the busbar does not exceed 120 percent of the busbar ampere rating. (5) Connections shall be permitted on busbars of panelboards that supply lugs connected to feed-through conductors or are supplied by feed-through conductors. The feed-through conductors shall be sized in accordance with 705.12(A). Where an overcurrent device is installed at either end of the feed-through conductors, panelboard busbars on either side of the feed-through conductors shall be permitted to be sized in accordance with 705.12(B)(1) through (B)(3). (6) Connections shall be permitted on switchgear, switchboards, and panelboards in configurations other than those permitted		

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	current and the rating of the overcurrent device protecting the busbar does not exceed 120 percent of the current rating of the busbar. (5) Connections shall be permitted on switchgear, switchboards, and panelboards in configurations other than those permitted in 705.12(B)(3)(1) through (B)(3)(4) where designed under engineering supervision that includes available fault-current and busbar load calculations. (6) Connections shall be permitted on busbars of panelboards that supply lugs connected to feed-through conductors. The feed-through conductors shall be sized in accordance with 705.12(B)(1). Where an overcurrent device is installed at the supply end of the feed-through conductors, the busbar in the supplying panelboard shall be permitted to be sized in accordance with 705.12(B)(3)(1) through 705.12(B)(3)(3). **(C) Marking.** Equipment containing overcurrent devices in circuits supplying power to a busbar or		in 705.12(B)(1) through (B)(5) where designed under engineering supervision that includes available fault-current and busbar load calculations.		

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	conductor supplied from multiple sources shall be marked to indicate the presence of all sources. **(D) Suitable for Backfeed.** Fused disconnects, unless otherwise marked, shall be considered suitable for backfeed. Circuit breakers not marked "line" and "load" shall be considered suitable for backfeed. Circuit breakers marked "line" and "load" shall be considered suitable for backfeed or reverse current if specifically rated. **(E) Fastening.** Listed plug-in-type circuit breakers back-fed from electric power sources that are listed and identified as interactive shall be permitted to omit the additional fastener normally required by 408.36(D) for such applications.				
705.76	[Did not exist]	FR-9507, SR-8407	**705.76 Microgrid Control System (MCS).** Microgrid control systems shall comply with the following:	Added section for microgrid control systems (MCS) that correlates with the current state of the industry and available standards. Impacts: No negative impact.	**2**

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			(1) Coordinate interaction between multiple power sources of similar or different types, manufacturers, and technologies (including energy storage) (2) Be evaluated for the application and have a field label applied, or be listed, or be designed under engineering supervision (3) Monitor and control microgrid power production and power quality (4) Monitor and control transitions with a primary source external to the microgrid		
705.80	[Did not exist]	FR-9414, SR-8408	**705.80 Power Source Capacity.** For interconnected power production sources that operate in island mode, capacity shall be calculated using the sum of all power source output maximum currents for the connected power production source.	Added section covering interconnected power production sources that are operating in island mode. Impacts: No negative impact.	**2**
Article 706	**Energy Storage Systems**				
706.7(A)	[Did not exist]	FR-9079, SR-8086	**(A) Commissioning.** ESSs shall be commissioned upon installation. This shall not apply in one- and two-family dwellings.	Revised to require ESS to be commissioned upon installation in other than one- and two-family dwellings. Impacts: No negative impact.	**2**

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706.15	**706.15 Disconnecting Means.** **(A) ESS Disconnecting Means.** A disconnecting means shall be provided for all ungrounded conductors derived from an ESS and shall be permitted to be integral to listed ESS equipment. The disconnecting means shall comply with all of the following: (1) The disconnecting means shall be readily accessible. (2) The disconnecting means shall be located within sight of the ESS. Where it is impractical to install the disconnecting means within sight of the ESS, the disconnect shall be installed as close as practicable, and the location of the disconnecting means shall be field marked on or immediately adjacent to the ESS. The marking shall be of sufficient durability to withstand the environment involved and shall not be handwritten. (3) The disconnecting means shall be lockable open in accordance with 110.25.	FR-9086	**706.15 Disconnecting Means.** **(A) ESS Disconnecting Means.** Means shall be provided to disconnect the ESS from all wiring systems, including other power systems, utilization equipment, and its associated premises wiring. **(B) Location and Control.** The disconnecting means shall be readily accessible and shall comply with one or more of the following: (1) Located within the ESS (2) Located within sight and within 3 m (10 ft) from the ESS (3) Where not located within sight of the ESS, the disconnecting means, or the enclosure providing access to the disconnecting means, shall be capable of being locked in accordance with 110.25 Where controls to activate the disconnecting means of an ESS are used and are not located within sight of the ESS, the disconnecting means shall be	System level disconnect and emergency shutdown function requirements are revised to be consistent with other similar articles. Additional requirements are added for separate enclosures containing only batteries or battery components. Impacts: No negative impact.	**2**

