IEEE - IAS/PES JTCC December 14, 2021 Meeting Minutes

Location: On-Line Meeting: Please do not turn on video unless necessary. Some members may have bandwidth issues.

Times: Scheduled 10:00am – 6:00pm Eastern

Attendance: All IEEE - IAS/PES JTCC organizational representatives (ORs) to NFPA are expected to attend and participate and vote unless they must recuse themselves.

All IEEE – IAS/PES JTCC Non-Voting Members are expected to attend and participate in the discussions.

Guests who are neither of the above are welcome to attend the IEEE - IAS/PES JTCC Co-Chairs. Guests may not address the meeting without advance permission from the IEEE - IAS/PES JTCC Co-Chairs.

IEEE – IAS/PES JTCC Organizational Representatives to NFPA Voting Members

Attendee's Name	Company	Position	Attendance	
			14th	
Daleep C Mohla	DCM Elect Consulting	IEEE - IAS/PES JTCC Co-Chair CMP-5 Principal NFPA 70E Principal NFPA 79 Principal	✓	
Paul Myers	NUTRIEN	IEEE - IAS/PES JTCC Secretary CMP-8 Principal	✓	
Michael Anthony	Standards Michigan	CMP-15 Alternate	✓	
William Cantor	TPI	CMP-13 Principal NFPA 70B Principal NFPA 855 Principal	✓	
Kurt Clemente	RS&H, Inc.	CMP-18 Principal	✓	
Paul Dobrowsky	Innovative Technology Services	NFPA 70E Alternate (abstain from all of NFPA 70)	✓	
Matthew Dozier	*i*Design Services	CMP-15 Principal	✓	
Nehad El-Sherif	Self-supported	CMP-2 Principal	✓	
Mark Gibbs	Consolidated Nuclear Security LLC	CMP-4 Principal	✓	
Andy Hernandez	Facebook	CMP-12 Principal	✓	
Will McBride	CONAM Construction	CMP-14 Principal	✓	
Bill McCoy	Telco Sales, Inc.	CMP-16 Principal	✓	
Josiah McNulty	Nutrien	CMP-8 Alternate	✓	
Sharon Mullen	DuPont	CMP-9 Alternate	✓	
Dennis Nielsen	Lawrence Berkley Nat. Lab.	CMP-6 Principal	✓	
Kent Sayler	P2S Engineering	CMP-1 Principal	✓	
Arthur J. Smith, III	Waldemar S. Nelson and Co., Inc.	CMP-11 Principal	✓	
Paul Sullivan	DuPont	CMP-9 Principal	✓	
Bill Szeto	Self-supported	CMP-3 Principal	✓	
Steve Townsend	GM Sustainable Workplaces	CMP-10 Principal CMP-11 Alternate	✓	
Frank Tyler	DuPont	CMP-1 Alternate	✓	
Peter Walsh	Teaticket Technical Associates LLC	CMP 10 Alternate	✓	

IEEE - IAS/PES JTCC December 14, 2021 Meeting Minutes

IEEE – IAS/PES JTCC Attendees – other than voting members

Attendee's Name	Company	Member IAS	Member PES	Position	Attendance	
					12/14	
Chris Searles	BAE Batteries		Yes	IEEE - IAS/PES JTCC Co-Chair Non-Voting Member	✓	
Chris Hunter	Cerro Wire	Yes		Non-Voting Member	✓	
Dan Neeser	Eaton Bussmann Div.	Yes		Non-Voting Member	✓	
Chet Sandberg	C.L. Sandberg & Assoc.	Yes		Non-Voting Member	✓	
Marcelo Valdes	ABB	Yes		Non-Voting Member	✓	
Keith Waters	Schneider Electric	Yes	Yes	Non-Voting Member	✓	
Jimmy Guerrero	Cheniere Energy, Inc.	Yes	Yes	Non-Voting Member	✓	
Mark W. Earley	Alumni Code Consulting Group	Yes		Non-Voting Member	✓	
Chad Jones	Cisco Systems, Inc.	No		Guest	✓	

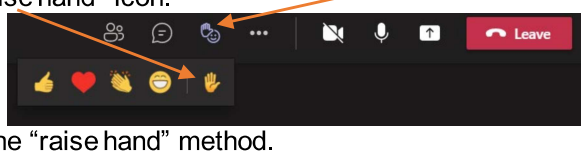
Tuesday December 14, 2021

Start of Meeting at 1000 Hrs Eastern — Daleep Mohla
Welcome — Chris Searles
Explanation of voting responsibilities and contents of reports

Meeting Protocol:

Conduct of meeting

- The meeting will be conducted in a fashion similar to that of an NFPA technical committee meeting
  1. Request permission to speak by selecting the smiley face with hand and then selecting the "raise hand" icon.



  2. Voting will use the "raise hand" method.
  3. Motions to oppose a panel action Second Revision must be accompanied by a statement.

- Roberts Rules will be followed as closely as possible.
- A motion to oppose a panel action may be for one or more reasons:

1. Technical 2. Best engineering practice 3. Field experience If Co-Chair(s) must recuse themselves, the Secretary/Treasurer will temporarily chair the meeting.	
Introduction of participants, record of attendance, requests to become a non-voting member, and determination of a quorum. Quorum will be determined by presence of a majority of IEEE-IAS/PES JTCC organizational representatives (ORs) to NFPA. The IEEE – IAS/PES JTCC presently has 22 Principal and Alternate ORs to NFPA, thus, a quorum will be achieved with the attendance of 12 ORs. Paul Dobrowski announced that he will abstain from all NFPA 70 Second Revision Directed Vote balloting. Paul D. is a member of CMP 5 representing the American Chemistry Council (ACC). As a result, there are 21 voting members, and a quorum will be achieved with the attendance of 11 ORs. Chris Searles, Co-chair started the meeting at 10:01 AM eastern and introduced himself. Chris asked Daleep Mohla, Co-chair to conduct the meeting. ***Approval of agenda*** Additions to agenda? Motion to approve: Andy Hernandez Second: Steve Townsend Approved Unanimously ***Approval of FR meeting minutes*** **(sent on March 22, 2021)** Modifications to meeting minutes? Motion to approve: Paul Sullivan Second: Bill McCoy Approved Unanimously	Paul Myers

2023 NEC Second Revision Reports

Each NEC Representative will have a maximum of 20 minutes for their report to be considered and ballot instructions agreed to.

CMP-1, 2023 NEC Second Revision Report

Articles 90, 100, 110, Ch. 9 and Annexes A, H, I, J

(Kent Sayler, Principal - Frank Tyler, Alternate)

1) **Noteworthy Panel Actions**

a) *Panel Statistics: 121 PCs; 31 SRs. 12 voting members; 1 final motion had < 9 supporting votes*

b) *Second Revision No. 7743-NFPA 70-2023 [Definition: Servicing]*

Servicing. The process of following a manufacturer's set of instructions or applicable industry standards to analyze, adjust, or perform prescribed actions upon equipment with the intention to preserve or restore the operational performance of the equipment.

Informational Note: Servicing often encompasses maintenance and repair activities.

- Affirmative statement to the corresponding FR was to add “or industry consensus standards” in the same location

c) *Second Revision No. 7666-NFPA 70-2021 [Section No. 110.3(A)]*

(A) Examination.
In judging equipment, considerations such as the following shall be evaluated:

(1) Suitability for installation and use in conformity with this Code

Informational Note No. 1: Equipment may be new, reconditioned, refurbished, or remanufactured.

Informational Note No. 2: Suitability of equipment use may be identified by a description marked on or provided with a product to identify the suitability of the product for a specific purpose, environment, or application. Special conditions of use or other limitations and other pertinent information may be marked on the equipment, included in the product instructions, or included in the appropriate listing and labeling information. Suitability of equipment may be evidenced by listing or labeling.

(2) Mechanical strength and durability, including, for parts designed to enclose and protect other equipment, the adequacy of the protection thus provided

(3) Wire-bending and connection space

(4) Electrical insulation

(5) Heating effects under normal conditions of use and also under abnormal conditions likely to arise in service

(6) Arcing effects

(7) Classification by type, size, voltage, current capacity, and specific use

(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

Informational Note No. 3: See the IEC 62443 series of standards for Industrial Automation and Control Systems, the UL 2900 series of standards for Software Cybersecurity for Network- Connectable Products, and UL 5500 the Standard for Remote Software Updates, are standards that provide frameworks to mitigate current and future security cybersecurity vulnerabilities and address software integrity in systems of electrical equipment.

(9) Other factors that contribute to the practical safeguarding of persons using or likely to come in contact with the equipment

The addition of item 8 generated some discussion within the JTCC. This appears to impose requirements on Health Care Facilities (Article 517). Is the NEC the appropriate location for a requirement like this? Is this enforceable? This may need to be changed from "Life Safety" to "Emergency" if intended to apply to all emergency systems.

d) *Second Revision No. 7704-NFPA 70-2021 [Section No. 110.16(B)]*

(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 ~~acceptable~~ applicable industry practice and include the date the label was applied. The label shall meet the requirements of 110.21(B).

Informational Note No. 1: See ANSI Z535.4-2011 (R2017), Product Safety Signs and Labels, for guidelines for the design of safety signs and labels for application to products.

Informational Note No. 2: See NFPA 70E-2021, Standard for Electrical Safety in the Workplace, for ~~acceptable~~ applicable industry practices for equipment labeling. This standard provides specific criteria for developing arc-flash labels for equipment that provides nominal system voltage, incident energy levels, arc-flash boundaries, minimum required levels of personal protective equipment, and so forth.

e) *Second Revision No. 7801-NFPA 70-2021 [Section No. 110.26]*

110.26 Spaces About Electrical Equipment.

~~Access and~~ 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 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 (6-1/2 ft) high.

Discussion around retrofits/replacements in existing spaces.

f) *Second Revision No. 7810-NFPA 70-2021 [Section No. 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 (6-1/2 ft) high shall be provided to give access to the working space about electrical equipment.

Open equipment doors shall not impede ~~the entry~~ access to ~~or~~ 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 (6-1/2 ft) high.

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions
Second by Andy Hernandez
Motion Passed (16 Yay – 5 Nay)

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-2, 2023 NEC Second Revision Report

Articles 210, 220, and Annex D, Examples D1 through D6

(Nehad El-Sherif, Principal - Alternate Vacant)

1) Noteworthy Panel Actions

a) *The scope of Article 210 was revised to align with the addition of a new Article 235 for medium voltage branch circuit requirements (SR-8154).*

Panel Statement:

A new Article 235 is included in the 2023 NEC as a result of Second Revision 8155. This was the result of a Task Group formed based on Public Comment 635. The Scope of Article 210 is revised to reflect alignment with the voltage limits in Article 210 and the new Article 235. The title to the Article is updated to reflect this new limitation. The new article does not rely on Article 210; therefore, the statement that the article supplements or modifies Article 210 is no longer needed in the Informational Note. Additionally, the informational note is rewritten to comply with 4.1.3 of the NEC Style Manual. This is expected to be an Informational Note for one cycle, to assist users of the Code to easily identify the location of the related new Article.

b) *New cooking appliances were added to first level subdivision 210.8(D) list (list items 8 through 12). The final list is: 1) automotive vacuum machines, 2) drinking water coolers and bottle fill stations, 3) cord-and-plug-connected high-pressure spray washing machines, 4) tire inflation machines, 5) vending machines, 6) sump pump, 7) dishwashers, 8) electric ranges, 9) wall-mounted ovens, 10) counter-mounted cooking units, 11) clothes dryers, and 12) microwave ovens (SR-7966).*

Panel Statement:

The referenced cooking appliances in the comment were added to 210.8(D).

Due to the nature of the hazard with these installations. This requirement was

placed in 210.8(D) to address all outlets and not be limited to only receptacle outlets found in 210.8(A).

Section 210.8(D) now includes new list items (8) through (12), as these are sometimes hard wired to outlets and would not be a part of the GFCI requirements found for receptacles in laundry areas as part of 210.8(A) and 210.8(B). The shock hazard does not go away due to hard wired versus cord-and-plug connected equipment.

c) *CMP-2 continued its support for the expansion of GFCI protection of dwelling outdoor outlets in first level subdivision 210.8(F) to garages, accessory buildings, and boathouses as well as HVAC units (SR-7971).*

Panel Statement:

Because outlets do not have a rating, this section was reworded to properly address the fact that it is the branch circuit that has a rating.

210.8(F)(3) was relocated to the parent text of 210.8(F) and the list items were renumbered in this section.

The word "where" was replaced with "if" to align with the style manual 3.3.4 for proper use of the term.

The suggested addition of dwellings into the title of 210.8(F) was not added, as it is currently located in the first paragraph and not necessary to be added here.

The suggested changes to add a list item for dwellings and modify the exception were not accepted as they do not add clarity. The existing exception referencing 210.8(C) is appropriate and the suggested change would vastly expand the exception without substantiation. Utilization was not added, as it is more limiting without proper substantiation.

d) *The following changes were made to AFCI protection in Section 210.12:*
- *Rewording to comply with the style manual and improve usability (SR-8203)*
- The addition of 'Bathrooms' in 210.12(B) (SR-8204)
- The addition of 'Garages' in 210.12(B) (SR-8019)
- The addition of 10-ampere branch circuits to 210.12(C) (SR-8205) and to 210.12(D) (SR-8206)

Panel Statement:

Rewording of 210.12 throughout for grammatical accuracy and clarity.

210.12(A)(3), 210.12(A)(4), and 210.12(A)(6) do not conform with 2020 NEC® Style Manual 3.3.4 for word clarity using "where" instead of correct "if" for conditions.

210.12(A) addresses the means of AFCI protection whereas 210.12(B) addresses the locations of a dwelling unit required to have AFCI protection. The FR does not comply with 2020 NEC® Style Manual 3.1.3 (Informational notes contain explanatory information and shall be located directly after the rule they apply to). Accordingly, 210.12(B) Informational Note No 1 pertaining to the means of AFCI protection is relocated directly after 210.12(A), as 210.12(A) Informational Note. The remaining Informational Notes in 210.12(B) are renumbered accordingly.

In 210.12(A) Informational Note, the cited standard UL 1699-2011 is now designated as ANSI/UL 1699-2020.

210.12(B) Exception No 2 is rewritten to clarify the exception expires January 1, 2025.

210.12(F) has been moved to 210.12(D) as these may be locations within other occupancies. The descriptions of these areas have been changed to align with other NFPA documents for clarity.

e) *The most notable change in 210.52(C) is the addition of a new requirement to provide provision for a future outlet if one is not installed to serve an island or peninsular countertop or work surface (SR-8209).*

Panel Statement:

Data sets compiled by CPSC epidemiologists show that there were 45 anecdotal reports of burn/other injuries between Jan 1991 through 2020, as well as an estimated 9,700 burn/other injuries treated in U.S. hospital emergency departments. The data sets indicate that the injuries were caused by tipping and spilling the contents of countertop cooking appliances, many of which specifically involved children pulling on the appliance cord. Many of these incidents involved second- and third-degree burn injuries; and 10 resulted in death, including the deaths of infants as young as 8 months of age. The investigations revealed that children may pull power cords, or the cords may get snagged inadvertently when a person is walking by. The data sets presented here are reported incidents in CPSC databases, and the number of actual burns on a national scale is likely much greater.

The requirement for receptacles serving the countertop or work surface of an island or peninsula is made optional, but guidance for location is maintained when they are provided.

Exception No. 2 under 'Wall Spaces' has also been added to help the installer where a surface behind a sink is not available for a receptacle to be installed.

f) *A new Article 235 for medium voltage branch circuits (over 1000 Volts ac, 1500 Volts dc, Nominal) requirements was created (SR-8155).*

Panel Statement:

Article 235 was proposed (PC 285) by a Task Group formed based on Public Comment 635. This proposal forms the basis for this CMP 2 action to create Article 235, which includes requirements for branch circuits rated over 1000 Vac, 1500 Vdc, nominal (referred to here as "medium voltage branch circuits"). Sections from Article 210 that are applicable to medium voltage branch circuits have been copied and moved to this new Article. References to Section 311.60 in Article 210 are revised to indicate Section 315.60 in this new Article.