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	For one-family and two-family dwellings, a disconnecting means or its remote control shall be located at a readily accessible location outside the building. **(B) Remote Actuation.** Where controls to activate the disconnecting means of an ESS are used and are not located within sight of the system, the location of the controls shall be field marked on the disconnecting means. **(C) Notification and Marking.** Each ESS disconnecting means shall plainly indicate whether it is in the open (off) or closed (on) position and be permanently marked "ENERGY STORAGE SYSTEM DISCONNECT." The disconnecting means shall be legibly marked in the field to indicate the following: (1) Nominal ESS ac voltage and maximum ESS dc voltage (2) Available fault current derived from the ESS		lockable in accordance with 110.25, and the location of the controls shall be marked on the disconnecting means. For one- and two-family dwellings, an ESS shall include an emergency shutdown function to cease the export of power from the ESS to premises wiring of other systems. An initiation device(s) shall be located at a readily accessible location outside the building and shall plainly indicate whether in the "off" or "on" position. The "off" position of the device(s) shall perform the ESS emergency shutdown function. **(C) Notification and Marking.** Each ESS disconnecting means shall plainly indicate whether it is in the open (off) or closed (on) position and be permanently marked as follows: "ENERGY STORAGE SYSTEM DISCONNECT" The disconnecting means shall be legibly marked in the field to indicate the following: (1) Nominal ESS output voltage		

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	(3) An arc-flash label applied in accordance with acceptable industry practice (4) Date the calculation was performed *Exception:* *List items (2), (3), and (4) shall not apply to one- and two-family dwellings.* For ESS disconnecting means where the line and load terminals may be energized in the open position, the device shall be marked with the following words or equivalent: WARNING ELECTRIC SHOCK HAZARD TERMINALS ON THE LINE AND LOAD SIDES MAY BE ENERGIZED IN THE OPEN POSITION The notification(s) and marking(s) shall comply with 110.21(B).		(2) Available fault current derived from the ESS (3) An arc-flash label applied in accordance with acceptable industry practice (4) Date the calculation was performed *Exception:* *List items (2), (3), and (4) shall not apply to one- and two-family dwellings.* For ESS disconnecting means where the line and load terminals could be energized in the open position, the device shall be marked with the following words or equivalent: **WARNING** **ELECTRIC SHOCK HAZARD** **TERMINALS ON THE LINE AND LOAD** **SIDES MAY BE ENERGIZED IN THE OPEN POSITION** The notification(s) and marking(s) shall comply with 110.21(B).		

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	(D) Partitions Between Components. Where circuits from the input or output terminals of energy storage components in an ESS pass through a wall, floor, or ceiling, a readily accessible disconnecting means shall be provided within sight of the energy storage component. Fused disconnecting means or circuit breakers shall be permitted to be used.		**(D) Partitions Between Components.** Where circuits from the input or output terminals of energy storage components in an ESS pass through a wall, floor, or ceiling, a readily accessible disconnecting means shall be provided within sight of the energy storage component. Fused disconnecting means or circuit breakers shall be permitted to be used. **(E) Disconnecting Means for Batteries.** In cases where the battery is separate from the ESS electronics and is subject to field servicing, 706.15(E)(1) through (E)(4) shall apply. **(1) Disconnecting Means.** A disconnecting means shall be provided for all ungrounded conductors. A disconnecting means shall be readily accessible and located within sight of the battery. **(2) Disconnection of Series Battery Circuits.** Battery circuits exceeding 240 volts dc nominal between conductors or to ground shall have provisions to disconnect the series-connected strings into segments not exceeding 240 volts dc nominal for maintenance by qualified persons. Non-load-		

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			break bolted or plug-in disconnects shall be permitted. **(3) Remote Activation.** Where a disconnecting means is provided with remote controls to activate the disconnecting means and the controls for the disconnecting means are not located within sight of the battery, the disconnecting means shall be capable of being locked in the open position, in accordance with 110.25, and the location of the controls shall be field marked on the disconnecting means. **(4) Notification.** The disconnecting means shall be legibly marked in the field. The marking shall be of sufficient durability to withstand the environment involved and shall include the following: (1) Nominal battery voltage (2) Available fault current derived from the stationary standby battery system (3) An arc-flash label in accordance with acceptable industry practice (4) Date the calculation was performed		

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706.51	[Did not exist]	FR-9196	**706.51 Flywheel ESS (FESS).** Flywheel ESS (FESS) using flywheels as the storage mechanism shall also comply with all of the following: (1) FESS shall not be used for one- or two-family dwelling units. (2) FESS shall be provided with bearing monitoring and controls that can identify bearing wear or damage to avoid catastrophic failure. (3) FESS shall be provided with a containment means to contain moving parts that could break from the system upon catastrophic failure. (4) The spin-down time of the FESS shall be provided in the maintenance documentation.	Requirements are added to address flywheel ESS that are also included under Article 706 in "Other Energy Storage Technologies." It is important for these systems to have bearing monitoring and containment in the event there are projectiles that break off of the system. Impacts: No negative impact.	**2**
Article 708	**Critical Operations Power Systems**				
708.2	[Did not exist]	SR-8034	**708.2 Reconditioned Equipment.** Reconditioned transfer switches shall not be permitted.	Added section for reconditioned equipment. Impacts: No negative impact.	**2**
708.7	[Did not exist]	FR-8914	**708.7 Cybersecurity.** COPS that are connected to a communication network and have the capability to permit control of	Added section for cybersecurity associated with Critical Operations Power Systems (COPS). Impacts: No negative impact.	**2**

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			any portion of the premises COPS shall comply with either of the following: (1) The ability to control the system is limited to a direct connection through a local nonnetworked interface. (2) It is connected through a networked interface complying with one of the following methods: a. The system and associated software are identified as being evaluated for cybersecurity. b. A cybersecurity assessment is conducted on the connected system to determine vulnerabilities to cyberattacks. The cybersecurity assessment shall be conducted when the system configuration changes and at not more than 5-year intervals. Documentation of the evaluation, assessment, and certification shall be made available to those authorized to inspect, operate, and maintain the system.		

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708.24(A)	**(A) General.** Transfer equipment, including automatic transfer switches, shall be automatic and identified for emergency use. Transfer equipment shall be designed and installed to prevent the inadvertent interconnection of normal and critical operations sources of supply in any operation of the transfer equipment. Transfer equipment and electric power production systems installed to permit operation in parallel with the normal source shall meet the requirements of Article 705. Transfer equipment shall not be permitted to be reconditioned.	FR-8939, SR-8040	**(A) General.** Transfer equipment, including automatic transfer switches, shall be automatic, listed, and identified for emergency use. Transfer equipment shall be designed and installed to prevent the inadvertent interconnection of normal and critical operations sources of supply in any operation of the transfer equipment. Transfer equipment and electric power production systems installed to permit operation in parallel with the normal source shall meet the requirements of Parts I and II of Article 705.	Revised to add listing requirements for transfer switches and to clarify cross reference. Impacts: No negative impact.	**2**
708.24(D)	**(D) Bypass Isolation Automatic Transfer Switches.** Where loads are supplied by only one automatic transfer switch, the automatic transfer switch shall include a bypass isolation switch to facilitate maintenance as required in 708.6(C) without jeopardizing continuity of power. When the bypass isolation transfer switch is in the bypass mode, either it shall	SR-8041	**(D) Redundant Transfer Equipment.** If COPS loads are supplied by a single feeder, the COPS shall include redundant transfer equipment or a bypass isolation transfer switch to facilitate maintenance as required in 708.6(C) without jeopardizing continuity of power. If the redundant transfer equipment or bypass isolation transfer switch is manual (or nonautomatic), then it shall	Revised title to “Redundant Transfer Equipment” and revised text to describe the functionality that is needed when emergency loads are supplied by a single feeder. Impacts: No negative impact.	**2**

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	automatically initiate transfer between power sources upon loss of the connected power source or it shall remain actively supervised by a qualified person who can manually initiate a transfer between power sources.		be actively supervised by a qualified person when the primary (automatic) transfer equipment is disabled for maintenance or repair.		
708.54	**708.54 Selective Coordination.** Critical operations power system(s) overcurrent devices shall be selectively coordinated with all supply-side overcurrent protective devices. Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system. *Exception:* *Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.*	FR-8944	**708.54 Selective Coordination.** **(A) General.** Critical operations power system(s) overcurrent protective devices (OCPDs) shall be selectively coordinated with all supply-side and load-side OCPDs. Selective coordination shall be selected by a licensed professional engineer or other qualified persons engaged primarily in the design, installation, or maintenance of electrical systems. The selection shall be documented and made available to those authorized to design, install, inspect, maintain, and operate the system. **(B) Replacements.** Where critical operations power system(s) OCPDs are replaced, they shall be reevaluated to ensure selective coordination is maintained with all supply-side and load-side OCPDs.	Added section to correlate with 700.32 on selective coordination to address requirements where critical operations power system OCPDs are replaced, modified, added, or deleted. Impacts: No negative impact.	**2**

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			(C) Modifications. If modifications, additions, or deletions to the critical operations power system(s) occur, selective coordination of the critical operations power system(s) OCPDs with all supply-side and load-side OCPDs shall be reevaluated. *Exception:* *Selective coordination shall not be required between two overcurrent devices located in series if no loads are connected in parallel with the downstream device.*		
Article 720	**Circuits and Equipment Operating at Less Than 50 Volts**	FR-9580	[Deleted]	Deleted Article 720 to remove confusion around applicability of the article throughout the code as it was based on antiquated technology.	
Article 722	[Did not exist]	FR-9582, CC-8380	**Article 722 Cables for Power-Limited Circuits and Fault-Managed Power Circuits**	Created new Article 722, Cables for Power-Limited Circuits and Fault-Managed Power Circuits, covering Class 2 and Class 3 power-limited circuits, power-limited fire alarm (PLFA) circuits, and Class 4 fault-managed power circuits. Common cabling requirements formerly in Articles 725 and 760 have been relocated into new Article 722. Impacts: No negative impact.	**2**