The following sections are included in this Article that have been removed from Article 210:

- *210.6(E) is now included in 235.6*
- *210.19(B) and 210.19(E) are now included in 235.19*

The following Sections are a duplicate to those that are in Article 210 but are included here to ensure completeness of this new Article 235. The requirements of each of these sections were reviewed for applicability to medium voltage branch circuits and modified

accordingly without making technical changes modifying the existing requirements for medium voltage branch circuits:

- *210.9 has been included as part of 235.9*
- *210.10 has been included as part of 235.10*
- *210.11 has been included as part of 235.11*
- *210.18 has been included as part of 235.18*
- *210.20 has been included as part of 235.20*
- *210.22 has been included as part of 235.22*
- *210.23 has been included as part of 235.23*
- *210.63 has been included as part of 235.63*

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Mark Gibbs

Motion Passed unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-3, 2023 NEC Second Revision Report

Articles 300,590,720,725, 727,728,760, and Chapter 9, Tables 11(A) and (B), and Tables 12(A) and (B)

(William Szeto, Principal - Alternate Vacant)

1) EXECUTUVE SUMMARY

Most of the activities centered around the rewriting of Article 722.

The Public Comment was developed by a Panel 3 appointed task group to address a Correlating Committee request to restructure the new Article 722 on power limited cables to remove any material that is specific to Class 2, Class 3, PLFA and optical fiber cables and move this material back into Articles 725, 760 and 770.

At the same time, the redundancies in Articles 725, 760 and 770 that were originally addressed in FR 9582 also appear in the new Article 726 for Class 4 circuits (FR 9606). This Public Comment also removes these redundancies from Article 726 and incorporate Class 4 cables into Article 722.Attached are 6 documents as follows:

- Article 722 rework substantiation.docx. This document is the text of this substantiation
- Article 722 - Taking out specific material from 725, 760 & 770; adding 726 class 4 redundant material.docx.

This document is a revision of article 722 that removes any material that is specific to class 2, class 3, PLFA and optical fiber cables. The original parts (I), (III) and (IV) are eliminated. Part (V) is renumbered as part (II). There is some relocation of common material into part (I). This document also adds the redundant material from article 726 into article 722. The title of article 722 is revised to accommodate optical fiber cables and the addition of class 4 cables. Panel 16 pointed out that "power limited cables" does not adequately describe optical fiber cables. Class 4 circuits are technically not power limited in the way that class 2, class3 or PLFA circuits are limited although the energy available into a fault is power limited. Therefore a separate designation in the title is needed.

- Article 725 - Material from 722 put back into 725 (using FR text).docx. This document is a revision of article 725 that adds the material from article 722 back in as directed by the correlating committee.

- Article 726 - moving redundant material into 722.docx.

This document is a revision of article 726 that removes redundant material now covered by article 722. Installation criteria that is unique to class 4 cables remains in article 726 as directed by the correlating committee. Article 722 combines common cabling requirements found in articles 725, 726, 760, and 770 into a single article. The proposed revisions also remove the redundancy between the text-based requirements and the tabular requirements by including most of the requirements only in tabular form in article 722. This has been found to be more user-friendly. some of the text-based requirements do not lend themselves to being represented in tabular form and remain as text in the new article 722.

• Article 760 - Material from 722 Put Back into 760 (Using FR Text).docx
This document is a revision of Article 760 that adds the material from Article 722 back in as directed by the Correlating Committee. It was found that a lot of material that was supposed to be removed in the First Revision was not removed. Some of this now remains as part of the restructuring. This revision removes the redundant material that is still in Article 722 as a correction to the FR.

• Article 70 - Moving Redundant Material into 722.docx
Panel 16 rejected the original Global PI 3671 that proposed moving redundant material into the new Cables Article 722. This document is a resubmission of the revision of Article 770 that removes redundant material that is now located in Article 722. Installation criteria that is unique to optical fiber cable remains in Article 770 as directed by the Correlating Committee.

- Article 722 combines common cabling requirements found in Articles 725, 726, 760, and 770 into a single article. The proposed revisions also remove the redundancy between the text-based requirements and the tabular requirements by including most of the requirements only in tabular form in Article 722. This has been found to be more user-friendly. Some of the text-based requirements do not lend themselves to being represented in tabular form and remain as text in the new Article 722.

Changes proposed are included in this report as GREEN.

Article 590 Temporary installation

Two out of three PC were rejected. PC 1962 on 590.8(B) was accepted.

ARTICLE 305 – **Requirements For Wiring Methods and Material for Rated Over 1000 Volts ac, 1500 volts dc, Nominal**

Four PC submitted for Article 305. They are rejected. However, details discussion on PC 1879, 1335, and 587 were held during the meeting. Details of the discussions were included in this report.

ARTICLE 300 – GENERAL REQUIREMENTS FOR WIRING METHODS AND MATERIAL

A total of 35 PC were submitted for the meeting. Substantial amount of discussions were held on each PC submitted. The following PC submitted were accepted:

1962	Global
897	Global
1540	30.5
1542	30.6
1611	300.11
1318	300.14
1320	300.18(A)

Details of the ACCPTED and the REJECTED PCs are included with this report.

JTCC Discussion: Article 726 is the actual article that discusses fault-managed power. However, wiring methods for fault-managed power circuits was directed to be placed in 722 by the CC.

ARTICLE 722 - Part I. General

722.1 Scope. This article covers the general requirements for the installation of single- and multiple-conductor cables used in Class 2 and Class 3 power-limited circuits, power-limited fire alarm (PLFA) circuits, fault-managed power (Class 4) circuits and optical fiber installations.

(G) Thermocouple Circuits. Conductors in Type PLTC cables used for Class 2 thermocouple circuits shall be permitted to be any of the materials used for thermocouple extension wire.

(H) Bundling of 4-Pair Cables Transmitting Power and Data. 725.144 shall apply to 4-pair cables that are used to transmit power and data to a powered device.

(I) Installation of Circuit Conductors Extending Beyond One Building. Where Class 2 or Class 3 Circuit conductors that extend beyond one building and are run so as to be subject to accidental contact with electric light or power conductors operating over 300 volts to ground, or are exposed to lightning on interbuilding circuits on the same premises, the requirements of the following shall also apply: comply with the following:

(1) Sections 800.44, 800.53, 800.100, 805.50, 805.93, 805.170(A), and 805.170(B) for other than coaxial conductors (2) Sections 820.44, 820.93, and 820.100 for coaxial conductors

(J) Raceway Fill for Optical Fiber Cables. Raceway fill for optical fiber cables shall comply with either 722.135(J)(1) or (2).

(1) Without Electric Light or Power Conductors. Where optical fiber cables are installed in raceway without electric light or power conductors, the raceway fill requirements of Chapters 3 and 9 shall not apply.

(2) Nonconductive Optical Fiber Cables with Electric Light or Power Conductors. Where nonconductive optical fiber cables are installed with electric light or power conductors in a raceway, the raceway fill requirements of Chapters 3 and 9 shall apply.

Article 725 Class 2 and Class 3 Power-Limited Circuits

Part I. General

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.
Informational Note: The circuits described herein are characterized by usage and electrical power limitations that differentiate them from electric light and power circuits; therefore, alternative requirements to those of Chapters 1 through 4 are given with regard to minimum wire sizes, ampacity adjustment and correction factors, overcurrent protection, insulation requirements, and wiring methods and materials.

Class 2 and Class 3 circuits equipment shall be installed in a neat and workmanlike manner.

The installation shall also comply with 300.4 and 300.11.

(B) Circuit Integrity (CI) Cable.

Circuit integrity (CI) cable shall be supported at a distance not exceeding 610 mm (24 in.). Cable shall be secured to the noncombustible surface of the building structure. Cable supports and fasteners shall be steel.

725.136 Separation from Electric Light, Power, Class 1, Non–Power-Limited Fire Alarm Circuit Conductors, and Medium-Power Network-Powered Broadband Communications Cables.

(A) General. Cables and conductors of Class 2 and Class 3 circuits shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non–power-limited fire alarm circuits, and medium-power network-powered broadband communications circuits unless permitted by 722.141(B) through (H).

(B) Separated by Barriers. Class 2 and Class 3 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 separated by a barrier.

(C) Raceways Within Enclosures. In enclosures, Class 2 and Class 3 circuits shall be permitted to be installed in a raceway to separate them from Class 1, non–power-limited fire alarm and medium-power network-powered broadband communications circuits.

(D) Associated Systems Within Enclosures. Class 2 and Class 3 circuit conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 2 and Class 3 circuits, and where (1) or (2) applies:

(1) The electric light, power, Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm (0.25 in.) separation from the conductors and cables of Class 2 and Class 3 circuits.

(2) The circuit conductors operate at 150 volts or less to ground and also comply with one of the following:

(a) The Class 2 and Class 3 circuits are installed using Type CL3, CL3R, or CL3P or permitted substitute cables, provided these Class 3 cable conductors extending beyond the jacket are separated by a minimum of 6 mm (0.25 in.) or by a nonconductive sleeve or nonconductive barrier from all other conductors.

(b) The Class 2 and Class 3 circuit conductors are installed as a Class 1 circuit in accordance with 725.41.

(E) Enclosures with Single Opening. Class 2 and Class 3 circuit conductors entering compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with Class 1, non–power-limited fire alarm and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to Class 2 and Class 3 circuits. Where Class 2 and Class 3 circuit conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting (such as a tee), provided the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

(F) Manholes. Underground Class 2 and Class 3 circuit conductors in a manhole shall be permitted to be installed with Class 1, non–power-limited fire alarm and medium-power network-powered broadband communications circuits where one of the following conditions is met:

(1) The electric light, power, Class 1, non–power-limited fire alarm and medium-power network- powered broadband communications circuit conductors are in a metal-enclosed cable or Type UF cable.

(2) The Class 2 and Class 3 circuit conductors are permanently and effectively separated from the conductors of other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing, in addition to the insulation or covering on the wire.

(3) The Class 2 and Class 3 circuit conductors are permanently and effectively separated from conductors of the other circuits and securely fastened to racks, insulators, or other approved supports.

(G) Cable trays. Class 2 and Class 3 circuit conductors shall be permitted to be installed in cable trays, where the conductors of the electric light, Class 1, and non–power-limited fire alarm circuits are separated by a solid fixed barrier of a material compatible with the cable tray or where the Class 2 or Class 3 circuits are installed in Type MC cable.

(H) Where Protected. Class 2 and Class 3 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 Class 1 wiring methods in accordance with 724.46 and where they are protected by an approved raceway.

(I) Other Applications. For other applications, conductors of Class 2 and Class 3 circuits shall be separated by at least 50 mm (2 in.) from conductors of any electric light, power, Class 1 non– power-limited fire alarm or medium power network-powered broadband communications circuits unless one of the following conditions is met:

(1) Either all of the electric light, power, Class 1, non–power-limited fire alarm and medium- power network-powered broadband communications circuit conductors or all of the Class 2 and Class 3 circuit conductors are in a raceway or in metal-sheathed, metal-clad, non–metallic- sheathed, Type TC, or Type UF cables

(2) All of the electric light, power, Class 1 non–power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are permanently separated from all of the Class 2 and Class 3 circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.

722.139 Installation of Conductors of Different Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More Class 2 Circuits. Conductors of two or more Class 2 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly.

(B) Two or More Class 3 Circuits. Conductors of two or more Class 3 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly.

(C) Class 2 Circuits with Class 3 Circuits. Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, raceway, or cable routing assembly with conductors of Class 3 circuits, provided that the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required for Class 3 circuits.

(D) Class 2 and Class 3 Circuits with Communications Circuits.

(1) Communications Cables. Conductors of one or more Class 2 or Class 3 circuits shall be permitted in the same cable with conductors of communications circuits provided the cable is a listed communications cable that shall be installed in accordance with the requirements of Part V of Article 805. The cables shall be listed as communications cables.

(2) Composite Cables. Cables constructed of individually listed Class 2, Class 3, and communications cables under a common jacket shall be permitted to be classified as communications cables. The fire resistance rating of the composite cable shall be determined by the performance of the composite cable.

(E) Class 2 or Class 3 Cables with Other Circuit Cables. Jacketed cables of Class 2 or Class 3 circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with jacketed cables of any of the following:

(1) Power-limited fire alarm systems in compliance with Parts I and III of Article 760

(2) Nonconductive and conductive optical fiber cables in compliance with Parts I and IV of Article 770

(3) Communications circuits in compliance with Parts I and IV of Article 805

(4) Community antenna television and radio distribution systems in compliance with Parts I and IV of Article 820

(5) Low-power, network-powered broadband communications in compliance with Parts I and IV of Article 830

(F) Class 2 or Class 3 Conductors or Cables and Audio System Circuits. Audio system circuits described in 640.9(C), and installed using Class 2 or Class 3 wiring methods in compliance with 725.133 and 725.154, shall not be permitted to be installed in the same cable, raceway, or cable routing assembly with Class 2 or Class 3 conductors or cables.

Article 760 Fire Alarm Systems
Part I. General

760.1 Scope.
This article covers the installation of wiring and equipment of fire alarm systems, including all circuits controlled and powered by the fire alarm system.

760.124 Circuit Marking.
The equipment supplying PLFA circuits shall be durably marked where plainly visible to indicate each circuit that is a power-limited fire alarm circuit.
Informational Note: See 760.130(A), Exception No. 3, where a power-limited circuit is to be reclassified as a non–power-limited circuit.

760.127 Wiring Methods on Supply Side of the PLFA Power Source.
Conductors and equipment on the supply side of the power source shall be installed in accordance with the appropriate requirements of Part II and Chapters 1 through 4. Transformers or other devices supplied from power-supply conductors shall be protected by an overcurrent device rated not over 20 amperes.
Exception: The input leads of a transformer or other power source supplying power-limited fire alarm circuits shall be permitted to be smaller than 14 AWG, but not smaller than 18 AWG, if they are not over 300 mm (12 in.) long and if they have insulation that complies with 760.49(B).

760.130 Wiring Methods and Materials on Load Side of the PLFA Power Source.
Fire alarm circuits on the load side of the power source shall be permitted to be installed using wiring methods and materials in accordance with 760.130(A), (B), or a combination of (A) and (B). Parts I and II of Article 722 shall apply.

(A) NPLFA Wiring Methods and Materials.
The It shall be permitted to use of NPLFA wiring methods in accordance with 760.46, 760.49, or 760.53 for PLFA circuits shall be permitted. Conductors shall be solid or stranded copper. 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 760.136.

Exception: The ampacity adjustment factors specified in 310.15(C)(1) shall not apply.
(B) PLFA Wiring Methods and Materials.

Power-limited fire alarm conductors and cables described in 760.179722.179 shall be installed as detailed in 722.135, 760.130(B)(1) through , (B)(2), or 760.130(B)(34) 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.).

(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) Non-concealed Spaces. Cables specified in Chapter 3 and meeting the requirements of 760.179(A) and (B) shall be permitted to be installed in non-concealed spaces where the exposed length of cable does not exceed 3 m (10 ft).

(4) Portable Fire Alarm System. 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.

760.133 Installation of Conductors and Equipment in Cables, Compartments, Cable Trays, Enclosures, Manholes, Outlet Boxes, Device Boxes, Raceways, and Cable Routing Assemblies for Power-Limited Fire Alarm Circuits.
Conductors and equipment for power-limited fire alarm circuits shall be installed in accordance with Article 722 Parts I and II, and 760.136 through 760.143.