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Article 724	[Did not exist]	FR-9591	**Article 724 Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits**	Created new Article 724, Class 1 Power-Limited Circuits and Class 1 Power-Limited Remote-Control and Signaling Circuits, covering Class 1 circuits that are not a part of a device or utilization equipment. Impacts: No negative impact.	**2**
Article 725	**Class 2 and Class Power-Limited Circuits**				
725.1	**725.1 Scope.** This article covers remote-control, signaling, and power-limited circuits that are not an integral part of a device or of utilization equipment.	FR-9562, SR-8499	**725.1 Scope.** This article covers power-limited circuits, including power-limited remote-control and signaling circuits, that are not an integral part of a device or of utilization equipment.	Revised to remove Class I items to correlate with new Article 724, to clarify what is covered, and to add Informational Note 2. Impacts: No negative impact.	**1**
725.3(E)	[Did not exist]	FR-9621, SR-8473	**(E) Cables for Class 2 and Class 3 Circuits.** The listing and installation of cables for Class 2 and Class 3 circuits shall comply with Part I and Part II of Article 722.	Added section on the listing and installation of cables for Class 2 and Class 3 circuits and to correlate with new Article 722. Impacts: No negative impact.	**2**
725.10	[Did not exist]	SCR-99	**725.10 Hazardous (Classified) Locations.** Cables and equipment shall be permitted to be used in hazardous (classified) locations where specifically permitted by other articles in this *Code*.	Added section covering hazardous (classified) location requirements. Impacts: No negative impact.	**2**
725.127	725.127 Wiring Methods on Supply Side of the Class 2 or Class 3 Power Source.	FR-9447	**725.127 Wiring Methods on Supply Side of the Class 2 or Class 3 Power Source.**	Revised to remove 20 ampere transformer limitation due to developments in PoE power sources that would exceed that.	**2**

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	Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapters 1 through 4. Transformers or other devices supplied from electric light or power circuits shall be protected by an overcurrent device rated not over 20 amperes. *Exception:* *The input leads of a transformer or other power source supplying Class 2 and Class 3 circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG if they are not over 305 mm (12 in.) long and if they have insulation that complies with 725.49(B).*		Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Chapters 1 through 4. *Exception:* *The input leads of a transformer or other power source supplying Class 2 and Class 3 circuits shall be permitted to be smaller than 14 AWG but not smaller than 18 AWG if they are protected by an overcurrent device rated not over 20 amperes, are not over 305 mm (12 in.) long, and have insulation that complies with 724.49(B).*	Impacts: No negative impact.	
725.130(A)	**(A) Class 1 Wiring Methods and Materials.** Installation shall be in accordance with 725.46. *Exception No. 1:* *The ampacity adjustment factors given in 310.15(C)(1) shall not apply.* *Exception No. 2:* *Class 2 and Class 3 circuits shall be permitted to be reclassified and installed as Class 1 circuits if the Class 2 and Class 3 markings*	FR-9449	**(A) Class 1 Wiring Methods and Materials.** Use of Class 1 wiring methods for Class 2 and Class 3 circuits shall be permitted. Separation from electric light, power, Class 1, non-power-limited fire alarm circuit conductors, and medium-power network-powered broadband communications cables shall comply with 725.136. *Exception:* *The ampacity adjustment factors given in 310.15(C)(1) shall not apply.*	Revised to permit Class 1 wiring methods with Class 2 and Class 3 circuits. These requirements provide more assurance of maintaining circuit separation than reclassifying Class 2 and Class 3 circuits as Class 1 circuits and retains the certification integrity of the connected equipment in the system. Impacts: No negative impact.	**2**

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	required in 725.124 are eliminated and the entire circuit is installed using the wiring methods and materials in accordance with Part II, Class 1 circuits.				
Article 726	[Did not exist]	FR-9606	**Article 726 Class 4 Fault-Managed Power Systems**	Created new Article 726, Class 4 Fault-Managed Power Systems, for wiring systems and equipment including utilization equipment of Class 4 fault-managed power (FMP) systems. The Class 4 Power System is a fault-managed system that relies on an electronic handshake to verify that the powered device is present and operating correctly before greater than Class 2 power is applied. Faults result in immediate termination of output power. Impacts: No negative impact.	**2**
Article 727	Article 727 Instrumentation Tray Cable: Type ITC	FCR-457	[Deleted]	Deleted former Article 727 and relocated requirements to new Article 335. Impacts: No negative impact.	**1**
Article 750	**Energy Management Systems**				
750.6	[Did not exist]	FR-9119, SR-8069	**750.6 Listing.** Energy management systems shall be one of the following:	Added section to include listing requirements. Impacts: No negative impact.	**2**

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			(1) Listed as a complete energy management system (2) Listed as a kit for field installation in switch or overcurrent device enclosures (3) Listed individual components assembled as a system		
Article 760	**Fire Alarm Systems**				
760.3(O)	[Did not exist]	SR-8693	**(O) Cables for Power-Limited Fire Alarm (PLFA) Circuits.** The listing and installation of cables for power-limited fire alarm circuits shall comply with Part III of this article and Parts I and II of Article 722.	Added section referencing Part III of Article 760 and Parts I and II of Article 722 for the listing and installation of cable for power-limited fire alarm circuits. Impacts: No negative impact.	**2**
760.10	[Did not exist]	SCR-104	**760.10 Hazardous (Classified) Locations.** Cables and equipment shall be permitted to be used in hazardous (classified) locations where specifically permitted by other articles in this *Code*.	The permitted use in Hazardous Classified Locations is moved to 760.10, and is modified to use similar language from 337.10 regarding applications in hazardous locations. Impacts: No negative impact.	**1**
760.33	[Did not exist]	FR-9524	760.33 Supply-Side Overvoltage Protection. A listed surge-protective device (SPD) shall be installed on the supply side of a fire alarm control panel in accordance with Part II of Article 242.	Fire alarm control panels contain electronics that can be damaged by surges appearing on the supply side of the equipment. Providing overvoltage protection can increase the reliability of an installation. Added section to require a listed surge-protective device to be installed on the	**2**