760.136 Separation from Electric Light, Power, Class 1, NPLFA, and Medium-Power Network-Powered Broadband Communications Circuit Conductors.

(A) General.
Power-limited fire alarm circuit cables and conductors shall not be placed in any cable, cable tray, compartment, enclosure, manhole, outlet box, device box, raceway, or similar fitting with conductors of electric light, power, Class 1, non–power-limited fire alarm circuits, and medium- power network-powered broadband communications circuits unless permitted by 760.136(B) through (G).

(B) Separated by Barriers.
Power-limited fire alarm circuit cables shall be permitted to be installed together with Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are separated by a barrier.

(C) Raceways Within Enclosures.
In enclosures, power-limited fire alarm circuits shall be permitted to be installed in a raceway within the enclosure to separate them from Class 1, non–power-limited fire alarm, and medium- power network-powered broadband communications circuits.

(D) Associated Systems Within Enclosures.
Power-limited fire alarm conductors in compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power, Class 1, non-power- limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits, and shall comply with either of the following conditions:

1. The electric light, power, Class 1, non-power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors are routed to maintain a minimum of 6 mm (1 □4 in.) separation from the conductors and cables of power-limited fire alarm circuits.
2. The circuit conductors operate at 150 volts or less to ground and also comply with one of the following conditions:

a) The fire alarm power-limited circuits are installed using Type FPL, Type FPLR, Type FPLP, or permitted substitute cables if these power-limited cable conductors extending beyond the jacket are separated by a minimum of 6 mm (1 □4 in.) or by a nonconductive sleeve or nonconductive barrier from all other conductors.

b) The power-limited fire alarm circuit conductors are installed as non-power- limited circuits in accordance with 760.46.

(E) Enclosures with Single Opening.
Power-limited fire alarm circuit conductors entering compartments, enclosures, device boxes, outlet boxes, or similar fittings shall be permitted to be installed with electric light, power,
Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuits where they are introduced solely to connect the equipment connected to power-limited fire alarm circuits or to other circuits controlled by the fire alarm system to which the other conductors in the enclosure are connected. Where power-limited fire alarm circuit

conductors must enter an enclosure that is provided with a single opening, they shall be permitted to enter through a single fitting (such as a tee), provided the conductors are separated from the conductors of the other circuits by a continuous and firmly fixed nonconductor, such as flexible tubing.

(F) 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 methods and materials in accordance with Part II of Article 760 and are protected by an approved method.

(G) Other Applications.
For other applications, power-limited fire alarm circuit conductors shall be separated by at least 50 mm (2 in.) from conductors of any electric light, power, Class 1, non–power-limited fire alarm, or medium-power network-powered broadband communications circuits unless one of the following conditions is met:

1. Either (a) all of the electric light, power, Class 1, non–power-limited fire alarm, and medium-power network-powered broadband communications circuit conductors or (b) all of the power-limited fire alarm circuit conductors are in a raceway or in metal-sheathed, metal-clad, nonmetallic-sheathed, or Type UF cables.
2. All of the electric light, power, Class 1, non–power-limited fire alarm, and medium- power network-powered broadband communications circuit conductors are permanently separated from all of the power-limited fire alarm circuit conductors by a continuous and firmly fixed nonconductor, such as porcelain tubes or flexible tubing, in addition to the insulation on the conductors.

760.139 Installation of Conductors of Different PLFA Circuits, Class 2, Class 3, and Communications Circuits in the Same Cable, Enclosure, Cable Tray, Raceway, or Cable Routing Assembly.

(A) Two or More PLFA Circuits.
Cable and conductors of two or more power-limited fire alarm circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly.

(B) Class 2 Circuits with PLFA Circuits.
Conductors of one or more Class 2 circuits shall be permitted within the same cable, enclosure, cable tray, raceway, or cable routing assembly with conductors of power-limited fire alarm circuits if the insulation of the Class 2 circuit conductors in the cable, enclosure, raceway, or cable routing assembly is at least that required by the power-limited fire alarm circuits.

(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.

(D) Low-Power Network-Powered Broadband Communications Cables and PLFA Cables.
Low-power network-powered broadband communications circuits shall be permitted in the same enclosure, cable tray, raceway, or cable routing assembly with PLFA cables.

(E) Audio System Circuits and PLFA Circuits.
Audio system circuits described in 640.9(C) and installed using Class 2 or Class 3 wiring methods in compliance with 725.133 and 725.154 shall not be permitted to be installed in the same cable, cable tray, raceway, or cable routing assembly with power-limited conductors or cables.

760.145 Current-Carrying Continuous Line-Type Fire Detectors.

(A) Application.
Listed continuous line-type fire detectors, including insulated copper tubing of pneumatically operated detectors, employed for both detection and carrying signaling currents shall be permitted to be used in power-limited circuits.

(B) Installation.
Continuous line-type fire detectors shall be installed in accordance with 760.124 through 760.130 and 760.133. 760.176 Listing and Marking of NPLFA Cables.

Non-power-limited fire alarm cables installed as wiring within buildings shall be listed in accordance with 760.176(A) and (B) and as being resistant to the spread of fire in accordance with 760.176(C) through (F), and shall be marked in accordance with 760.176(G). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath. Non-power-limited fire alarm cables shall have a temperature rating of not less than 60°C (140°F). Non-power-limited fire alarm cables shall be permitted to contain optical fibers. Informational Note: See UL 1425, Standard for Cables for Non-Power-Limited Fire-Alarm Circuits, for information on non- power-limited fire alarm cables.

(A) NPLFA Conductor Materials.
Conductors shall be 18 AWG or larger solid or stranded copper.

(B) Insulated Conductors.
Insulation on conductors shall be rated for the system voltage and not less than 600 V. Insulated conductors 14 AWG and larger shall be one of the types listed in Table 310.4(1) or one that is identified for this use. Insulated conductors 18 AWG and 16 AWG shall be in accordance with 760.49.

(C) Type NPLFP.
Type NPLFP non-power-limited fire alarm cable for use in other space used for environmental air shall be listed as being suitable for use in other space used for environmental air as described in 300.22(C) and shall also be listed as having adequate fire-resistant and low smoke–producing characteristics.

(D) Type NPLFR.
Type NPLFR non–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.

Informational Note: One method of defining fire-resistant characteristics capable of preventing the carrying of fire from floor to floor is that the cables pass ANSI/UL 1666-2012, Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts.

(E) Type NPLF.
Type NPLF non–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 space used for environmental air, and shall also be listed as being resistant to the spread of fire.

(F) Fire Alarm Circuit Integrity (CI) Cable, Fire-Resistive Cable System, or Electrical Circuit Protective System.
Cables that are used for survivability of critical circuits under fire conditions shall be listed and meet the requirements of 760.176(F)(1), (F)(2), or (F)(3).

(1) Circuit Integrity (CI) Cables.
Circuit integrity (CI) cables specified in 760.176(C), (D), and (E) and used for survivability of critical circuits shall be marked for an additional classification using the suffix "-CI." In order to maintain its listed fire-resistive rating, CI cables shall only be installed in free air in accordance with 760.24(B). CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective fire-resistive cable system as covered in 760.176(F)(2). CI cables shall only be permitted to be installed in a raceway where specifically listed and marked as part of an electrical circuit protective system as covered in 760.176(F)(2). Circuit Integrity (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 760.176(F)(2).

(2) Fire-Resistive Cable Systems.
Cables specified in 760.176(C), (D), (E), and (F)(1) that are part of a fire-resistive cable system shall be identified with the system identifier and hourly rating marked on the protectant or the smallest unit container and installed in accordance with the listing of the system.

(3) Electrical Circuit Protective System.
Protectants for cables specified in 760.176(C), (D), and (E) that 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 protective system.

(G) NPLFA Cable Markings.
Multiconductor non–power-limited fire alarm cables shall be marked in accordance with Table 760.176(G). Non–power-limited fire alarm circuit cables shall be permitted to be marked with a maximum usage voltage rating of 150 volts. Cables that are listed for circuit integrity shall be identified with the suffix "-CI" as defined in 760.176(F). The temperature rating shall be marked on the jacket of NPLFA cables that have a temperature rating exceeding 60°C (140°F). The jacket of NPLFA cables shall be marked with the conductor size. Informational Note: Cable types are listed in descending order of fire performance.
Table 760.176(G) NPLFA Cable Markings

Cable Marking
Type

Note 1: Cables identified in 760.176(C), (D), and (E) and meeting the requirements for circuit integrity shall have the additional classification using the suffix "-CI" (for example, NPLFP-CI, NPLFR-CI, and NPLF-CI).

Note 2: Cables containing optical fibers shall be provided with the suffix "-OF".
Listing and Marking of PLFA Cables and Insulated Continuous Line-Type Fire Detectors.
Insulated continuous line-type fire detectors shall be listed in accordance with 760.179(KA) through (D). Cable used in a wet location shall be listed for use in wet locations or have a moisture-impervious metal sheath.

(A) The cable shall be listed as being resistant to the spread of fire in accordance with 722.179(A)(1), (2) and (3)

(B) 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) The cable shall be marked with a fire resistance type FPLP, FPLR or 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 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) The cable jacket compound shall have a high degree of abrasion resistance.

Article 726 Class 4 (CL4) Power Systems
Part I. General
726.1 Scope.
This article covers the installation of wiring and equipment of fault-managed power (FMP) systems, including utilization equipment incorporating parts of these systems.
Informational Note No. 1: See Article 100 for definitions related to this section.
Informational Note No. 2: Class 4 power systems consist of a Class 4 power transmitter and a Class 4 power receiver connected by a cabling system. These systems are characterized by monitoring the circuit for faults and controlling the power transmitted to ensure the energy and power delivered into any fault is limited. Class 4 systems differ from Class 1, Class 2, and Class 3 systems in that they are not limited for power delivered to an appropriate load. They are power limited with respect to risk of shock and fire between the Class 4 transmitter and Class 4 receiver.

Article 770 Optical Fiber Cables
Part I. General
770.1 Scope.
This article covers the installation of optical fiber cables. This article does not cover the construction of optical fiber cables.
770.3 Other Articles.
Installations of optical fiber cables shall comply with 770.3(A) through (D). Only those sections of Chapter 2 and Article 300 referenced in this article shall apply to optical fiber cables.

(A) Cables in Ducts for Dust, Loose Stock, or Vapor Removal.
(B) The requirements of 300.22(A) for wiring systems shall apply to conductive optical fiber cables. (B) Hybrid Cables.

Hybrid optical fiber cables shall be classified as electrical cables in accordance with the type of electrical conductors. They shall be constructed, listed, and marked in accordance with the appropriate article for each type of electrical cable.

(C) Optical Fiber Cables within Buildings. The listing and installation of optical fiber cables within buildings shall comply with Part V and Article 722 Parts I and II.

(D) Vertical Support for Fire-Resistive Cables.
Vertical installations of circuit integrity (CI) cables installed in a raceway or cables of fire-resistive cable systems shall be installed in accordance with their listing.

7XX.12 Uses Not Permitted. Cables shall not be installed in any hazardous (classified) location, except as permitted by other articles of this Code.

770.21 Access to Electrical Equipment Behind Panels Designed to Allow Access.
Access to electrical equipment shall not be denied by an accumulation of optical fiber cables that prevents removal of panels, including suspended ceiling panels.

770.24 Mechanical Execution of Work.
(A) General.
Optical fiber cables shall be installed in a neat and workmanlike manner. Cables installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be secured by hardware, including straps, staples, cable ties listed and identified for securement and support, hangers, or similar fittings, designed and installed so as not to damage the cable. The installation shall also conform to 300.4 and 300.11. Plenum cable ties and other nonmetallic cable accessories used to secure and support cables in other spaces used for environmental air (plenums) shall be listed as having low smoke and heat release properties in accordance with 800.170.

Part V. Installation Methods Within Buildings

770.110 In addition to this Part V, Parts I and II of Article 7XX shall apply to wiring methods and materials for optical fiber cable used within buildings.

(3) 770.111 Innerduct for Optical Fiber Cables.

Listed plenum communications raceways, listed riser communications raceways, and listed general-purpose communications raceways selected in accordance with Table 800.154(b) shall be permitted to be installed as innerduct in any type of listed raceway permitted in Chapter 3.

ARTICLE 590
TEMPORARY INSTALLATIONS

Section	PC	PAGE	RESOLUTION
590.4(F)	1128	84	REJECT- FR 9460 was to clear up confusion on the "grounded/grounding" of a metal shell. The code does permit newer temporary lighting strings. Metal guarded sockets are not required, however, if they are utilized, they must be grounded.
590.8(A)	279	85	REJECT- The proposed added language in this public comment is unnecessary. The installer should check their work and the authority having jurisdiction is responsible for enforcing compliance.
590.8(B)	1962 GLOBAL	3	ACCEPT – Informational note has been revised and relocated to section (A) to comply with the Style Manual.

Article 590 Temporary Installations

590.1 Scope.

The provisions of this article apply to temporary electric power and lighting installations.

590.2 All Wiring Installations.

(A) Other Articles.

Except as specifically modified in this article, all other requirements of this Code for permanent wiring shall apply to temporary wiring installations.

(B) Approval.

Temporary wiring methods shall be acceptable only if approved based on the conditions of use and any special requirements of the temporary installation.

590.3 Time Constraints.

(A) During the Period of Construction.

Temporary electric power and lighting installations shall be permitted during the period of construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities.

(B) 90 Days.

Temporary electric power and lighting installations shall be permitted for a period not to exceed 90 days for holiday decorative lighting and similar purposes.

(C) Emergencies and Tests.

Temporary electric power and lighting installations shall be permitted during emergencies and for tests, experiments, and developmental work.

(D) Removal.

Temporary wiring shall be removed immediately upon completion of construction or purpose for which the wiring was installed.

ARTICLE 305

REQUIREMENTS FOR WIRING METHODS AND MATERIAL FOR SYSTEMS RATED OVER 1000 VOLTSac, 1500dc, NOMINAL

Art 305	1879	75	REJECT BUT SEE PC 1335- Addressing medium voltage in the NEC in a more comprehensive manner is a work in progress. It is acknowledged that this will be a long-term task to complete, but with changes to the 2023 NEC, that work is underway. The additional information on MV installations would provide the electrical industry, including inspectors, with more guidance in terms of medium voltage installations. The effort is about code ease of use, which will lead to more and improved requirements. There would be an increased level of safety by including more information on medium voltage installations, as there is more of a likelihood of an individual in the electrical industry applying the requirements if those requirements are included and are easier to locate. The removal of parts from Article 305 does not mean those parts are not MV related. The parts originally identified for relocation were chosen due to their existing segregation of MV related requirements, as opposed to other Chapter 3 articles where MV was more integrated into the requirements. The idea behind Table 305.7 is to identify the location of the MV requirements for each wiring method, and this can still be accomplished by adjusting the specifications for the 3 parts that would remain in their respective articles.

			It appears that the Correlating Committee Public Comment to remove from 305 parts that are retained in MV sections under other panels was about purview and not a referendum on the concept or a position regarding the Style Manual. There is no Style Manual rule that would indicate that a voltage range does not constitute a specific topic. In support of this position, we point to Article 490, which has been in the NEC as an Article for "Equipment over 1000 Volts, Nominal" for decades, and the newly created Article 311 in the 2020 NEC, which is segregates conductors and cables based on a voltage range. Lastly, Table 305.7 has been modified and moved to allow style manual compliance and updated to make it accurate. If it is incomplete, please use the process to help fill out the missing parts.
305.1	1493	81	REJECT- The NEC is not intended as a design specification or an instruction manual for untrained persons
305.7	1335	82	REJECT BUT SEE RELATED SR – "Not specified" may lead to confusion or interpretation. Replacing "Not specified" with "Not Restricted" removes this problem. Also, the table is relocated to a new section, "Other Articles" to comply with the style manual. Move section 305.7 to new section "305.3 Other Articles", renumber to Table 305.3. Renumber starting at "305.3 Conductors of different systems", incrementing by 1. Replace "Not specified" in Table 305.3 with "No Restriction[1]" and add footnote 1 to Table 305.3 stating: [1]No restriction indicates that the Code gives no restriction on the voltage at which this method can be used.
305.51(B)	587	83	REJECT-. Saying that something doesn't need to be stated because there is no way that it would be done any other way is not technical substantiation. In fact, it's a challenge to the users of the Code to find alternate ways. The text is not being deleted as the requirement must be stated. If fiberglass is an acceptable support material, data would need submitted in the Public Input stage along with technical substantiation and a request to add it to the list in the Code.

ARTICLE 300

GENERAL REQUIREMENTS FOR WIRING METHODS AND MATERIALS

Section	PC	PAGE	RESOLUTION
GLOBAL	1962	3	ACCEPT – Changes made to comply with Style Manual. 300.11(B)(1) Informational Note Existing IN – 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. Recommended revision – See ANSI/ASTM E119-18b, Standard Test Methods for Fire Tests of Building Construction and Materials for one method of testing to determine fire rating.

			300.17 Informational Note See PC 1785 300.22(C) Informational Note No. 2 Existing IN - The phrase other spaces used for environmental air (plenum) as used in this section correlates with the use of the term plenum in NFPA 90A-2018, Standard for the Installation of Air-Conditioning and Ventilating Systems, and other mechanical codes where the plenum is used for return air purposes, as well as some other air-handling spaces. Recommended revision – See NFPA 90A-2018, Standard for the Installation of Air-Conditioning and Ventilating Systems, and other mechanical codes for how the phrase other spaces used for environmental air (plenum), as used in this section, correlates with the use of the term plenum where the plenum is used for return air purposes, as well as some other air-handling spaces. 300.22(C)(1) Informational Note Existing IN - One method to determine low smoke and heat release properties is that the nonmetallic cable ties and other nonmetallic cable accessories exhibit a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with ANSI/UL 2043-2008, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces. Recommended revision – See ANSI/UL 2043-2008, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces for one method of testing low smoke and heat release properties for nonmetallic cable ties, and other nonmetallic cable accessories, to determine a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less 300.22(C)(3) Informational Note Existing IN - One method to determine low smoke and heat release properties is that the equipment exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less when tested in accordance with ANSI/UL 2043-2013, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces. Recommended revision – See ANSI/UL 2043-2013, Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces for one method of testing low smoke and heat release properties to determine that the equipment exhibits a maximum peak optical density of 0.50 or less, an average optical density of 0.15 or less, and a peak heat release rate of 100 kW or less. NOTE: see global PC 1962 suggestions.doc
GLOBAL	897	12	ACCEPT – Changes made to comply with Style Manual. Existing 300.11(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 raceways shall not be supported by ceiling grids. Recommendation -

			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. NOTE: see global PC 897 suggestions for TG1.doc
300.2	1878	21	REJECT BUT SEE RELATED SECOND REVISION -The text in 300.2 was reverted to closely match what was in the 2020 code and only modified to add "1500 volts dc" in two spots and a reference to 305.1.: change 300.2(A) to: Wiring methods specified in Chapter 3 shall be used for 1000 volts ac, 1500 volts dc, nominal, or less where not specifically limited in some section of Chapter 3. They shall be permitted for over 1000 volts ac, 1500 volts dc, nominal, where specifically permitted elsewhere in this Code (see section 305.1).
New section after 300.4	19	22	REJECT- While wiring in homes can be damaged as indicated in the "Code Petition Summary", workmanship as cited in the report can be an issue also; and is outside the scope of the NEC. As stated in the panel's statement to resolve the original PI's associated with this public comment, cables installed less than 1 ¼ inches from the nearest edge require protection. Section 110.2 requires conductors and equipment to be acceptable if approved. If the authority having jurisdiction feels that the cable or raceway type wiring method is subject to physical damage, they may require additional protection. Protection of circuitry has increased over time with the creation, and increased use of, AFCI protection. AFCI protection detects and protects against issues raised by this public comment. The public comment added substantial new material over the public input (PI 701).
300.4(A)	20	24	REJECT- While wiring in homes can be damaged as indicated in the "Code Petition Summary", workmanship as cited in the report can be an issue also; and is outside the scope of the NEC. As stated in the panel's statement to resolve the original PI's associated with this public comment, cables installed less than 1 ¼ inches from the nearest edge require protection. Section 110.2 requires conductors and equipment to be acceptable if approved. If the authority having jurisdiction feels that the cable or raceway type wiring method is subject to physical damage, they may require additional protection. Protection of circuitry has increased over time with the creation, and increased use of, AFCI protection. AFCI protection detects and protects against issues raised by this public comment. The public comment added substantial new material over the public input (PI 701).
300.4(A)	754	28	REJECT – Cables installed less than 1 ¼ inches from the edge require protection. Enforcement of the code is the responsibility of the AHJ. Universal enforcement of the code is outside of the scope of the NEC.
300.4(E)	1333	29	ACCEPT – Malleable Iron fittings are only one type associated with Rigid Conduit and IMC and there can be arguments made there are better options available that offer superior physical protection. The change to 'associated listed fittings' covers these other types.
300.4(E)	755	30	REJECT – It is not up to a Panel to provide evidence to resolve a public input, it is up to the submitter of the public input to provide substantiation for the proposed change. That being the case, no technical substantiation has been provided as to a problem caused with the current language. This section is meant to prohibit cables, raceways, and boxes from being installed in the space between the metal

			deck and the roofing material which is not typically found with other types of roofs. Protection from physical damage requirements are outlined in the specific section of each wiring method. The issue that arises with re-roofing metal corrugated roofing is unique and different than those other types of roofing which typically have the original roofing material removed before the new roofing material is installed. Metal corrugated roof decking roofs utilize longer fastening methods in order to comply with hold down requirements. This section is meant to prohibit cables, raceways, and boxes from being installed in the space between the metal deck and the roofing material which is not typically found with other types of roofs. Furthermore, the only change to this section was adding 'metal-corrugated' to the title, as the charging text referenced only metal-corrugated roofing. The title was edited for clarity.
300.5	1540	31	ACCEPT – It was the Panel's intent to add EMT to Column 3 which is for "other approved Raceways", not Column 2
300.5(A)	1334	36	REJECT BUT SEE PC 1540 – It was the Panel's intent to add EMT to Column 3 which is for "other approved Raceways", not Column 2
300.5(A)	1684	40	REJECT BUT SEE RELATED SECOND REVISION –There are other types of EMT aside from galvanized, and not all require supplemental protection. Pointing the reader to 358.10 will help them decide if supplemental protection is needed. [add: 6. See 358.10 if Electrical Metallic Tubing (EMT) is directly buried.]
300.5(A)	1764	44	REJECT BUT SEE PC 1684 – EMT has been allowed in direct burial applications. UL 797 states that aluminum EMT needs supplemental corrosion protection for direct burial, but it does not mention that galvanized or stainless require supplemental corrosion protection. The guide card mentions that supplementary corrosion protection is generally required in direct contact with earth, but one cannot assume it is required as it would not be required for stainless conduit. One needs to rely on the UL guide card and Article 358 for EMT.
300.5(A)	317	48	REJECT BUT SEE PC 1684 – There are other types of EMT aside from galvanized, and not all require supplemental protection. Pointing the reader to 358.10 will help them decide if supplemental protection is needed.
300.5(D)	520	52	REJECT – Feeders and branch circuits have overcurrent protection ahead of them whereas service conductors do not (they may have limited overcurrent protection provided by the utility company). Though it is not required, it is permitted to install warning ribbon above feeders and branch circuits
300.5(D)(3)	557	53	REJECT – Feeders and branch circuits have overcurrent protection ahead of them whereas service conductors do not (they may have limited overcurrent protection provided by the utility company). Though it is not required, it is permitted to install warning ribbon above feeders and branch circuits
300.5(D)	1778	54	REJECT BUT SEE RELATED SECOND REVISION – As indicated in this public comment, the parent text, necessarily setting forth the parameters to which the first-level subdivision will apply, is a single sentence, and the subject of that sentence is "Direct-burial conductors and cables." Therefore, none of the four numbered paragraphs following apply to buried raceways. By removing the word "Direct-" from the parent text, the subdivisions will now cover conductors whether they are in a raceway or are direct buried. (delete direct buried in the charging text under (D)) –
300.6	1542	55	ACCEPT – As indicated by the submitter enclosures are not limited to "meter socket enclosures". Modifying, and adding the text as indicated in this public

			comment, "enclosures (other than surrounding fences and walls)" will aid in clarity and enforcement
300.6(A)(2)	1431	57	REJECT BUT SEE PC 1542 – The comma will be removed in the resolution of PC 1542
300.6(A)	664	58	REJECT BUT SEE RELATED PC 1542 – Deleting the Informational Note and adding "anywhere other than at the factory where the product is listed", makes it very clear that coating threads with an approved electrically conductive, corrosion-resistant compound is required unless the threads are cut at the factory where the product is listed. [note: Delete informational note and revise text second sentence of existing text to read: Where corrosion protection is necessary and the conduit is threaded anywhere other than at the factory where the product is listed, the threads shall be coated with an approved electrically conductive, corrosion-resistant compound.
300.7(B)	586	59	REJECT – Informational notes are just that, informational, and are in place to provide additional information to the code user. The NEC is not an instructional manual
300.10	1315	60	REJECT BUT SEE PC 1317 – The requirement for mechanical security is located in section 300.10. As such, the exception for mechanically securing raceways and cable assemblies is being moved from 300.12 for clarity.
300.10	758	61	REJECT – Removing the term 'short sections of raceway' could create enforcement problems. There has to be some limiting method to the length of raceway permitted in this exception and different installations may require different lengths of raceways. While the current language limits the length, section 110.2 can be utilized by the authority having jurisdiction to allow lengths as needed for special circumstances. Similarly, the term "unlikely to be contacted by people…." could create enforcement problems based on the interpretation of the AHJ.
300.11(c)	1611	62	ACCEPT – With the creation of new Art 726 covering Class 4 circuit conductors and cables, the addition of Class 4 circuit conductors and cables into 300.11(C)(2) is needed for consistency and clarity
300.12	1317	63	REJECT BUT SEE RELATED SR – The requirement for mechanical security is located in section 300.10. As such, the exception for mechanically securing raceways and cable assemblies is being moved from 300.12 for clarity. [MOVE exception 2 in 300.12 to exception 3 in 300.10]
300.12	757	64	REJECT BUT SEE RELATED SECOND REVISION – Precedent exists in the titles of the neighboring sections: "300.15 Boxes, Conduit Bodies, or Fittings — Where Required. " "300.16 Raceway or Cable to Open or Concealed Wiring. (A) Box, Conduit Body, or Fitting." To remain consistent with other section headings, it is appropriate to add 'conduit bodies' to the sentence: Raceways, cable armors, and cable sheaths shall be continuous between cabinets, boxes, <u>conduit bodies,</u> fittings, or other enclosures or outlets.
300.14	1318	65	ACCEPT – The proposed language modification will aid with clarity and consistency and is consistent with other sections of the NEC

300.14	1774	66	REJECT – It is agreed that things happen, and that adequate conductor length should be provided during the initial installation however, if the conductor is damaged at some point after the initial installation, the individual who did the installation of the wiring should not be penalized with the responsibility for making any necessary corrections. Allowing the conductor to be spliced or unspliced allows for a corrective method after the original installation.
300.15(F)	1060	67	REJECT – Existing text does not need substantiation; that happened when it was placed into the code. This public comment lacks substantiation. The articles for the different wiring methods allow one to use them for exposed or concealed locations and the fittings that are used for these raceways are allowed to be used in the same locations. EMT set screw fittings are listed for exposed or concealed locations because the conduit itself is allowed to be used in those locations. Going from flex to EMT, for example, is made before pulling the conductors in so those fittings are also allowed in concealed locations because both wiring methods are allowed to be used in concealed locations.
300.15(F)	2166	68	REJECT – The second sentence in section 300.15(F) is not a standalone sentence and the fittings referenced in the second sentence are the ones permitted in the first sentence. The charging text of 300.10(F) requires a box, unless otherwise permitted in 300.15(A) through (L). As such, the proposed language in this public comment is not needed as the proposed text is already covered in the charging text.
300.15	1319	69	REJECT – As indicated in the charging text of section 300.15 a box is required unless otherwise permitted. Clarification that these are conductor splice, termination, junction, and pull points was needed and this first draft revision was created to help eliminate misinterpretations. The wording "wiring method transition points" was added to the end of the new language to provide direction on handling installations where wiring methods change from one type to another. As wiring method transition fittings are covered by 300.15(F), this type of point in the wiring system was added as it must be included in the charging language of 300.15. If we lose wiring methods transition fittings from being covered in the charging paragraph of 300.15 then the enforcement of wiring method transition fittings as being listed for the wiring methods they are used with will no longer apply to these points on the wiring system. TG VOTED. REJECT – 9, ACCEPT – 0
300.17	1785	70	REJECT BUT SEE RELATED SR – Chapter 7 was reorganized which relocated Class 1 circuits out of the article with Class 2 and Class 3. Also, a new Class 4 was created. Fire alarm circuits were divided between PLFA and NPLFA. A new article for limited power and fault manages cables was created. The added text will point the code user to the proper code sections. Change: "Class 1, Class 2, and Class 3 circuits, Article 725; fire alarm circuits, Article 760; and optical fiber cables and raceways, Article 770." To: "Class 1 circuits, 724.3(A); Class 2, Class 3, Class 4, and power-limited fire alarm (PLFA) circuits, 722.3(A); Non-power-limited fire alarm (NPLFA) circuits, 760.3(I); and optical fiber cables and raceways, 722.135(J)/770.100(B)"
300.17	1966	71	REJECT BUT SEE PC 1785 – Chapter 7 was reorganized which relocated Class 1 circuits out of the article with Class 2 and Class 3. Also, a new Class 4 was created. Fire alarm circuits were divided between PLFA and NPLFA. A new article for limited power and fault manages cables was created. The added text will point the code user to the proper code sections.

300.17	907	72	REJECT BUT SEE PC 1785 – Chapter 7 was reorganized which relocated Class 1 circuits out of the article with Class 2 and Class 3. Also, a new Class 4 was created. Fire alarm circuits were divided between PLFA and NPLFA. A new article for limited power and fault manages cables was created. The added text will point the code user to the proper code sections.
300.18(A)	1320	73	ACCEPT – As indicated, identified is a defined term in Article 100 and is not applicable as referenced in this sentence. "In accordance with" is the correct wording and will aid in clarity
300.25	1321	74	ACCEPT – Fire-resistance rating is a defined term and was accepted to add clarity to the section.

2) **Statements Opposing Second Revisions**

None

3) **Motion**

Motion to support all Second Revisions

Second by Bill McCoy

Motion Passed Unanimously

4) **Direction to IEEE-IAS/PES- JTCC Representative**

JTCC Representative is directed to support all first revisions

CMP-4, 2023 NEC Second Revision Report

Articles 690, 691, 692, 694, & 705

(Mark Gibbs, Principal - Alternate Vacant)

1) **Noteworthy Panel Actions**

a) *CMP-4 had 110 Public Comments that resulted in 12 Public Comments being Accepted, 74 Reject but see Second Revision, and 24 Public Comments were Rejected. Notably there were 24 Public Comments by the NFPA Correlating Committee.*

2) **Statements Opposing First Revisions**

None

3) **Motion**

Motion to support all Second Revisions

Second by Andy Hernandez

Motion Passed Unanimously

4) **Direction to IEEE-IAS/PES- JTCC Representative**

JTCC Representative is directed to support all first revisions

CMP-5, 2023 NEC Second Revision Report

Articles 200, 250

(Daleep Mohla, Principal - Alternate Vacant)

Daleep Mohla requested Chris Seales to assume the role of Chair for discussions of CMP 5 Report.