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				supply side of a fire alarm control panel. Impacts: No negative impact.	
760.130(B)	**(B) PLFA Wiring Methods and Materials.** Power-limited fire alarm conductors and cables described in 760.179 shall be installed as detailed in 760.130(B)(1), (B)(2), or (B)(3) of this section and 300.7. Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15. **(1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces.** Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed in such a way that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.).	FR-9552, SR-8695	**(B) PLFA Wiring Methods and Materials.** Power-limited fire alarm conductors and cables described in 722.179 shall be installed as detailed in 722.135 and 760.130(B)(1) through (B)(4). Devices shall be installed in accordance with 110.3(B), 300.11(A), and 300.15. **(1) In Raceways, Exposed on Ceilings or Sidewalls, or Fished in Concealed Spaces.** Cable splices or terminations shall be made in listed fittings, boxes, enclosures, fire alarm devices, or utilization equipment. Where installed exposed, cables shall be adequately supported and installed such that maximum protection against physical damage is afforded by building construction such as baseboards, door frames, ledges, and so forth. Where located within 2.1 m (7 ft) of the floor, cables shall be securely fastened in an approved manner at intervals of not more than 450 mm (18 in.). **(2) Passing Through a Floor or Wall.**	Revised to add subsections for nonconcealed spaces and portable fire alarm systems. Impacts: No negative impact.	**2**

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	(2) Passing Through a Floor or Wall. Cables shall be installed in metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1), or unless an equivalent solid guard is provided. **(3) In Hoistways.** Cables shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, or electrical metallic tubing where installed in hoistways. *Exception:* *As provided for in 620.21 for elevators and similar equipment.*		Cables shall be installed in metal raceways or rigid nonmetallic conduit where passing through a floor or wall to a height of 2.1 m (7 ft) above the floor, unless adequate protection can be afforded by building construction such as detailed in 760.130(B)(1) or unless an equivalent solid guard is provided. **(3) Nonconcealed Spaces.** Cables specified in Chapter 3 and meeting the requirements of 722.179(A)(15)(a) and (A)(15)(b) shall be permitted to be installed in nonconcealed spaces where the exposed length of cable does not exceed 3 m (10 ft). **(4) Portable Fire Alarm Systems.** A portable fire alarm system provided to protect a stage or set when not in use shall be permitted to use wiring methods in accordance with 530.12.		
760.136(G)	[Did not exist]	FR-9534	**(G) Where Protected.** PLFA circuits shall be permitted to be installed together with the conductors of electric light, power, Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are installed using NPFLA wiring	Added section that permits PLFA circuits to be installed with other circuit conductors when installed using NPLFA wiring methods in accordance with Part II of Article 760 and are protected by an approved method. This revision removes the reclassification exception and adds permission to	**2**

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			methods and materials in accordance with Part II of Article 760 and are protected by an approved method.	utilize NPLFA wiring methods under specified conditions. Impacts: No negative impact.	
760.139(C)	[Did not exist]	FR-9535	**(C) Class 3 and Communications Circuits with PLFA Circuits.** Cable and conductors of Class 3 and communications circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with cables and conductors of power-limited fire alarm circuits.	Added section addressing Class 3 and communications circuits installed with PLFA circuits. Impacts: No negative impact.	**2**
760.179	760.179 Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors. PLFA cables installed as wiring within buildings shall be listed as being resistant to the spread of fire and other criteria in accordance with 760.179(A) through (H) and shall be marked in accordance with 760.179(I). Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(J). Cable used in a wet location shall be listed for use in wet	FR-9541, SR-8602	760.179 Listing and Marking of Insulated Continuous Line-Type Fire Detectors. Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(A) through (D). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath. **(A) Listing.** The cable shall be listed as being resistant to the spread of fire in accordance with 722.179(A)(1), (A)(2), and (A)(3).	Revised to remove former reference to 725.179(J), add references to 725.179(A) through (D), and to add subsections covering listing, voltage and temperature rating, markings, and cable jacket compound. The majority of 760.179 was deleted as it is now covered in Article 722. The requirements for Insulated Continuous Line-Type fire detectors were consolidated into 760.179(A)(B)(C)(D). Impacts: No negative impact.	**1**

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	locations or have a moisture-impervious metal sheath. **(A) Conductor Materials.** Conductors shall be solid or stranded copper. **(B) Conductor Size.** The size of conductors in a multiconductor cable shall not be smaller than 26 AWG. Single conductors shall not be smaller than 18 AWG. **(C) Voltage and Temperature Ratings.** The cable shall have a voltage rating of not less than 300 volts. The cable shall have a temperature rating of not less than 60°C (140°F). **(D) Type FPLP.** Type FPLP power-limited fire alarm plenum cable shall be listed as being suitable for use in ducts, plenums, and other space used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics. **(E) Type FPLR.**		**(B) Voltage and Temperature Rating.** The cable shall have a voltage rating of not less than 300 volts. The cable shall have a temperature rating of not less than 60°C (140°F). **(C) Markings.** The cable shall be marked as fire resistance Type FPLP, Type FPLR, or Type FPL in accordance with 722.179(B). The voltage rating shall not be marked on the cable. The temperature rating shall be marked on the jacket of cables that have a temperature rating exceeding 60°C (140°F). The jacket of PLFA cables shall be marked with the conductor size. *Exception:* *Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.* **(D) Cable Jacket Compound.** The cable jacket compound shall have a high degree of abrasion resistance.		