1) **Noteworthy Panel Actions**

a) *Eleven SRs are to modify definitions to include searchable terms or editorial changes to clarify (e.g., metallic changed to metal etc.)*
This includes five SRs where:
Acronym from certain terms such as Bonding Jumper, Bonding Jumper Equipment (Equipment Bonding Jumper), Bonding Jumper, Main (Main Bonding Jumper) r etc. deleted and searching terms added in parenthesis at multiple places

- ***SR 8053 - Section 250.140 Frames of Ranges and Clothes Dryers***
Previously, under the exception for existing circuits, the frame was permitted to be connected to the grounded conductors if the grounded conductor originated in the Service equipment.

250.140 is now in two subtitled sections 250.140 (A) and 250.140(B).
250.140 (A) addresses the new installations.
250.140(B) incorporates the former exception for existing branch circuits that originated at the service equipment and it was expanded to recognize existing branch circuits originating at other than service equipment. The expansion was necessary to provide relief for situations where existing 3-wire branch circuits to electric ranges or dryers are connected to equipment that was formally service equipment but is now feeder supplied

b) **Second Revision No. 7938-NFPA 70-2021 [Section No. 250.6(C)]**

SR 7938 added language to 250.6 (C) about objectionable current that seems to be in conflict with 250.6 (A) and 250.6 (B). The new language allows objectionable currents as a result of grounding and bonding connections required by the Code.

(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 not be classified as objectionable current for the purposes specified in 250.6(A) and (B).

Reference
250.6 Objectionable Current.

(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 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) **Second Revision No. 8071- NFPA 70-2021 [Section No. 250.122 (B)]**

SR 8071 expanded the Informational Note under 250.122 (B) referencing a software developed and marketed by Steel Tube Institute (STI). STI website where this software

is located for downloading is primarily focused on expanding use of Steel conduits. NEC has normally just stated the requirements and has not referenced any software to achieve the objective. Inclusion of STI software will set a precedent for other segments of the industry such as Copper Development Association, Aluminum Association to propose their software for advancing interests of their industry segment.
It is requested that IEEE- IAS/PES JTCC oppose this panel action.

2) Statements Opposing Second Revisions

a) **Second Revision No. 7938-NFPA 70-2021 [Section No. 250.6(C)]**

Objectionable currents, by definition, are the current causing objection – i.e., safety to personnel or equipment or performance issues that may cause unacceptable safety concerns. If currents do not result in any safety or performance issues, they may not be considered objectionable.

If objectionable currents cause any direct or indirect safety issues, these need to be addressed and alterations need to be made to mitigate as required in 250.6 (B).

The added text "and from currents resulting from required grounding and bonding" allows that such objectionable currents can be permanent unlike objectionable currents due to ground fault which are momentary and transitory in nature.

b) **Second Revision No. 8071- NFPA 70-2021 [Section No. 250.122 (B)]**


SR 8071 – GEMI Software.pptx

There are multiple software and techniques available in the industry for proper sizing of the equipment grounding conductors to clear a fault without extensive damage to the electrical equipment and circuit as required in NEC 110.10.
The new text added in the Informational Note provides reference to a specific software developed and distributed by the Steel Tube Institute.
The primary purpose of this software is to promote use of steel conduit.
GEMI Software site has the following statement:
"Download the GEMI Analysis Software to learn how steel conduit can shield against the effects of EMF in your electrical distribution systems, about its use as an equipment grounding conductor, and more."

NEC normally only specifies the performance without referencing a specific software to achieve that objective

For example. NEC 110.9 requires. "Equipment intended to interrupt current at fault levels shall have an interrupting rating at nominal circuit voltage at least equal to the current that is available at the line terminals of the equipment". But it does not reference a specific software to calculate the fault available at the line side of the terminals.

3) Motion

Motion to support all Second Revisions except the following with the above IEEE Statement opposing the second revision

a. Second Revision No. 7938-NFPA 70-2021 [Section No. 250.6(C)

b. Second Revision 8071-NFPA 70-2021 [Section No. 250.122(B)

Second by Bill McCoy

Motion Passed with one objection to item B (20 Yay – 1 Nay)

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions with the exception of (list SRs or the following SRs) with the negative statements provided above

Chris Searles handed the role of Chair back to Daleep Mohla.

CMP-6, 2023 NEC Second Revision Report

Articles 310, 311, 320, 322, 324, 326, 328, 330, 332, 334, 336, 337, 338, 340, 382, 394, 396, 398, 399, 400, 402, Chapter 9, Tables 5 through 9, Annex B and E and Examples D7
(Dennis Nielsen, Principal - Alternate Vacant)

1) Noteworthy Panel Actions

a) Second Revision No. 8432-NFPA 70-2021 Detail tables 310.16 and 310.17 (13/0/0)

(CMP6) The panel acted to revert to 2020 code language for the minimum size of conductors for 310.3(A), Tables 310.16 and 310.17, and wiring methods in multiple articles, including Articles 320, 330, 334, 336, and 340. To ensure public safety, further time is needed to study 14 AWG copper-clad aluminum and 16 AWG copper as minimum conductor sizes.

Multiple test reports were presented to the panel as substantiation for the public comments in the 2023 revision cycle covering 14 AWG copper-clad aluminum conductor heating at certain ampacity levels under insulation to replicate a real-world installation. The reports point to the need for a deeper understanding of the performance of 14 AWG copper-clad aluminum.

During the 2023 NEC revision cycle, the panel received reports and presentations from:

1) the Bimetallics Task Group (conducted at an Eaton facility)
2) the Copper Development Association (conducted at a Hampton Tedder facility)
3) the Southwire company (conducted at the DB Cofer laboratory)
4) the Cable Technologies Laboratory (conducted at their facility)
5) the Cerrowire company (conducted at the Marmon Innovation and Technology Center)

The Panel also considered reports from the 2020 NEC revision cycle, including the NSF International report.

To determine the appropriate code requirements to ensure the installation of reduced branch circuit conductor sizes is both practical and safe, additional information is required. The panel requests public input that includes the

following information obtained from credible sources and qualified testing laboratories:

1) Testing of representative wiring methods with 14 AWG copper-clad aluminum and 16 AWG copper shall be performed. Representative wiring methods could include those with non-metallic jackets, metallic sheaths, and those in metallic and non-metallic raceway systems.
2) Each wiring method shall have three current-carrying conductors.
3) At a minimum, testing of 16 AWG copper and 14 AWG copper-clad aluminum in thermal insulation is required. To address questions that were raised about existing branch circuit conductor sizes and heat rise in thermal insulation, the panel is also requesting testing of:

    a. 14 AWG copper and 12 AWG copper-clad aluminum
    b. 12 AWG copper and 10 AWG copper-clad aluminum

4) Equivalent testing of aluminum conductors is also welcomed.
5) For each wiring method, testing shall be performed at the 60C, 75C, and 90C ampacity values as appropriate as indicated or proposed in Table 310.16. Each test shall continue for a minimum of 3 hours or until thermal stability is reached, unless the temperature exceeds 150C at which point the test will be terminated. Conductor temperature shall be no more than 2C above ambient when each test begins.
6) Testing shall include installations that are representative of both attic and wall locations.
7) Thermocouples shall be affixed in contact with the insulation of a current-carrying conductor inside the wiring method. For cable wiring methods the jacket or sheath shall be replaced/restored over the thermocouple.
8) Thermocouples shall not be placed on or next to framing members or any other building components other than thermal insulation and the conductor insulation. Thermocouples shall be placed no less than every 10 feet along the wire within the wiring method and temperature data values shall be recorded no less than every 30 seconds. Thermocouples shall be placed on the conductor insulation within one foot of the supply and load connections. Ambient temperature shall be recorded continuously.
9) Voltage and current at the supply and load connections shall be monitored and values shall be recorded at a minimum of every 30 seconds."
10) All conductors shall be tested under equivalent conditions.

The panel has also identified remediating actions that could be taken to prevent overheating in this type of installation, including installation restrictions, reduced ampacity values in the Article 310 tables, or ampacity adjustment requirements.

Affirmative Comment:
The CMP6 Panel statement provided significant direction for test data to ensure the application is suitable for installations. Utilization of NRTL certified labs using calibrated equipment and controlled environments to provide certified test results will ensure following standardized requirements and testing.

b) Second Revision No. 8404-NFPA 70-2021[Section No. 310.3(A)] (12/1/0)

(A) Minimum Size of Conductors.

The minimum size of conductors for voltage ratings up to and including 2000 volts shall be ~~16~~ 14 AWG copper , ~~14~~ or 12 AWG aluminum or copper-clad aluminum, ~~or 12 AWG aluminum~~, except as permitted elsewhere in this Code.

Other **SRs** with similar changes and same committee statement:

Second Revision No. 8436-NFPA 70-2021 [Section No. 330.104] 12/1/0

Second Revision No. 8437-NFPA 70-2021 [Section No. 334.104] 10/2/1

Second Revision No. 8443-NFPA 70-2021 [Section No. 336.104] 11/1/0

Second Revision No. 8446-NFPA 70-2021 [Section No. 340.104] 11/1/1

Affirmative Comment:

The CMP6 Panel statement provided significant direction for test data to ensure the application is suitable for installations. Utilization of NRTL certified labs using calibrated equipment and controlled environments to provide certified test results will ensure following standardized requirements and testing

c) Second Revision No. 8309-NFPA 70-2021 [Section No. 330.112(A)]

(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 ~~725~~ 724 .49. ~~Conductors larger than 16 AWG~~ 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.

d) Second Revision No. 8340-NFPA 70-2021 [Definition: Drilling Rig Cable, Type P]

~~Drilling Rig~~ Cable, ~~Type P~~. Industrial Mobile (Industrial Mobile Cable), Type IM

A factory assembly of one or more insulated flexible tinned copper conductors, with associated equipment grounding conductor(s), with or without a braided metallic armor and with an overall nonmetallic jacket.

Second Revision No. 8298-NFPA 70-2021 [Article 337]

~~**Article 337** Drilling Rig~~ Article 337 Industrial Mobile Cable: Type ~~P~~ IM

Part I. General

337.1 Scope.

This article covers the use, installation, and construction specifications for up through 2000 volt ~~drilling rig~~ industrial mobile cable, Type ~~P~~ IM (armored and unarmored).

e) Second Revision No. 8274-NFPA 70-2021 [Section No. 400.4]

In addition to conductors used for control and signaling circuits, Types E, EO,

ETP, and ETT elevator cables shall be permitted to incorporate in the construction one or ~~more 20 AWG~~ more of the following: optical fibers; 24 AWG or larger telephone conductor pairs, one or more coaxial cables, one or more optical fibers, or one or more communications cables. The ~~20 AWG~~ 24 AWG or larger conductor pairs shall be permitted to be covered with suitable shielding for telephone, audio, data transfer, or higher frequency communications circuits; the coaxial cables shall consist of a center conductor, insulation, and a shield for use in video or other radio frequency communications circuits. The optical fiber shall be suitably covered with flame-retardant thermoplastic.

Committee Statement: This change correlates with the second revision changes made in 620.12 by CMP-12.

f) Second Revision No. 8483-NFPA 70-2021 [Annex E]

Type IV ~~is a single construction category that provides for~~ construction includes traditional heavy timber construction~~. Both~~ and mass timber construction. In heavy timber construction, the structural framework and the exterior walls are required to be noncombustible except that wood members of certain minimum sizes are allowed. ~~This construction type is seldom used for multifamily dwellings but, if used, would be permitted to be four stories high.~~ In mass timber construction, structural elements of cross-laminated timber (CLT) are permitted. Allowable building height for mass timber is higher than heavy timber.

***Table E.2** Maximum Number of Stories for Types V, IV, and III Construction:*

IV Heavy Timber ~~4~~ 5

IV Heavy Timber, Sprinklered ~~5~~ 6

IV Mass Timber 12

***Table E.3** Cross-Reference of Building Construction Types*

*IBC — IA IB IIA IIB IIIA IIIB IV * VA VB*

**Mass timber in the IBC is Type IV A, IV B, and IV C*

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions and include the following affirmative statement for SRs 8432, 8404, 8436, 8437, 8443, 8446

The CMP6 Panel statement provided significant direction for test data to ensure the application is suitable for installations. Utilization of qualified labs using calibrated equipment and controlled environments to provide certified test results will ensure following standardized requirements and testing.

Second by Steve Townsend

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions and include the statement provided above in item 3) for SRs 8432, 8404, 8436, 8437, 8443, 8446.

Lunch Break	***(~1:45 pm Eastern)***	***45 minutes***

CMP-7, 2023 NEC Second Revision Report

NO REPRESENTATION

CMP-8, 2023 NEC Second Revision Report

Articles 342, 344, 348, 350, 352, 353, 354, 355, 356, 358, 360, 362, 366, 368, 369(new) 370, 371(new) 372, 374, 376, 378, 380, 384, 386, 388, 390, 392, Chapter 9, Tables 1 through 4, Example D13, and Annex C

(Paul Myers, Principal – Alternate, Josiah McNulty)

1) Noteworthy Panel Actions

a) Second Revision No. 8156-NFPA 70-2021 [Article 371]

A new Article 371 was added for Flexible Bus Systems during the First Revision. There was a PC to remove it as UL has not fully developed the product standard. However, the Outline of Investigation has been issued and the standard is anticipated to be developed prior to the publication of the 2023 Code. The panel felt that the placement of a product in the Code prior to the UL Standard being fully developed has precedence and since the product itself is under development, the Code needed to include it. Additional changes were made to the language.

Panel Statement:

This second revision clarifies in 371.14 and 371.18 that qualified design engineering supervision is needed for proper installation of flexible bus systems and that such installations must remain within the limitations of the listing and manufacturers installation instructions.

Additional language is added to 371.20 to clarify the acceptable termination methods.

This second revision removes the current rating marking requirement from the flexible insulated bus insulation in 371.120(C) to accommodate the possibility of different installation locations, ambient conditions, bundling, and other factors. A marking requirement for the manufacturers part identification is added to assist in correct component identification for the installer and AHJ.As shown in 371.120(A) the listed current rating for the system continues to be marked on the system nameplate.

Part IV Requirements for Over 1000 Volts is removed as the product listing standard does not presently address flexible insulated bus rated over 1000 volts. If the scope is expanded in the future to include such systems additional language is needed to address topics such as shielding, terminations, impulse withstand voltage ratings, rated momentary current, and possibly other installation items.

b) Second Revision No. 8144-NFPA 70-2021 [Section No. 342.20(B)]

IMC Trade Sizes 5 and 6 were added in Article 342 and in Table C8. However, the TCC may reject the additions as new material. The Panel felt that it was NOT new material because Trade Sizes 5 and 6 were added in Article 358 for EMT during the First Draft

and the inclusion of IMC was a natural extension.

Panel Statement:

The panel accepted changes to include trade sizes 5 and 6 IMC to Article 342 to keep consistency in the rigid metal raceway articles.

The panel found that due to the changes made in the first draft by FR7583 and the fact that the products are manufactured similarly that the addition of the new trade sizes are not considered new material.

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Steve Townsend

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-9, 2023 NEC Second Revision Report

Articles 312, 314, 404, 408, 450, 490

(Paul Sullivan, Principal - Alternate Sharon Mullen)

1) Noteworthy Panel Actions

a) *Many Second Revisions concerning the reorganization of the NEC to include an article 495 to include information about equipment operating at over 1000 Volts. Some of those proposals have been accepted by CMPs. Others (such as for motors, resistors, reactors, and transformers) were rejected. PC 1424 is one example of this work.*

b) *Many updates concerning different definitions associated with these Articles, such as the definition of "transformer".*

c) *Concerned about one Public Comment (1054) that proposed requiring all overcurrent protection devices not exceeding 15,000 Volts be listed. This PC was "rejected but hold", meaning it will be an item of discussion for the next Code cycle. Requiring these devices to be listed would result in significant work and cost with questionable benefit.*

d) *Continued work in Articles 312 and 314 concerning type/sized of screws/fasteners that can be used to secure equipment covers or devices.*

e) *Continued work in Article 404 to provide clearer guidance on the allowed wiring to snap switches, especially snap switches with CO/ALR ratings.*

f) *Added an Article 404.16 requirement stating that molded-case switches are not allowed to be reconditioned.*

Discussion that exterior equipment within the Alaskan market is not required to be 3rd party approved but interior equipment continues to have that requirement. Support to maintain that "utility" equipment continues to be exempt.

"Transformer" vs. "Auto-transformer"

2) **Statements Opposing Second Revisions**

None

3) **Motion**

Motion to support all Second Revisions

Second by Will McBride

Motion Passed Unanimously

4) **IEEE-IAS/PES JTCC Direction to IEEE-OR**

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-10, 2023 NEC Second Revision Report

Articles 215, 225, 230, 240, 280 and 285

(Steve Townsend, Principal - Peter Walsh, Alternate)

1) **Noteworthy Panel Actions**

a) ***Public Comment No. 1808-NFPA 70-2021 [Section No. 230.43]***

Submitter: Ward Judson, nVent Electric

Committee Action: Rejected but see related SR-8241-NFPA 70-2021

SR added Flexible Bus Systems to list under Article 230.43 Wiring Methods for 1000 Volts, Nominal, or Less.

Statement of the Problem:

This public comment provides a correlating addition to recognize Flexible Bus Systems as one of the available wiring methods listed in 230.43 for services. The only change being made is to include Flexible Bus System in the list for 230.43. No other changes are intended. Attached to this PC is a clean file to show the intended changes.

Flexible Bus Systems are included in a new Article 371 which was accepted by CMP-8 as FR 7621 in the first draft stage. The accepted article text requires the Flexible Bus System to be listed as a system. There are two UL Outlines of Investigation in process to provide the listing for the Flexible Insulated Bus and the Flexible Bus System. Section 371.10(1) in the article permits the Flexible Bus System to be used as a wiring method for services, feeders and branch circuits. Section 230.43 is a list of wiring methods that may be used for services and this addition is to ensure the list is complete.

Committee Statement:

The addition of Flexible Bus Systems recognizes the wiring method for use in services as found in permitted uses in NEC 371.10 and listed in accordance with 371.6. The panel recommends that the correlating committee confirm that the ballot passes for the new Article 371.

b) ***Public Comment No. 2161-NFPA 70-2021 [Section No. 230.67(E)]***

Submitter: Stephen Rood, Legrand North America

Committee Action: Rejected

~~*(E) Ratings.*~~

~~*SPDs shall have a nominal discharge current rating (In) of not less than 10kA.*~~

Statement of the Problem:

The new list item (E) for ratings under 230.67 should be deleted. As 230.67(C) permits Type 1 and Type 2 SPDs, then the new 230.67(E) that excludes Type 2 SPDs that would have an In of 3kA or 5kA conflicts with what is permitted in 230.67(C). To confirm:

UL 1449 allows for Type 1 SPDs to have an In of 10 or 20kA and Type 2 SPDs to have an In of 3, 5, 10, or 20kA.

This addition of a minimum 10kA rating by selected industry participants represents an exclusion of products offered by many OTHER industry providers and stakeholders (i.e. – those firms providing Type 2 SPDs that have an In of 3kA or 5kA) that can be and are marketed today as "meeting Code" no longer being permitted to do so. This addition conflicts with 230.67(C), as products that currently meet Type 2 SPD requirements as defined by UL 1449 (therefore in compliance with 230.67(C)) would be unduly excluded without evidence-based data because of this ratings requirement.

There is no appropriate cause, basis, or justification to negatively impact other marketplace participants by working to "box out" certain Type 2 SPDs that have an In of 3kA or 5kA from being able to continue to "meet Code". 230.67(E) should not have been introduced without accounting for the inclusion of Type 2 SPDs that have an In of 3kA or 5kA as being able to meet the NEC, as it is currently and still permitted by 230.67(C). It is inappropriate to introduce a conflict into the NEC of this nature, which on the surface unduly reduces installation choice and resulting market competition.

There is nothing in the UL or IEEE standards stating a surge current value of 10kA reduces the risk of fire to equipment or premises wiring systems. As there was no defined rationale for a value of 10 kA, the NEC should not mandate this objective requirement based upon subjective speculation.

Committee Statement:

It is important that the surge device be installed on a circuit such that it will not be expected to discharge a surge greater than it nominal discharge rating. IEEE Std C62.41.2 characterizes the service entrance as being typically exposed to surges rated up to 10kA. The requirement is clear that this is a nominal discharge rating and not a short circuit current rating.

c) ***Public Comment No. 1555 NFPA 70-2021 [Section No. 230.91(b)]***

Submitter: Megan Hayes, NEMA
(Related Public Comments 1681 by submitter Chad Kennedy, Schneider Electric; and 1670 by Agnieszka Golriz, NECA)

Committee Action: Rejected but see related SR-8453-NFPA 70-2021

230.91 Location.

~~*(A) General.*~~

The service overcurrent device shall be an integral part of the service disconnecting means or shall be located immediately adjacent thereto. Where fuses are used as the service overcurrent device, the disconnecting means shall be located ahead of the supply side of the fuses.

~~*(B) Separate Enclosure.*~~

~~*Services over 150 volts to ground and not over 1000 volts phase-to-phase that include fuses rated 1600 amperes or higher, or circuit breakers where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated or can be adjusted is 1600 amperes or higher, the service disconnecting means and overcurrent device shall be located in a separate enclosure from feeder or branch circuit overcurrent devices.*~~

Statement of the Problem:

The new requirements added by FR 7778 as a new 230.91(B) should not be included in the Code at this time. As drafted, the language will not only result in an increase in the number of conductor terminations, but will also present difficulties in achieving common equipment configurations such as Main-Tie-Main line-ups.

FR 7778 was created in response to PI 4261. The focus of PI 4261 was an arc energy protection method for the line side of the service disconnect which is currently not addressed within the NEC. The inclusion of separate enclosure requirements as shown in 230.91(B) does not address the line side arc energy exposure at the service disconnect.

The industry needs additional time to determine the line side arc energy reduction protection level and evaluation criteria before including any requirements within the NEC. 230.62(C) already requires barriers in service equipment so that no uninsulated, ungrounded service conductors are exposed to inadvertent contact while servicing load terminations with the service disconnect is in the open position. Further expansion of this requirement as drafted in 230.91(B) is not necessary at this time as it introduces complexities in common system configurations and does not alter the line side arc energy exposure at the service disconnect.

Committee Statement:

The requirements in 230.91(B) are removed to align with the existing requirement for line side barriers in 230.62(C) and the lack of substantiation that the line side arc flash hazard is reduced. The line side barriers reduce the likelihood of an event initiating on the line side.

The heading to 230.91(A) was removed to comply with the NFPA Manual of Style.

d) ***Public Comment No. 1423-NFPA 70-2021 [Global Input]***
Submitter: Robert Osborne, UL LLC

Committee Action: Rejected but see related SR-8472-NFPA 70-2021

Relocate requirements for feeders, outside branch circuits and feeders, and services over 1000 Vac or 1500 Vdc from Articles 215, 225, and 230 into the new Article 235. See attached word document for deletions from Articles 215, 225, and 230, and the new requirements to be added to Article 235.

Statement of the Problem:

This Public Comment is submitted on behalf of a Correlating Committee Long-Range Planning Task Group consisting of Robert Osborne (Chair), Paul Barnhart, Lou Grahor, David Temple, Donny Cook, Dean Hunter, Mike Querry, Roger McDaniel, Dave Burns, Rod Belisle, Tim Croushore, and Kevin Rogers.

This Public Comment, was developed with the goal of improving usability and providing a platform to increase the focus on requirements associated with Medium or High Voltage.

Reconsider PI 3819 which includes the combining of the branch-circuits, feeders, outside feeders and branch-circuits, and service installations "over 1000-volts", in the "new" Article 235.

The new Article 235 intended to be created by CMP 2 (refer to PC 285) locates the MV requirements in one location for usability and clarity. With the addition of Article 235 that only covers branch-circuits over 1000-volts, the proposed combining all of the requirements for "over 1000-volt" installations from Article 215, 225 and 230, provides an opportunity to create a consistent approach to address MV installations. The MV Task Group is concerned that failure to look at a long-term solution for systems over 1000-volts may create a vacuum in which other standards look to fill that void. Requirements for systems rated over 1000-volts are not arranged consistently within the document as covered by the Technical Committees.

As an example, CMP-10 addresses MV requirements in different locations within their purview. The "over 1000-volts" requirements exist in a dedicated "Part" within the Article – such is the case with existing Articles 225 and 230, and in Article 215, the "over 1000-volts" are intermingled with the "under 1000-volt" requirements. In addition, the specific requirements in Article 215 related to the sizing of feeder conductors using the 125% factor are located under the rules for 600 volts or less. Also, the requirement in section 215.3 for Overcurrent protection allows for 100% rated breakers and does not appear to correlate with the 215.2(B). The present layout is lacking in usability and clarity.

Committee Statement:

This action will combine all the requirements under the purview of CMP-10 for feeders, outside branch circuits and feeders, and services over 1000 Vac or 1500 Vdc into the new Article 235. This action is to correlate with the actions taken by CMP-2 on PC-285 which created the new Article 235.

The corresponding sections from Articles 215, 225, and 230 will be deleted as the requirements have been relocated to the new Article 235.

The edition year ANSI/NETA ATS was removed so that it is automatically the latest edition as outlined in 90.1(C) pursuant to PC-853.

CMP-10 is requesting the correlating committee review the changes in scope of Articles 225 and 230. The scope change to Article 215 is addressed by SR-8369.

e) ***Public Comment No. 1876-NFPA 70-2021 [Section No. 240.67]***
Submitter: Agnieszka Golriz, NECA

Committee Action: Rejected but see related SR-8323-NFPA 70-2021

Where fuses rated ~~1000~~ 1200 amperes or higher are installed, 240.67(A), (B), and (C) shall apply.

****Statement of the Problem:***

No technical substantiation was provided to reduce the threshold for the requirement for Arc Energy Reduction methods where fuses are installed from 1200 amps to 1000 amps.

Committee Statement:

No technical substantiation was provided to reduce the threshold for the requirement for Arc Energy Reduction methods where fuses are installed from 1200 amps to 1000 amps.

The hazards posed by arc flashes are known. The panel is open to reconsidering the threshold for arc flash protection during the next code cycle based on scientific data in accordance with the NFPA Regs.

2) Statements Opposing Second Revisions
None

3) Motion

Motion to support all Second Revisions

Second by Josiah McNulty

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-11, 2023 NEC First Draft Report

Articles 409, 430, 440, 460, 470 and Annex D, Examples D8
(*Arthur J. Smith, III, Principal - Steven Townsend, Alternate*)

1) Noteworthy Panel Actions

a) ***Public Comment No. 1489-NFPA 70-2021 [Section No. 409.70]***
Submitter: John Kovacik, UL LLC

Committee Action: Rejected

409.70 ~~Surge Protection. (New FR Article)~~

~~Safety interlock control devices for personnel protection that are subject to damage from surge events shall have surge protection installed in accordance with Part II of Article 242.~~

Statement of the Problem:

Delete this proposed new requirement. The language is very subjective and unenforceable. How does an AHJ determine that an industrial control panel

incorporates safety interlock control devices for personnel protection. Further, if an AHJ can somehow determine that such devices are provided, how does the AHJ determine that such devices are subject to damage from surge events. It is a leap of faith to expect that both conditions can be verified. There is no mechanism in place to assist the AHJ in making these determinations. Industrial control panels are not provided with any information that would assist them in determining compliance with this requirement. The proposed language will result in some AHJ's requiring surge protection for panels that do not require it in order to avoid noncompliance of a requirement that they cannot interpret and apply properly. This is an unintended consequence and should not exist. Forcing users to install equipment that is not necessary is not the intent of the code. We should not mandate the use of surge protection in industrial control panels. Requirements exist in UL508A for the selection and use of surge protective devices. We should leave it to the discretion of the panel manufacturer when and how to use them.

Committee Statement:

The requirements for surge protection for safety circuits are necessary to provide protection for these circuits, therefore, the panel is keeping the language added at first draft as modified by SR-7680

b) ***Public Comment No. 1579-NFPA 70-2021 [Section No. 409.70]***
Submitter: Megan Hayes, NEMA

Committee Action: Rejected but See Second Revision No. 7680-NFPA 70-2021

409.70 Surge Protection. (New FR Article)

*Safety ~~interlock control devices~~ **circuits** for personnel protection that are subject to damage from surge events shall have surge protection installed in accordance with Part II of Article 242.*

Statement of the Problem:

NEMA agrees with CMP 11's addition of surge protection into industrial control panels with safety devices installed. The wording of "Safety interlock" formerly corresponded with section 670.6. However, CMP 12 has changed the wording to "safety circuit" to correlate with NFPA 79 (FR 9578) and added a definition for a safety circuit (FR 9518). The proposed change will bring industrial control panels into alignment with these changes.

Committee Statement:

Response to PC-1579: "Safety interlock control devices" is changed to "safety circuits" to match the definition of safety circuit in Article 100.

Response to PC-1736: The reference to Article 242 is being removed because it is redundant to the requirements of the code. Additionally, clarification is added with respect to the location of the surge protective device, it must be within or immediately adjacent to the industrial control panel.

CMP-11 requests that the correlating committee remove the "(670)" from the

definition for "safety circuit" in accordance with NEC Style Manual section 2.2.2.3.2, as by creating this SR the definition is used in more than one article.

Second Revision No. 7680-NFPA 70-2021 [Section No. 409.70]

409.70 Surge Protection.

Safety interlock control devices circuits for personnel protection that are subject to damage from surge events shall have surge protection installed in accordance with Part II of Article 242 within or immediately adjacent to the control panel.

Committee Statement:

Response to PC-1579: "Safety interlock control devices" is changed to "safety circuits" to match the definition of safety circuit in Article 100.

Response to PC-1579: "Safety interlock control devices" is changed to "safety circuits" to match the definition of safety circuit in Article 100.

Response to PC-1736: The reference to Article 242 is being removed because it is redundant to the requirements of the code. Additionally, clarification is added with respect to the location of the surge protective device, it must be within or immediately adjacent to the industrial control panel.

CMP-11 requests that the correlating committee remove the "(670)" from the definition for "safety circuit" in accordance with NEC Style Manual section 2.2.2.3.2, as by creating this SR the definition is used in more than one article. Response Message: SR-7680-NFPA 70-2021

c) ***Public Comment No. 1488-NFPA 70-2021 [Section No. 409.110]***
Submitter: John Kovacik, UL LLC

Committee Action: Rejected but see related SR SR-7742-NFPA 70-2021

409.110 Marking.

An industrial control panel shall be marked with a permanent nameplate attached to the enclosure that is visible after installation and complying with 409.110(A) or (B) and (C)

(A) Panels intended for Industrial Machinery

The nameplate shall be attached to the outside of the enclosure

~~*that is of sufficient durability to withstand the environment involved, that is not handwritten, and that is visible after installation.*~~

(B) All other panels

The nameplate shall be attached to the outside or inside of the door or cover of the enclosure, or on the inside walls of the enclosure.