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	Type FPLR power-limited fire alarm riser cable shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. **(F) Type FPL.** Type FPL power-limited fire alarm cable shall be listed as being suitable for general-purpose fire alarm use, with the exception of risers, ducts, plenums, and other spaces used for environmental air, and shall also be listed as being resistant to the spread of fire. **(G) Fire Alarm Circuit Integrity (CI) Cable or Electrical Circuit Protective System.** Cables that are used for survivability of critical circuits under fire conditions shall meet either 760.179(G)(1) or (G)(2). **(1) Circuit Integrity (CI) Cables.** Circuit integrity (CI) cables specified in 760.179(D), (E), (F), and (H), and used for survivability of critical circuits, shall have an additional classification using the suffix “CI.” Circuit integrity (CI) cables shall only be				

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	permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective system as covered in 760.179(G)(2). **(2) Electrical Circuit Protective System.** Cables specified in 760.179(D), (E), (F), (H), and (G)(1), that are part of an electrical circuit protective system, shall be identified with the protective system number and hourly rating printed on the outer jacket of the cable and installed in accordance with the listing of the protective system. **(H) Coaxial Cables.** Coaxial cables shall be permitted to use 30 percent conductivity copper-covered steel center conductor wire and shall be listed as Type FPLP, FPLR, or FPL cable. **(I) Cable Marking.** The cable shall be marked in accordance with Table 760.179(I). The voltage rating shall not be marked on the cable. Cables that are listed for circuit integrity shall be identified with the suffix "-CI" as defined				

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	in 760.179(G). The temperature rating shall be marked on the jacket of PLFA cables that have a temperature rating exceeding 60°C (140°F). The jacket of PLFA cables shall be marked with the conductor size. *Exception:* *Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.* **Table 760.179(I) Cable Markings** **Cable Marking** FPLP FPLR FPL Note: Cables identified in 760.179(D), (E), and classification using the suffix "-CI" (for exampl Informational Note: Cable types are listed in descending order of fire performance. **(J) Insulated Continuous Line-Type Fire Detectors.**				

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	Insulated continuous line-type fire detectors shall be rated in accordance with 760.179(C), listed as being resistant to the spread of fire in accordance with 760.179(D) through (F), and marked in accordance with 760.179(I), and the jacket compound shall have a high degree of abrasion resistance.				

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Chapter 8 Communications Systems					
Article 800	**General Requirements for Communications Systems**				
800.100(B)(2)	**(2) In Buildings or Structures with Grounding Means.** If an intersystem bonding termination is established, 250.94(A) shall apply. If the building or structure served has no intersystem bonding termination, the bonding conductor or grounding electrode conductor shall be connected to the nearest accessible location on one of the following: (1) The building or structure grounding electrode system as covered in 250.50 (2) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52 (3) The power service accessible means external to enclosures using the options identified in 250.94(A), Exception (4) The nonflexible metal power service raceway	FR-8897	**(2) In Buildings or Structures with Grounding Means.** If an intersystem bonding termination is established, 250.94(A) shall apply. If the building or structure served has no intersystem bonding termination, the bonding conductor or grounding electrode conductor shall be connected to the nearest accessible location on one of the following: (1) The building or structure grounding electrode system as covered in 250.50 (2) The power service accessible means external to enclosures using the options identified in 250.94(A), Exception (3) The nonflexible metal power service raceway (4) The service equipment enclosure (5) The grounding electrode conductor or the grounding electrode conductor metal enclosure of the power service	Revised list item (7) to reflect the increased use of nonmetallic water piping systems within buildings and to de-emphasize their use as a grounding connection for communications systems. Impacts: No negative impact.	**1**

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	(5) The service equipment enclosure (6) The grounding electrode conductor or the grounding electrode conductor metal enclosure of the power service (7) The grounding electrode conductor or the grounding electrode of a building or structure disconnecting means that is connected to a grounding electrode as covered in 250.32 A bonding device intended to provide a termination point for the bonding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on nonremovable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable. For purposes of this section, the mobile home service equipment or the mobile home disconnecting means located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, or at a mobile home disconnecting means connected to an electrode by a		(6) The grounding electrode conductor or the grounding electrode of a building or structure disconnecting means that is connected to a grounding electrode as covered in 250.32 (7) The grounded interior metal water piping system, within 1.5 m (5 ft) from its point of entrance to the building, as covered in 250.52 A bonding device intended to provide a termination point for the bonding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on nonremovable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable. For purposes of this section, the mobile home service equipment or the mobile home disconnecting means located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, or at a mobile home disconnecting means connected to an electrode by a grounding electrode conductor in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.		