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) *Industrial control panels supplied by more than one electrical source where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel shall be marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.*

(4) *Short-circuit current rating of the industrial control panel based on one of the following:*

(a) *Short-circuit current rating of a listed and labeled assembly*

(b) *Short-circuit current rating established utilizing an approved method*

Informational Note: See ANSI/UL 508A, Standard for Industrial Control Panels, Supplement SB, for an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(5) *If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.*

(6) *Electrical wiring diagram or the identification number of a separate electrical wiring diagram or a designation referenced in a separate wiring diagram.*

(7) *An enclosure type number marked on the industrial control panel enclosure.*

Statement of the Problem:

The revisions align the marking requirements for the nameplate with those in UL 508A, The Standard for Industrial Control Panels and NFPA 79, The Standard for Industrial Machinery. The requirement for durability to withstand the environment and not being handwritten is considered covered by Section 110.21. These changes also satisfy the directives to the panel in Correlating Committee Note No. 17.

Additional comments;

The following are just a few UL standards that require product nameplates to be "plainly visible" after installation. This does not mean the product nameplate must be on the outside of the enclosure - although clearly it can be. These standards have allowances for the product nameplate to be located on the inside of enclosures provided the nameplate is readily visible by opening an enclosure door or removing an enclosure cover.

- *UL 67 – Panelboards*
- *UL 98 - Enclosed and Dead-Front Switches*
- *UL 218 - Fire Pump Controllers*
- *UL 347 Series - Medium Voltage Equipment*
- *UL 508 and UL 60947 Series - Industrial Control Equipment*

- *UL 845 - Motor Control Centers*
- *UL 891 – Switchboards*
- *UL 977 - Fused Power-Circuit Devices*
- *UL 1008 Series - Transfer Switch Equipment*
- *UL 6420 - Safety Isolation Equipment*
- *UL 61800-5-1 - Adjustable Speed Electrical Power Drive Systems*

For products certified to all of these UL standards, the focus is on verification/validation of all product markings to ensure the product nameplate is "plainly visible" after installation during the product evaluation. Until such time as the electrical distribution and control industry can agree to mandate all enclosed equipment product nameplates be provided on the outside of the enclosure through a consensus process, the requirements for industrial control panel nameplates should not be any different.

Committee Statement:

The FR was modified to include markings that should be identified on the outside of the industrial control panel while allowing some items to be identified on the inside. Identification of certain markings on the outside of the panel can increase safety of persons working on industrial control panels.

Response to PC-1488: It is important to keep the information in 409.110(2) and (3) on the outside of the enclosure for all industrial control panels.

d) ***Public Comment No. 1566-NFPA 70-2021 [Section No. 409.110]***
Submitter: Megan Hayes, NEMA

Committee Action: Rejected but see related SR SR-7742-NFPA 70-2021

409.110 Marking.

An industrial control panel shall ~~be marked with a permanent nameplate attached to the outside of the enclosure that is~~ ***have permanent markings that are*** *of sufficient durability to withstand the environment involved, that ~~is~~* ***are*** *not handwritten, and that ~~is~~* ***are*** *visible after installation. ~~The nameplate shall include the following information~~* ***The markings in 409.110(2), (3), (4), and (7) shall be attached to the outside of the enclosure. The markings in 409.110(1), (5), and (6) shall be attached to either the inside or outside of the enclosure. The following markings shall be included:***

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) Industrial control panels supplied by more than one electrical source where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel shall be marked to indicate that more than one disconnecting means is required to deenergize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.

(4) Short-circuit current rating of the industrial control panel based on one of the following:

(a) Short-circuit current rating of a listed and labeled assembly

(b) Short-circuit current rating established utilizing an approved method

Informational Note: ANSI/UL 508A, Standard for Industrial Control Panels, Supplement SB, is an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(5) If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.

(6) Electrical wiring diagram or the identification number of a separate electrical wiring diagram or a designation referenced in a separate wiring diagram.

(7) An enclosure type number shall be marked on the industrial control panel enclosure.

Statement of the Problem:

1. *The First Revision mischaracterizes all seven markings of section 409.110 as nameplate markings. The following markings are not nameplate markings:*

   (a) The marking in 409.110(3) is intended to be a safety sign which differs from nameplate markings due to the presence of a signal word, use of colors, and increased font size in accordance with ANSI Z535.4. The text and background of the safety sign is intended to attract attention. This marking is intended to be on the outside of the enclosure but not as part of the panel nameplate. UL 508A currently requires this marking to be placed on the outside of the panel and to be preceded by a signal word such as "WARNING-Risk of Electric Shock";

   (b) The second sentence of 409.110(3) includes a statement to identify the location of all (remote) disconnecting means supplying an industrial control panel. This information is not known by the panel manufacturer and could not be included on a panel nameplate. This information is specific to the installation and would be documented after the panel has been installed. The First revision would cause confusion of whether this information needs to be on the outside of the panel, or if the current wording, "…documented and available", is sufficient for remote disconnects; and

   (c) The marking in 409.110(6) describes an electrical wiring diagram that is typically applied to the inside of the door or located in a print pocket on the inside of the enclosure door. The electrical wiring diagram is not normally included as a part of a panel nameplate. The proposed changes to the First Revision text removes references to a "nameplate" and simply refers to markings in 409.110.

2. *The proposed revision requires all seven markings of section 409.110 to be located on the outside of the industrial control panel. The two stated goals mentioned in the substantiation of the public input were to require critical information to be located on the outside of the panel and to facilitate inspection of the panel without having to open the enclosure. The following markings do not meet these criteria and should not be required to be on the outside of a control panel:*

   (a) The marking in 409.110(1) for the control panel manufacturers name is not critical information necessary for inspections of the panel. The manufacturer name is not part of the required nameplate marking in section 670.3(A) for industrial machinery.

   (b) The second sentence of 409.110(3) includes a statement to identify the location of

all disconnecting means and currently indicates the information is documented and available. This information is not known by the panel manufacturer, is unique to the installation site and can only be applied after the panel has been installed. The First Revision would cause confusion of whether this information needs to be on the outside of the panel or if the current wording, "…documented and available", is sufficient;

(c) The marking in 409.110(5) refers to panels that are suitable as service equipment. For panels that are suitable as service equipment but not actually installed at the service entrance, the marking is not necessary on the outside of the enclosure. Section 409.110(5) does not include all the markings necessary for panels that are installed as service equipment. The requirements and markings for an industrial control panel installed as service equipment are covered in Article 230, Parts V, VI and VII, and are not addressed in Article 409. Service equipment markings are not part of the required nameplate marking in section 670.3(A) for industrial machinery; and

(d) Placing the wiring diagram marking in 409.110(6) on the outside of a control panel is not practical due to its size and would make inspections of the wiring connections within the panel more difficult. Having the wiring diagram inside the enclosure door or in a print pocket protects the marking from external effects on its legibility and makes the diagram readily available when inspections of the actual wiring connections are being performed. A diagram number does not provide any critical information for inspection purposes and would still require the document to be accessed within the panel enclosure or at another storage location.

The proposed changes to the First Revision text clarifies that only the markings in 409.110(2), (3), (4) and (7) need to be located on the outside of the industrial control panel and the remaining markings in 409.110(1), (5), and (6) can be located either on the inside or outside of the industrial control panel

Committee Statement:

The FR was modified to include markings that should be identified on the outside of the industrial control panel while allowing some items to be identified on the inside. Identification of certain markings on the outside of the panel can increase safety of persons working on industrial control panels.

Response to PC-1488: It is important to keep the information in 409.110(2) and (3) on the outside of the enclosure for all industrial control panels.

Second Revision No. 7742-NFPA 70-2021 [Section No. 409.110]

409.110 Marking.

An industrial control panel shall ~~be marked with a permanent nameplate~~ ***have permanent markings that are visible after installation. The markings in 409.110(2) and (3) shall be attached to the outside of the enclosure*** *~~that is of sufficient durability to withstand the environment involved, that is not handwritten, and that is visible after installation. The nameplate shall include the following information.~~*

Note: The following is noted by section number but not detailed in the Second Revision Report:

409.110(2) *Supply Voltage, number of phases, frequency, and full-load current for each incoming supply circuit*

409.110(3) *Industrial control panels supplied by more than one electrical source where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel shall be marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.*

The markings in 409.110(1), (4), (5), (6), and (7) shall be attached to either the inside or outside of the enclosure. The following markings shall be included*:*

(1) Manufacturer's name, trademark, or other descriptive marking by which the organization responsible for the product can be identified.

(2) Supply voltage, number of phases, frequency, and full-load current for each incoming supply circuit.

(3) Industrial control panels supplied by more than one electrical source where more than one disconnecting means is required to disconnect all circuits 50-volts or more within the control panel shall be marked to indicate that more than one disconnecting means is required to de-energize the equipment. The location of the means necessary to disconnect all circuits 50-volts or more shall be documented and available.

(4) Short-circuit current rating of the industrial control pane; based on one of the following:

a. Short-circuit current rating of a listed and labeled assembly

b. Short-circuit current rating established utilizing an approved method

Informational Note: See ANSI/UL 508A, Standard for Industrial Control Panels, Supplement SB, for an example of an approved method.

Exception to (4): Short-circuit current rating markings are not required for industrial control panels containing only control circuit components.

(5) If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.

(6) Electrical wiring diagram or the identification number of a separate electrical wiring diagram or a designation referenced in a separate wiring diagram.

(7) An enclosure type number marked on the industrial control panel enclosure.

Committee Statement:

The FR was modified to include markings that should be identified on the outside of the industrial control panel while allowing some items to be identified on the inside. Identification of certain markings on the outside of the

panel can increase safety of persons working on industrial control panels.

Response to PC-1488: It is important to keep the information in 409.110(2) and (3) on the outside of the enclosure for all industrial control panels.

Response Message:

Public Comment No. 1898-NFPA 70-2021 [Section No. 409.110]

Public Comment No. 1566-NFPA 70-2021 [Section No. 409.110]

Public Comment No. 936-NFPA 70-2021 [Section No. 409.110]

Public Comment No. 1488-NFPA 70-2021 [Section No. 409.110]

e) ***Public Comment No. 1094-NFPA 70-2021 [Section No. 430.208]***

Submitter: NEC Correlating Committee

Committee Action: Rejected but See Related Second Revision

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 an ampere rating of not less than ~~115~~ **100** percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have an ampere rating not less than ~~115 percent~~ **100 percent** of the rated input current of the power conversion equipment.*

Statement of the Problem:

Medium voltage disconnecting means for motor controllers and adjustable speed drives are already rated at 100%. It is not necessary to rate these to 115% of the full-load current rating of the motor.

Committee Statement:

Medium voltage disconnecting means for motor controllers and adjustable speed drives are already rated at 100%. It is not necessary to rate these to 115% of the full-load current rating of the motor.

f) ***Public Comment No. 1575-NFPA 70-2021 [Section No. 430.208]***

Submitter: Megan Hayes, NEMA

Committee Action: Rejected but See Related Second Revision

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 an ampere rating of not less than 115 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have an ampere rating not less than 115 percent of the rated input current of the power conversion equipment.

Statement of the Problem:

The following CC Note No. 30 appeared in the First Draft Report on First Revision No. 8047. The Correlating Committee directs the Panel to review FR 8047 and clarify the 115 percent rule for equipment rated over 1000 volts nominal and correlate with other sections of the code, specifically 245.21 (A)(4). The Correlating Committee also directs the Panel to review the text regarding the use of the term "ampere", as "ampere" is a unit of current.

Committee Statement:

The cc comments on ampere vs current ratings are addressed. The change of FLC sizing percentage is not changed based on technical review.

g) ***Public Comment No. 1886-NFPA 70-2021 [Section No. 430.208]***

Submitter: Frederic Hartwell, Hartwell Electrical Services, Inc.

Committee Action: Rejected

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 an ampere rating of not less than 115 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have an ampere rating not less than 115 percent of the rated input current of the power conversion equipment.

Statement of the Problem:

This comment is in response to the Correlating Committee Note 30. The 115% rule is indeed correlated with other parts of the Code, such as 430.110(A). The rules presented in the FR are not inconsistent with 490.21(A)(4), to the extent they would apply. The word "ampere" correctly correlates with the relevant equipment ratings; it is not being used where another word, such as ampacity, should be used.

Committee Statement:

The requested action would be in conflict with actions taken on PC-1094 and 1575, see SR-7569.

Second Revision No. 7569-NFPA 70-2021 [Section No. 430.208]

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 ~~an ampere~~ **a current** rating of not less than 115 percent of the full-load current rating of the motor. For adjustable-speed drive systems, the disconnecting means shall have ~~an ampere~~ **a current** rating not less than 115 percent of the rated input current of the power conversion equipment.*

Committee Statement:

The cc comments on ampere vs current ratings are addressed. The change of FLC sizing percentage is not changed based on technical review.

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Steve Townsend

Motion Passed Unanimously

4) JTCC Direction to IEEE-ER

JTCC Representative is directed to support all Second Revisions

CMP-12, 2023 NEC Second Revision Report

Articles 610, 620, 625, 626, 630, 640, 645, 647, 650, 660, 665, 668, 669, 670, 685 and Annex D, Examples D9 and D10

(*Andrew Hernandez*, Principal, - Alternate Vacant)

1) Noteworthy Panel Actions

a) *SR 7578, Article 620, Removed the definition of Motor*

b) SR 7739, Article 625, Removed definition of Cord Connector as applied to Electrified Truck parking spaces.

c) SR 7740, Article 626, *Removed definition of Parking Space Disconnecting Means*

d) SR 7748, Article 625, *Removed definition of Energy Management System and the requirements of Article 750*

e) SR 7749, Article 625, *Removed definition of Power Supply Cord (as applied to EVSE)*

f) SR 7760, Article 640, *Removed the definitions of Cable, Abandoned Audio Distribution*

g) SR 7584, Article 725, Section 610.13(D) removed

- ***Affirmative Comment:*** *All Deletions of the definitions removed for redundancy as found in other parts of the code*

h) SR 7744, Article 625*, Revised Definition for Electric Vehicle Supply Equipment (EVSE)*

i) SR 7753, Article 625, *Revised definition of Wireless Power Transfer Equipment (WPTE)*

- ***Affirmative Comment:*** *All revised to remove mandatory language*

j) SR 7511, Article 620.21 Wiring Methods, *Section references realigned. Revised definition of Wireless Power Transfer Equipment (WPTE)*

- ***Affirmative Comment:*** *Section references aligned with actions taken by CMP-3 to move requirements from Article 725 to new Article 722.*

k) SR 7558, Article 620.51(D)(2), *Revised to have Available Fault Current Marking to be marked at the disconnecting means not at the elevator control panel*

- ***Affirmative Comment:*** *Change needed to clarify where the field marking should be located*

l) SR 7725 & SR 7727, Article 625.44(A), *Portable and Fastened-in-Place Equipment section revised*

- ***Affirmative Comment:*** *Revised to allow 14-60R receptacles*

m) SR 7589, Article 630.13 Disconnecting Means, Reference to 110.22 removed for redundancy.

- ***Affirmative Comment:*** *Committee Statement, "…The committee would like to clarify marking of all disconnecting means options is required and necessary for the safe use of electric welders including cord and plug connected equipment."*

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Bill McCoy

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-13, 2023 NEC Second Revision Report

Articles 445, 455, 480, 695, 700, 701, 702, 706, 708, 712, 750 and Annex F and G

(William Cantor, Principal, - Alternate Vacant)

1) Noteworthy Panel Actions

a) *SR 8104*

This article applies to all installations of stationary standby batteries ~~composed of lead-acid or nickel-cadmium cells~~ ***having a capacity greater than 3.6 MJ (1 kWh)*** *.*

Informational Note No. 1: See Article 706 for installations that do not meet the definition of stationary standby batteries ~~or are composed of cells other than lead-acid or nickel-cadmium~~.

b) *SR 8116*

Informational Note No. 1: See Article 480 for installations that meet the definition of stationary standby batteries ~~and are composed of lead-acid or nickel-cadmium cells. For all other chemistries and for lead-acid and nickel-cadmium stored energy systems that do not fall under the definition of stationary standby batteries, this article applies .~~

2) Statements Opposing Second Revisions

a) Second Revision No. 8104-NFPA 70-2020 [Section No. 480.1]

IEEE statement opposing the Second Revision: SR8104

This change opens the door for technologies other than lead-acid and Nickel-cadmium to be installed with only component level listings (e.g. UL 1973). The

consensus on the NFPA 855 committee and the fire codes is that all batteries are considered energy systems and should be listed as a system (e.g. UL 9540) and in many cases should also be subjected to full-scale fire testing (e.g. UL 9540A). NFPA 855 does have exceptions to these listings for lead-acid and nickel-cadmium batteries in stationary standby applications which is consistent with the first revision wording.