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	grounding electrode conductor in accordance with 250.32 and located within 9.0 m (30 ft) of the exterior wall of the mobile home it serves, shall be considered to meet the requirements of this section.				
800.100(B)(3)	**(3) In Buildings or Structures Without an Intersystem Bonding Termination or Grounding Means.** If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2), the grounding electrode conductor shall be connected to one of the following: (1) To any one of the individual grounding electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4) (2) If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2) or (B)(3)(1), to any one of the individual grounding electrodes described in 250.52(A)(5), (A)(7), and (A)(8)	FR-8901	**(3) In Buildings or Structures Without an Intersystem Bonding Termination or Grounding Means.** If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2), the grounding electrode conductor shall be connected to one of the following: (1) To any one of the individual grounding electrodes described in 250.52(A)(1), (A)(2), (A)(3), or (A)(4) (2) If the building or structure served has no intersystem bonding termination or grounding means, as described in 800.100(B)(2) or (B)(3)(1), to any one of the individual grounding electrodes described in 250.52(A)(5), (A)(7), and (A)(8) (3) For communications circuits covered in Article 805 or network-powered broadband communications systems covered in Article 830,	Revised to prohibit steam and hot water pipes as bonding or grounding electrode conductors.	**X**

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	(3) For communications circuits covered in Article 805 or network-powered broadband communications systems covered in Article 830, to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (0.5 in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning protection system conductors, as covered in 800.53, and at least 1.8 m (6 ft) from electrodes of other systems Steam pipes, hot water pipes, or lightning protection system conductors shall not be employed as grounding electrodes for protectors and grounded metallic members.		to a ground rod or pipe not less than 1.5 m (5 ft) in length and 12.7 mm (0.5 in.) in diameter, driven, where practicable, into permanently damp earth and separated from lightning protection system conductors, as covered in 800.53, and at least 1.8 m (6 ft) from electrodes of other systems Steam pipes, hot water pipes, or lightning protection system conductors shall not be employed as grounding electrodes or as a bonding or grounding electrode conductor for protectors and grounded metal members.		
800.170	[Did not exist]	FR-9021	**800.170 Plenum Cable Ties.** Cable ties intended for use in other space used for environmental air (plenums) shall be listed as having low smoke and heat release properties.	Revised to add listing requirements for plenum cable ties. Impacts: No negative impact.	**2**
800.179	800.179 Plenum, Riser, General-Purpose, and Limited Use Cables. Plenum, riser, general-purpose, and limited-use cables shall be listed in accordance with 800.179(A) through (D) and shall have a temperature rating of not less than 60°C	FR-9036, SR-7988 SR-7976, SR-7977, SR-7978	800.179 Wires and Cables. Communications wires and cables, community antenna television cables, and network-powered broadband communications cables shall be listed in accordance with 800.179(A) through (L) and shall	Revised to correct the omission of requirements, to update section title, to correlate with changes in other Chapter 8 articles, and to add and renumber subsections. Impacts: No negative impact.	**2**

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	(140°F). The temperature rating shall be marked on the jacket of cables that have a temperature rating exceeding 60°C (140°F). The cable voltage rating shall not be marked on the cable. **(A) Plenum Cables.** Type CMP communications plenum cables, Type CATVP community antenna television plenum coaxial cables, and Type BLP network-powered broadband communication low-power plenum cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low smoke-producing characteristics. **(B) Riser Cables.** Type CMR communications riser cables, Type CATVR community antenna television riser coaxial cables, Type BMR network-powered broadband communications medium-power riser cables, and Type BLR network-powered broadband communications low-power riser cables shall be listed as being suitable for use		have a temperature rating of not less than 60°C (140°F). The temperature rating shall be marked on the jacket of cables that have a temperature rating exceeding 60°C (140°F). Conductors in communications cables, other than in a coaxial cable, shall be copper. Cables shall be permitted to contain optical fibers. Cables containing optical fibers shall be marked with the suffix "-OF." Communications wires and cables and network-powered communications cables shall have a voltage rating of not less than 300 volts; the insulation for the individual conductors, other than the outer conductor of a coaxial cable, shall be rated for 300 volts minimum. The cable voltage rating shall not be marked on the cable or on the under-carpet communications wire. *Exception:* *Voltage markings shall be permitted where the cable has multiple listings and voltage marking is required for one or more of the listings.* **(A) Plenum Cables.** Type CMP communications plenum cables, Type CATVP community antenna television plenum		

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	in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. **(C) General-Purpose Cables.** Type CM communications general-purpose cables, Type CATV community antenna television coaxial general-purpose cables, Type BM network-powered broadband communications medium-power general-purpose cables, and Type BL network-powered broadband communications low-power general-purpose cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. **(D) Limited-Use Cables.** Type CMX limited-use communications cables, Type CATVX limited-use community antenna television coaxial cables, and Type BLX limited-use network-powered broadband low-power cables shall be listed as being suitable for use in dwellings and for use in		coaxial cables, and Type BLP network-powered broadband communication low-power plenum cables shall be listed as being suitable for use in ducts, plenums, and other spaces used for environmental air and shall also be listed as having adequate fire-resistant and low-smoke-producing characteristics. **(B) Riser Cables.** Type CMR communications riser cables, Type CATVR community antenna television riser coaxial cables, Type BMR network-powered broadband communications medium-power riser cables, and Type BLR network-powered broadband communications low-power riser cables shall be listed as being suitable for use in a vertical run in a shaft or from floor to floor and shall also be listed as having fire-resistant characteristics capable of preventing the carrying of fire from floor to floor. **(C) General-Purpose Cables.** **(1) Type CMG.** Type CMG communications general-purpose cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and		

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	raceway and shall also be listed as being resistant to flame spread.		shall also be listed as being resistant to the spread of fire. **(2) Types CM, CATV, BM, and BL.** Type CM communications general-purpose cables, Type CATV community antenna television coaxial general-purpose cables, Type BM network-powered broadband communications medium-power general-purpose cables, and Type BL network-powered broadband communications low-power general-purpose cables shall be listed as being suitable for general-purpose use, with the exception of risers and plenums, and shall also be listed as being resistant to the spread of fire. **(D) Limited-Use Cables.** Type CMX limited-use communications cables, Type CATVX limited-use community antenna television coaxial cables, and Type BLX limited-use network-powered broadband low-power cables shall be listed as being suitable for use in dwellings and for use in raceway and shall also be listed as being resistant to flame spread. **(E) Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.**		

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			Cables that are used for survivability of critical circuits under fire conditions shall be listed and meet either 800.179(E)(1), (E)(2), or (E)(3). **(1) CI Cables.** Cables specified in 800.179(A) through (C) and used for survivability of critical circuits shall be marked with the additional classification using the suffix "CI." In order to maintain its listed fire rating, CI cable shall only be installed in free air in accordance with 800.24. CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of a fire-resistive cable system as covered in 800.179(E)(2). **(2) Fire-Resistive Cable Systems.** Cables specified in 800.179(A) through (C) and 800.179(E)(1) that are part of an electrical circuit protective system shall be fire-resistive cable identified with the protective system number on the product, or on the smallest unit container in which the product is packaged, and shall be installed in accordance with the listing of the protective system. **(3) Electrical Circuit Protective System.**		

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			Protectants for cables specified in 800.179(A) through (E), which are part of an electrical circuit protective system, shall be identified with the protective system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system. **(F) Types CMP-LP, CMR-LP, CMG-LP, and CM-LP Limited Power (LP) Cables.** Types CMP-LP, CMR-LP, CMG-LP, and CM-LP communications limited power cables shall be listed as suitable for carrying power and data up to a specified current limit for each conductor without exceeding the temperature rating of the cable where the cable is installed in cable bundles in free air or installed within a raceway, cable tray, or cable routing assembly. The cables shall be marked with the suffix "-LP(XXA)," where XX designates the current limit in amperes per conductor. **(G) Type CMUC Undercarpet Wires and Cables.** Type CMUC undercarpet communications wires and cables shall be listed as being suitable for undercarpet use and shall also be listed as being resistant to flame spread.		

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			(H) Communications Wires. Communications wires, such as distributing frame wire and jumper wire, shall be listed as being resistant to the spread of fire. **(I) Optional Markings.** Cables shall be permitted to be surface marked to indicate special characteristics of the cable materials.		
Article 810	**Antenna Systems**				
810.21(F)(2)	**(2) In Buildings or Structures with Grounding Means.** If the building or structure served has no intersystem bonding termination, the bonding conductor or grounding electrode conductor shall be connected to the nearest accessible location on the following: (1) The building or structure grounding electrode system as covered in 250.50 (2) The grounded interior metal water piping systems, within 1.52 m (5 ft) from its point of entrance to the building, as covered in 250.52 (3) The power service accessible means external to the building, as covered in 250.94	FR-8945	**(2) In Buildings or Structures with Grounding Means.** If the building or structure served has no intersystem bonding termination, the bonding conductor or grounding electrode conductor shall be connected to the nearest accessible location on one of the following: (1) The building or structure grounding electrode system as covered in 250.50 (2) The power service accessible means external to the building, as covered in 250.94 (3) The nonflexible metal power service raceway	Revised text in (6) to reflect the increased use of nonmetallic water piping systems within buildings to de-emphasize their use as a grounding connection for antenna systems. Impacts: No negative impact.	**1**

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	(4) The nonflexible metal power service raceway (5) The service equipment enclosure, or (6) The grounding electrode conductor or the grounding electrode conductor metal enclosures of the power service A bonding device intended to provide a termination point for the bonding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on nonremovable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable.		(4) The service equipment enclosure (5) The grounding electrode conductor or the grounding electrode conductor metal enclosures of the power service (6) The grounded interior metal water piping systems, within 1.52 m (5 ft) from its point of entrance to the building, as covered in 250.52 A bonding device intended to provide a termination point for the bonding conductor (intersystem bonding) shall not interfere with the opening of an equipment enclosure. A bonding device shall be mounted on nonremovable parts. A bonding device shall not be mounted on a door or cover even if the door or cover is nonremovable.		

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Chapter 9 Tables					
Chapter 9, Table 1	Table 1 Note (4) Where conduit or tubing nipples having a maximum length not to exceed 600 mm (24 in.) are installed between boxes, cabinets, and similar enclosures, the nipples shall be permitted to be filled to 60 percent of their total cross-sectional area, and 310.15(C)(1) adjustment factors need not apply to this condition.		Table 1 Note (4) Where conduit or tubing nipples, not including connectors, having a maximum length not to exceed 600 mm (24 in.) are installed between boxes, cabinets, and similar enclosures, the nipples shall be permitted to be filled to 60 percent of their total cross-sectional area, and 310.15(C)(1) adjustment factors need not apply to this condition.	Revised text to restricting nipple length to 24 inches without connectors. Impacts: No negative impact.	**2**
Chapter 9, Table 13	[Did not exist]	FR-8648, SR-7698	Table 13 Equipment Suitable for Hazardous (Classified) Locations	Added new table to address protection techniques associated with hazardous location wiring, deleted “v” from level of protection, and corrected cross references in table notes. Impacts: No negative impact.	**2**