This proposed revision is inconsistent with the other NFPA documents and the fire codes regarding battery safety.

b) Second Revision No. 8116-NFPA 70-2020 [Section No. 706.1]

IEEE statement opposing the Second Revision: SR8116

This change opens the door for technologies other than lead-acid and Nickel-cadmium to be installed with only component level listings (e.g. UL 1973). The consensus on the NFPA 855 committee and the fire codes is that all batteries are considered energy systems and should be listed as a system (e.g. UL 9540) and in many cases should also be subjected to full-scale fire testing (e.g. UL 9540A). NFPA 855 does have exceptions to these listings for lead-acid and nickel-cadmium batteries in stationary standby applications which is consistent with the first revision wording.
This proposed revision is inconsistent with the other NFPA documents and the fire codes regarding battery safety.

3) Motion

Motion to support all Second Revisions except the following with the above IEEE Statement opposing the second revision

c. SR 8104; Article 480.1 Scope
d. SR 8116; Article 706.1 Scope

Second by Steve Townsend

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions with the exception of SR 8104 and SR 8116 with the negative statements provided above

CMP-14, 2023 NEC Second Revision Report

Articles 500, 501, 502, 503, 504, 505, 506, 510, 511, 512, 513, 514, 515, 516

(Will E. McBride, Principal – Alternate Vacant)

1) Noteworthy Panel Actions

a) The term 'Class' is being removed from the 'Zone"

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Bill McCoy

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-15, 2023 NEC Second Revision Report

Articles 517, 518, 520, 522, 525, 530, 540

(Matt Dozier, Principal – Michael Anthony, Alternate)

1) **Noteworthy Panel Actions**

a) *SR's 1822, 561, 929, 1884 are all related to implementing demand factor calculations for aspects of branch circuit calculations for Hospitals. The SR's during the first draft were accepted by a slim margin vote. Following lengthy review of public comments and panel discussion the only element of demand calculations agreed upon was related to convenience outlet (receptacles).*

However, based upon direction from the correlating committee this table and the applied demand factors will be moved to Art. 220; therefore the panel rejected all related SR's and deferred the action to CMP-2 which it was understood will accept the single demand factor table for receptacles.

Comment: *We voted against the panel action, believing panel 15 has better understanding of demand in Hospitals, the committee vote was to support moving demand calculations to Art. 220. Therefore we support the committee action.*

b) *SR 239. Initiated by a panel member, this action was an attempt to renumber the whole of Art. 517. The intent is to provide "room" internal to the various chapters for new and extended sections (eg. Microgrid uses, new diagnostic and treatment equipment applications, etc.)*

There was some confusion and lengthy discussion regarding whether this should be undertaken by the panel or if NFPA staff or Standards Council can undertake this as an "editing" task.

Ultimately the committee voted to reject at this point and reconsider next cycle.

Comment: *We agree this is warranted.*

There has been much advancement if healthcare both the type of facilities offering healthcare services as well as advancement in diagnostic and treatment services. It will make it easier to facilitate additional code work if the Article is renumbered.

2) **Statements Opposing Second Revisions**

None

3) **Motion**

Motion to support all Second Revisions

Second by Michael Anthony

Motion Passed Unanimously

4) **IEEE-IAS/PES JTCC Direction to IEEE-OR**

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-16, 2023 NEC Second Revision Report

Articles 770, 800, 805, 810, 820, 830, and 840

(William J. McCoy, Principal - Alternate Vacant)

1) **Noteworthy Panel Actions**

Code Making Panel-16 (CMP-16) met on October 18, 2021 for the Second Draft meeting associated with the 2023 revision cycle of the National Electrical Code® (NEC®) to review the public comments (PCs) submitted on the First Draft of the NEC®. The following is a breakdown of the disposition of the PCs.

Total Number of PCs Submitted:	54
Panel Second Revision:	3
Accepted:	27
Rejected:	14
Reject But See:	13
Reject But Hold:	0

The reasons for a number of the PCs for which the second revision (SR) was issued are

- Moving redundant text from the existing Articles in Chapter 8 to the new General Article 800,
- Editorial changes to comply with the new Style Manual,
- Moving all definitions in Article 770 and Chapter 8 to Article 100,
- Adding references to the new Article 722.

a) The following are examples of how some of the definitions were changed.

Cable, Abandoned. (Abandoned Cable) (SR 7970-NFPA)

Installed cable that is not terminated at equipment, other than a termination fitting or a connector and is not identified for future use with a tag. (800) (CMP-16)

Informational Note: See 640.6(B), 645.5(G), 722.25, 726.25, 760.25, 770.25 and 800.25 for requirements covering the removal of abandoned cables.

Cable Sheath (SR7962-NFPA)

A single or multiple layers of a protective covering that holds and protects the conductors or optical fibers, or both contained inside.

Point of Entrance (SR 7953-NFPA)

~~**Point of Entrance (Point of Entrance Optical Fiber Cable).**~~

~~The point within a building at which the optical fiber cable emerges from an external wall or from a concrete floor slab. (CMP-16)~~

Because the definition of the point of entrance of an optical fiber cable is redundant; it is included in the definition of point of entrance.

Premises (SR 7955-NFPA)

The land and buildings ~~of a user~~ located on the user's side of the ~~utility-user network~~ point of demarcation between the communications service provider and the service user. (800) (CMP-16)

b) Public Comment 1945 which wanted to change the definition of Communications Circuits to state that it always included a Service Provider was rejected.

c) Public Comment 2187 which wanted to add a definition for Communications Service Point was rejected.

d) Public Comment 1999 which wanted to introduce the use of Communications Service Point was rejected.

e) Public Comment 706 was sent to CMP-16 by the Correlating Committee requesting that the relocation of installation requirements for optical fiber cable to Article 722 be reconsidered. Since this Public Comment belongs to CMP-3, CMP-16 was advised that they could not vote on this one, but the chairperson should include in his report to the Correlating Committee that CMP-16 rejected their request. However, Public Comment 1895 dealt with the same subject and was rejected.

NOTE: all rejected public comments received a unanimous vote by the CMP-16 members.

f) The following word deletions was made by Public Comment 897 which involved several Sections within Article 770 to provide clarity and ease of use resulting in Second Revisions 7940, 7908, 7913, 7914, and 7915.

Types OFNG, OFCG, OFN, and OFC shall not be ~~permitted to be~~ in vertical runs.

g) Second Revision 7920 (PC 1961) changed Section 800.3(A) to include the reference to Article 722 as shown below since additional installation requirements are now in Article 722.

(A) Output Circuits.

As appropriate for the services provided, the output circuits derived from a network-powered broadband communications system's network interface unit (NIU) or from a premises-powered broadband communications system's network terminal shall comply with the requirements of the following:

1. Installations of Class 2 and Class 3 circuits — Part II of Article 725 and Parts I & II of Article 722
2. Installations of power-limited fire alarm circuits — Part III of Article 760
3. Installations of optical fiber cables — Part V of Article 770
4. Installations of communications circuits — Part IV of Article 805

   Informational Note: The communications circuits covered by Article 805 are commonly referred to as POTS (plain old telephone service) circuits.
5. Installations of premises (within buildings) community antenna television and radio distribution circuits — Part V of Article 820

h) Second Revision 7971 (PC 205) removes listing requirements from Section 805.170 and 840.170(C) and moves these requirements to Section 800.171 as reflected below.

800.171 Communications Equipment.

Communications equipment shall be listed as being suitable for electrical connection to a communications network.

Informational Note No. 1: See ANSI/UL 60950-1-2014, *Standard for Safety of Information Technology Equipment*, ANSI/UL 1863-2012, *Standard for Safety Communications Circuit Accessories*, or ANSI/UL 62368-1-2014 or ANSI/UL 62368-1-2018, *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*.

Informational Note No. 2: See ANSI/ATIS 0600337-2016, *Requirements for Maximum Voltage, Current, and Power Levels Used in Communications Circuits*, for additional information regarding voltages, currents, and power allowed on communications circuits.

i) As a result, Second Revision 7979 (PC 206) made changes to Section 805.170 and are reflected

as follows.

805.170 Protectors.

~~as being suitable for electrical connection to a communications network.~~

~~Informational Note No. 1: See ANSI/UL 60950-1-2014, *Standard for Safety of Information Technology Equipment*, ANSI/UL 1863-2012, *Standard for Safety Communications Circuit Accessories*, or ANSI/UL 62368-1-2014 or ANSI/UL 62368-1-2018, *Audio/Video, Information and Communication Technology Equipment — Part 1: Safety Requirements*.~~

~~Informational Note No. 2: See ANSI/ATIS 0600337-2016, *Requirements for Maximum Voltage, Current, and Power Levels Used in Communications Circuits*, for additional information regarding voltages, currents, and power allowed on communications circuits.~~

Protectors shall be listed in accordance with 805.170(A) or (B).

(A) Primary Protectors.

The primary protector shall be listed and consist of an arrester connected between each line conductor and ground in an appropriate mounting. Primary protector terminals shall be marked to indicate line and ground as applicable.

Informational Note: See ANSI/UL 497-2017, *Standard for Protectors for Paired Conductor Communications Circuits*, to determine applicable requirements for a listed primary protector.

(B) Secondary Protectors.

The secondary protector shall be listed as suitable to provide means to safely limit currents to less than the current-carrying capacity of listed indoor communications wire and cable, listed telephone set line cords, and listed communications terminal equipment having ports for external wire line communications circuits. Any overvoltage protection, arresters, or grounding connection shall be connected on the equipment terminals side of the secondary protector current-limiting means.

Informational Note: See ANSI/UL 497A-2019, *Standard for Secondary Protectors for Communications Circuits*, to determine applicable requirements for a listed secondary protector.

j) Similar changes were made with Second Revision 7984 (PC 207) so that the information could be relocated from Section 840.170(C) to Section 800.171.

k) Second Revision 7946 (PC 211) made the following revisions to Section 840.160.

840.160 Powering Circuits.

~~Communications cables listed in accordance with 805.179~~Listed communications cables, in addition to carrying the communications circuit, shall also be permitted to carry circuits for powering listed communications equipment ~~listed in accordance with 805. 170.~~ The power source shall be listed in accordance with 840.170(G). Installation of the listed 4-pair communications cables for a communications circuit or installation where 4-pair communications cables are substituted for Class 2 and Class 3 cables in accordance with ~~725~~722.~~154~~122(AE) shall comply with 725.144.

Exception: Installing communications cables in compliance with 725.144 shall not be required for listed 4-pair communications cables where the rated current of the power source does not exceed 0.3 amperes in any conductor 24 AWG or larger.

Informational Note No. 1: A typical communications cable for this application is a 4-pair cable sometimes referred to as Category 5e (or higher) LAN cable or balanced twisted pair cable.

These types of cables are often used to provide Ethernet- and Power over Ethernet (PoE)-type services.

Informational Note No. 2: See 725.144 for requirements to manage the temperature rise of bundles of cables that provide power.

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Paul Sullivan

Motion Passed Unanimously

4) IEEE-IAS/PES JTCC Direction to IEEE-OR

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

CMP-17, 2023 NEC Second Revision Report

NO REPRESENTATION

CMP-18, 2023 NEC Second Revision Report

Articles 393, 406, 410, 411, 600, 605

(Kurt Clemente, Principal – Alternate Vacant)

1) Noteworthy Panel Actions

a) *1214 Means of Support NEC 410.36 [weight-supporting ceiling receptacle/weight-supporting attachment fitting, a.k.a SkyPlug]*

No comment required, but note that while CMP-18 continues to permit the new technology of WSCR/WSAF this Public Comment as originally submitted had the potential to require all bedrooms to use this specific product. The substantiation for safety has previously been sufficient to permit the technology in various locations (mostly 3-season rooms, not just bedrooms). No safety substantiation to require the product in bedrooms was provided.

b) *1387 Germicidal Irradiation lighting NEC 410.197(C)*

No comment required, but note CMP-18 saw some COVID-related interest in the expected widespread use of germicidal lighting. This submission requested the re-iteration/emphasis in Article 410 that germicidal lights must be mounted above a certain height to prevent eye injury to building occupants. While this issue is important, CMP-18 felt that 110.3(B) already contained this requirement and was adequate.

2) Statements Opposing Second Revisions

None

3) Motion

Motion to support all Second Revisions

Second by Bill McCoy

Motion Passed Unanimously

4) **IEEE-IAS/PES JTCC Direction to IEEE-OR**

IEEE-IAS/PES JTCC directs the IEEE-OR to support all second revisions

Other NFPA Reports

Each OR will have a maximum of 5 minutes for his status and timeline report - may use PowerPoint if desired or give a verbal report only.

NFPA 70B

(Bill Cantor, Principal –Alternate Vacant)

NFPA 70B has moved to a custom Fall 2022 revision cycle and the next edition will be 2023. The current version is 2019.

NFPA 70B has been mostly rewritten and reorganized as a standard in the first revision. The public comment closing date is February 9th, 2022.

The battery maintenance has mostly been consolidated to Chapter 32 (Energy Storage Systems) and Chapter 36 (Stationary Standby Batteries) consistent with the NFPA 70 organizational split (articles 480 and 706).

NFPA 70E

(Daleep Mohla, Principal – Paul Dobrowsky, Alternate)

Second draft Comment closing date May 31, 2022

NFPA 79

(Daleep Mohla, Principal – Alternate Vacant)

First Draft Meeting Feb 28 – Mar 2, 2022

Public Input Closing Date Jan 5, 2022

NFPA 855

(Bill Cantor, Principal – Alternate Vacant)

There has been some discussion to move the next revision from 2023 to 2024. Currently the listed schedule is for a 2023 version. The second draft meetings were concluded in November and the second draft report is reported to be posted on January 25th, 2022.

No dramatic changes have been made from the first revision although I was not able to attend most of the meetings due to a conflict with a major stationary battery conference being held as the same week as the second draft meetings. I have no alternate.

We have been able to make strides for the committee to recognize that stationary standby batteries composed of lead-acid or nickel-cadmium are typically treated as a component and have dramatically different safety risks than other technologies.

New business

Daleep Mohla
Chris Searles

1. A reminder for ***all*** IEEE-IAS/PES JTCC ORs to share these meeting minutes with their other interested committees.

2. Vacant OR positions
   a. NFPA 70
      - CMP2 Alternate
      - CMP3 Alternate
      - CMP4 Alternate
      - CMP5 Alternate
      - CMP6 Alternate
      - **CMP7 Principal**
      - CMP7 Alternate
      - CMP9 Alternate
      - CMP12 Alternate
      - CMP13 Alternate
      - CMP14 Alternate
      - CMP16 Alternate
      - **CMP17 Principal**
      - CMP17 Alternate
      - CMP18 Alternate
   b. **NFPA 1 Principal** and Alternate
   c. NFPA 70B Alternate
   d. **NFPA 73 Principal** and Alternate
   e. NFPA 79 Alternate
   f. **NFPA 99 Principal** and Alternate
   g. NFPA 855 Alternate

3. Request for members to push efforts to drive IEEE 3000 series referenced into the NEC. All IEEE standards, actually.

Adjourn

Moved by Steve Townsend, Second by Paul Sullivan ***1:32 pm Eastern***